CARBONATION OF FLUE GAS DESULFURIZATION GYPSUM FOR CO_2 SEQUESTRATION

by

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ABSTRACT

The IPCC asserts that to prevent a 2°C global temperature increase by the year 2050, CO_2 must be removed from the atmosphere by sequestration. The goal of this study was to use FGD gypsum for CO_2 mineralization and experimentally explore to find the optimal conditions for the highest conversation rates at ambient temperature while eliminating ammonia usage. While maintaining an alkaline solution using NaOH, a stirred reactor was utilized to study the effects of P_{CO_2} (0.69, 2.07, 4.14, 6.89, and 17.24 bar), solution pH (12, 13, 13.5 and 14), solid-to-solution ratio (1:100, 1:80, 1:40, 1:100), and reaction time (10, 15, 30, and 120+ min) variation on the rate of conversion. The $CaCO_3$ produced was calculated by Rietveld refinement of XRD patterns to determine the impact of each experimental variable.

Experimental results showed solution pH was a primary control on mineralization, with nearly 100% conversion of FGD gypsum to $CaCO_3$ occurring at initial pH = 13.5 and 14, for $P_{CO_2} > 2$ bar and S:L = 1:100. At initial pH of 12, no gypsum conversion occurred. Reaction time also affected the amount of gypsum conversion to $CaCO_3$. At initial pH = 13, S:L = 1:100 and $P_{CO_2} = 2.07$ bar, 15 min was the optimum reaction time, achieving 75% conversion. However, with the same conditions at 360 min, a 61% conversion occurred, due to final pH's below 7. Increasing S:L ratio resulted in increased gypsum-to-carbonate conversion.

The optimal conditions for conversion of gypsum into calcite occurred at short reaction times of 15 min, low pressures at around P_{CO_2} = 2.07 bar, and low solution ratios of S:L = 1:100, achieving 75% conversion. In contract, a reaction time of 360 min produced a result of only 61% conversion at the same P_{CO_2} and S:L ratio, due to the pH dropping below 7.

The results of this study demonstrate that FGD gypsum is a viable feedstock for CO_2 mineralization, potentially offering a cheap and rapid method for carbon sequestration.

ACKNOWLEDGMENTS

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INTRODUCTION

In 2014, carbon dioxide (CO_2) production worldwide reached an unprecedented 9.765 gigatons (Gt) per year (IPCC, 2014). Anthropogenic sources, such as the consumption of fossil fuels, have caused atmospheric CO_2 levels to rise from a pre-industrial level of 280 ppm (IPCC, 2014) to over 412 ppm (Tans and Keeling, 2019). Increasing CO_2 emissions have led to higher average global temperatures and global temperatures are predicted to increase by 1-4°C by 2100 (IPCC, 2014). Stopping the use of fossil fuels is simply not practical and by itself would be insufficient to prevent such a catastrophic increase in temperature. CO_2 must therefore be removed from the atmosphere and stored in a process called carbon sequestration (IPCC, 2014). Potential methods of carbon sequestration include geologic storage, ocean storage, and CO_2 mineralization.

Geologic storage seeks to capture and store the CO_2 in rock formations deep underground at major stationary emission sources such fossil fuel power plants and industrial plants. Although this CO_2 mitigation method was first proposed in the 1970s (Marchetti, 1977), it was not until the 1990s that geologic storage started to gain traction as a potential method for carbon sequestration (IPCC, 2006). As with all types of sequestration, the CO_2 gas must first go through processing. In the case of geologic storage, this begins with compression of the CO_2 gas to above 78.2 bar and raising the temperature above 31°C to create a supercritical fluid. It can then be pumped into various geologic settings, such as depleted or active oil reservoirs, coals seams or saline

formations. The introduction of supercritical CO_2 ($scCO_2$) into oil and gas fields for enhanced oil recovery (EOR) has been occurring for many years and is well established (Wilson *et al.*, 2003). The total capacity of geologic storage is massive with lower estimates at around 2,000 Gt CO_2 (IPCC 2006). However, despite the potential beneficial use of CO_2 for EOR and the high capacity of geologic storage, this type of carbon sequestration presents many issues.

The problems begin with locating appropriate storage sites near CO_2 point sources. To find these sites requires detailed assessments of the of the stratigraphy and structure of subsurface formations to determine their quality and capacity. Carbon capture, transportation, injection well and potential environmental costs must also be considered in site assessment. If CO_2 sources are located far from storage sites, the cost of transportation alone could make geologic storage non-viable. Another issue is the long-term stability of geologic storage. This type of storage requires long-term monitoring to ensure the injection and storage of $scCO_2$ is safe and secure. The purpose of monitoring is to detect any movement of the CO_2 that might impact storage security. This long-term monitoring comes at additional costs. If movement and release of the stored CO_2 occurs, the local environmental impacts could be great. While geologic storage shows promise, more stable and easily accessible storage would be preferable for some sites.

Another potential carbon sequestration method is ocean storage. CO2 is captured in the same manner as for geologic storage, but is then transported and injected at great depths into the ocean. The ocean seems like a logical choice for carbon sequestration since it is already a massive sink for CO_2. However, as more CO_2 is dissolved, ocean water pH levels will begin to decrease. As it stands, ocean pH levels have already decreased by 0.1 over the past 200 years due to anthropogenic increases of atmospheric CO_2 concentrations (IPCC, 2006). Changes in pH have been shown to be harmful to marine life, including, but not limited to, reduced growth,

mobility, and reproduction. The injection of a few Gt CO_2 into the ocean will produce a measurable decrease in the pH surrounding the injection site. While injection of CO_2 into the deep ocean would sequester the CO_2 for hundreds, maybe thousands, of years, the gradual change of ocean chemistry would be detrimental to local marine life.

Mineralization involves the reaction of gaseous CO_2 with a metal-oxide mineral, such as olivine, serpentine or gypsum (IPCC, 2006). Because these minerals are naturally occurring there is a massive potential for storage. Not only that, the conversion of these feedstock minerals to a carbonate solid phase would provide a long-term stable and safe storage method that will last for thousands or millions of years. However, previous studies of CO_2 mineralization have shown serpentine and olivine feedstocks to be prohibitive in terms of cost and time (Herzog, 2018). The cost of storing CO_2 in silicates costs between 50-100 USD/ton CO_2 because (1) the silicate mineral must be mined and then crushed, and (2) high temperatures and pressures are required to overcome the slow reaction kinetics caused by the low solubilities of silicates and mineralize the CO_2 (IPCC, 2006). In contrast to silicate mineral feedstocks, recent work has shown carbon sequestration using flue gas desulfurization (FGD) gypsum ($CaSO_4 \cdot 2H_2O$) to be quick, inexpensive, and permanent.

During the burning of coal at power plants, several toxic and hazardous gases such as sulfur dioxide (SO_2) are produced (Srivastava and Jozewicz, 2011). SO_2 has been shown to have detrimental effects on the environment and human health. It was the main source of acid rain until the 1990s and is associated with increased cardiovascular problems. One way to remove SO_2 from exhaust gases at coal power plants is to use wet limestone scrubbers. The process of removal works by releasing an alkaline aqueous slurry, such as limestone ($CaCO_3$), into a spray tower. The flue gases then dissolve into the slurry and react with the $CaCO_3$ to form FGD

gypsum. Over half of the FGD gypsum produced in the United States is just a waste product that is stored in surface piles (Butalia *et al.*, 2017). Because of its availability at large point sources of CO_2 and its current underutilization for other beneficial purposes, FGD gypsum is an attractive feedstock for CO_2 mineralization.

Wang *et al.* (2009) performed the first study testing the viability of using FGD gypsum as a feedstock for CO_2 mineralization. Wang *et al.* showed that conversion of gypsum into calcium carbonate ($CaCO_3$) is a two-step process, shown in equations (1) and (2), but conversion rates were low and sluggish.

$$CaSO_4 \cdot 2H_2O + 2NaOH \Leftrightarrow Ca(OH)_2 + Na_2SO_4 + 2H_2 \quad (1)$$

$$Ca(OH)_2 + CO_2 \Leftrightarrow CaCO_3 + H_2O \quad (2)$$

Later studies used ammonia (NH_3) and ammonium hydroxide (NH_4OH) to increase gypsum conversion rates to as high as 99.99% in as little as 30 min in bench-scale experiments (Song *et al.*, 2012; Lee *et al.*, 2012; Bao *et al.*, 2017). Although the gypsum to $CaCO_3$ conversion rates were high for these studies, the Haber-Bosch process used for manufacturing NH_3 (and NH_4OH) produces between 1.694 to 3.273 tons of CO_2 (IPCC 2006) per ton of NH_3, depending on the feedstock used.

NH_3 is produced in two main types of methods: steam reforming of light hydrocarbons and partial oxidation of gasification of heavy hydrocarbons (IPCC, 2006). Steam reforming of methane (CH_4) produces around 85% of all NH_3. A simple description of the Haber-Bosch process is as follows:

1) The feedstock is purified
2) Reforming of primary steam methane
3) Secondary reforming, or auto thermal reforming, with the addition of air

4) Conversion of CO and H_2O into CO_2 and H_2

5) Removal of CO_2

6) Methanation (removal of residual CO and CO_2)

7) NH_3 synthesis

Thus, in the case of Lee *et al*. (2012) which used 110% excess NH_3 in reactions converting gypsum to $CaCO_3$, the total output of CO_2 during the NH_3 production exceeded what was sequestered via the mineralization reactions. Other studies (e.g., Adzarpour *et al*., 2018) used elevated temperatures (up to 400°C) to increase reaction rates. This additional energy used to increase reaction temperatures also creates CO_2 emissions, if the energy is produced by coal or gas combustion.

This goal of this study was to react FGD gypsum in alkaline solutions, varying the solid:liquid ratio, pH levels, CO_2 pressures, and reaction time (Table 1) to find the optimum conditions for CO_2 mineralization. These experiments were carried out at ambient temperature in a stirred reactor to maintain elevated CO_2 pressures, rather than using elevated temperatures or NH_3 to increase reaction and conversion rates. The solid phase products were subsequently analyzed by X-ray diffraction (XRD) and scanning electron microscopy (SEM). The aqueous wastewater solutions were analyzed by inductively-coupled plasma emission spectroscopy (ICP-OES). Each experiment was performed in duplicate to test reproducibility and determine data precision. During experiments, the CO_2 regulator only registered in bar, they were then converted and reported here in bar.

Table 1. Experimental conditions

Solid:Liquid ratio (grams)	pH	P_{CO_2} (bar)	Reaction Time (min)
1:100 (0.8gram:79.2 grams)	12	0.69	10
1:80 (1gram:80 grams)	13	2.07	15
1:40 (2grams:80grams)	13.5	4.14	20
1:10 (7.27gram:72.73 grams)	14	6.89	120
		17.24	360

MATERIALS AND METHODS

2.1 Materials

FGD gypsum was provided by Southern Company, from a coal-fired power plant located in the southeastern United States and shipped to the University of Alabama in 5 gal buckets. Laboratory grade sodium hydroxide (NaOH) of 95% purity was purchased from EMD Millipore Corporation and dissolved in double deionized (DDI) water to prepare solutions at target pH values (12, 13, 13.5 and 14) in 1 L batches. Ultra-pure CO_2 (99.99% CO_2) was sourced from, Airgas, in Nashville, TN.

2.2 Experiment Setup

A stirred reactor was required to keep experiments under pressure.(Figure 1). The New Standard 50 mL Microclave™ (model CR0005H05ZH) reactor was manufactured by Autoclave Engineer. It was modified to increase the reaction vessel volume. A new 150 mL stainless steel vessel and longer stirring impeller rod were fabricated at the University of Alabama machine shop. Because of the increased reaction vessel length, a new base had to be made and attached to the bottom of the reactor frame. Between experiments, the reaction vessel and impeller were cleaned with 10 mL 35% HCl and 100 mL DDI water. This removed any excess $CaCO_3$ buildup on the vessel walls and impeller. After acid cleaning, the reaction vessel and impeller were rinsed 10 times with 100 mL DDI water, for 1 minute each time, to remove any residual acid and other contamination. FGD gypsum was homogenized by vigorous shaking of the 5-gal bucket.

Subsamples were removed from the bucket and placed in weighing boats to air dry. The air-dried FGD gypsum samples were not otherwise sieved, ground or oven dried, to more accurately represent the unreacted waste material produced at a power plant by a wet chemical scrubber system.

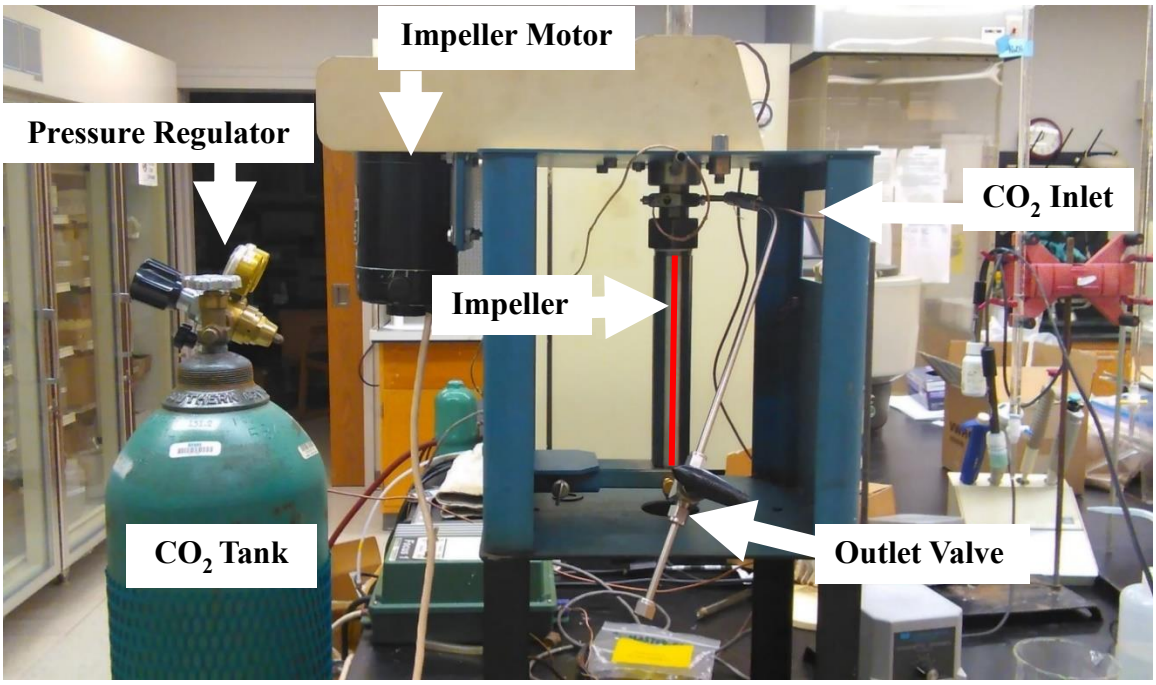

Figure 1. Stirred reactor, center, with attached reaction vessel, labeled with impeller. The CO_2 tank (left) is connected to the reactor via copper tubing through a regulator.

To set up each experiment, a sample of FGD gypsum was weighed out to the nearest ±0.001 g and set aside. The desired mass of the NaOH solution was added into a beaker to an accuracy of ±0.01 g, and quantitatively transferred to the clean and dry reaction vessel, followed by the gypsum sample. The loaded reaction vessel was then attached to the stirred reactor (Figure 2). The reactor was left unsealed while the CO_2 pressure was slowly raised to purge the air from the vessel. The reaction vessel was sealed, and the CO_2 pressure was then raised to the target pressure. After that, the outlet value was closed, and reaction vessel was sealed. The impeller motor was started and left to run for the duration of the experiment. At the end of the reaction

time, the impeller motor was stopped, the gas was turned off, and pressure was slowly released from the system to avoid frothing of the solution.

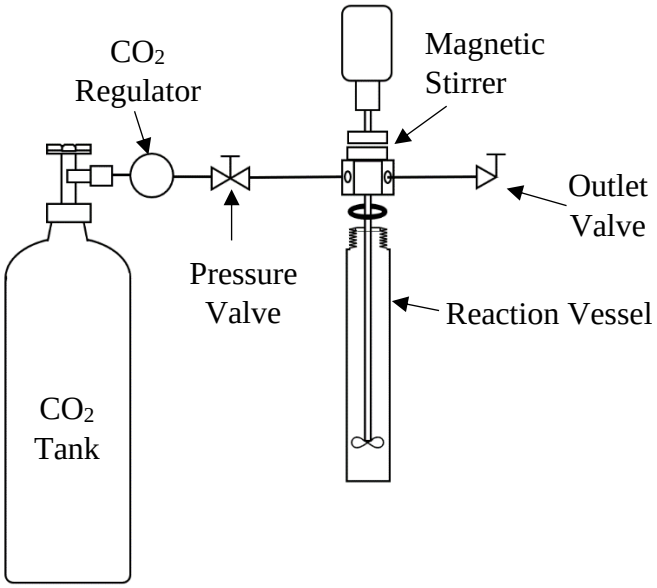

Figure 2. Schematic diagram of stirred reactor showing assembly of components.

2.3 Separation and Preparation of Aqueous and Solid Phases

At the end of each experiment, the stirred reactor was disassembled and the final pH of the reacted aqueous phase was measured by placing a pH electrode directly into the reaction vessel. Next, separation of the aqueous and solid phases began.

For experiments conducted at pH = 12, 13, 13.5 and 14, with 360 min reaction time, a portion of the aqueous phase was decanted from the reaction vessel into a centrifuge tube, while disturbing as little of the solid phase as possible. The aqueous phase was stored refrigerated at 4°C until vacuum filtration through a 0.45-µm cellulose acetate filter. The filtered aqueous phase was then poured into acid cleaned bottles, acidified with Optima™ ultrapure nitric acid (HNO_3)

to bring the pH below 2 to inhibit precipitation of minerals, and refrigerated at 4°C until analysis by ICP-OES.

Using DDI water, the solid phase was washed and scraped out of the reaction vessel and off the impeller into centrifuge tubes. Finally, a centrifuge tube filled with only DDI water was prepared as an aqueous phase blank and the tubes were centrifuged at 7500 RPM for 30 min. After centrifugation, the waste aqueous fraction was decanted off the collected solid phase and discarded. The solids were then washed out of the tubes into cleaned 100 mL sample holders using DDI water and left to air dry.

For the pH = 13 time series experiment, a slightly different method was used to separate the reacted aqueous and solid phases. Because of the large number of samples produced, vacuum filtration would have been too slow. Instead, the aqueous samples were passed through a 0.20 μm cellulose acetate syringe filter immediately after centrifugation, acidified to bring the pH below 2, and refrigerated until ICP-OES analysis.

2.4 Solid Phase Analysis

Before analysis, the solid phase was ground into a fine powder using a Diamonite® pestle. The ground sample was then analyzed by powder XRD using a Bruker D8 Advance X-ray diffractometer scanning from 5° to 70° 2-theta with a 0.0164792° step and a time step of 1 s.

A JEOL 7000 FE Scanning Electron Microscope was used to examine the morphology and composition of the solid phase. Energy dispersive spectroscopy (EDS) was used to determine the semiquantitative elemental compositions of mineral grains.

A Rietveld refinement process was used to calculate mineral percentages in the solid phase samples with the Bruker AXS Topaz software, Version 3.0 (Bruker AXS GBH, 2005). The

software requires structural refinement data for minerals present in the sample and uses a least squares method to vary mineral percentages to obtain a best match for the peak intensities observed in the XRD patterns.

2.5 Aqueous Phase Analysis

Aqueous solutions were analyzed in duplicate by the University of Alabama's Geochemical Analytical Laboratory using a Perkin Elmer Optima Dual View 4300 DV ICP-OES. The ICP-OES analyses returned major, minor and trace element concentrations in mg/L. Duplicate sample analyses were averaged and data standard deviations calculated.

The analytical precision of these concentrations was determined using limit of detection and standard deviation methods. These tables and calculations are compiled in appendix X.

RESULTS

3.1 Analysis of Unreacted Materials

XRD analysis of an unreacted homogenous sample of FGD gypsum shows that the material consists predominantly of $CaSO_4 \cdot 2H_2O$ (Figure 3). There is also a minor amount of unreacted $CaCO_3$ remaining from the desulfurization process, along with a trace amount of quartz. Major gypsum peaks correspond to characteristic d-spacings of 7.55, 4.26 and 3.05 Å. Major calcite peaks occur at d-spacing values of 3.02, 2.48 and 2.28 Å. A small quartz peak is visible at 3.16 Å d-spacing.

Scanning electron photomicrographs of the unreacted FGD gypsum show fine angular-to-rounded particles of gypsum, ranging in size from 10-50 μm (Figure 4). Energy dispersive X-ray spectra show calcium (Ca) and sulfur (S) to be evenly distributed throughout the sample, except for a few grains showing high Ca concentration but no S (Figure 5). These grains are interpreted to be residual calcite grains.

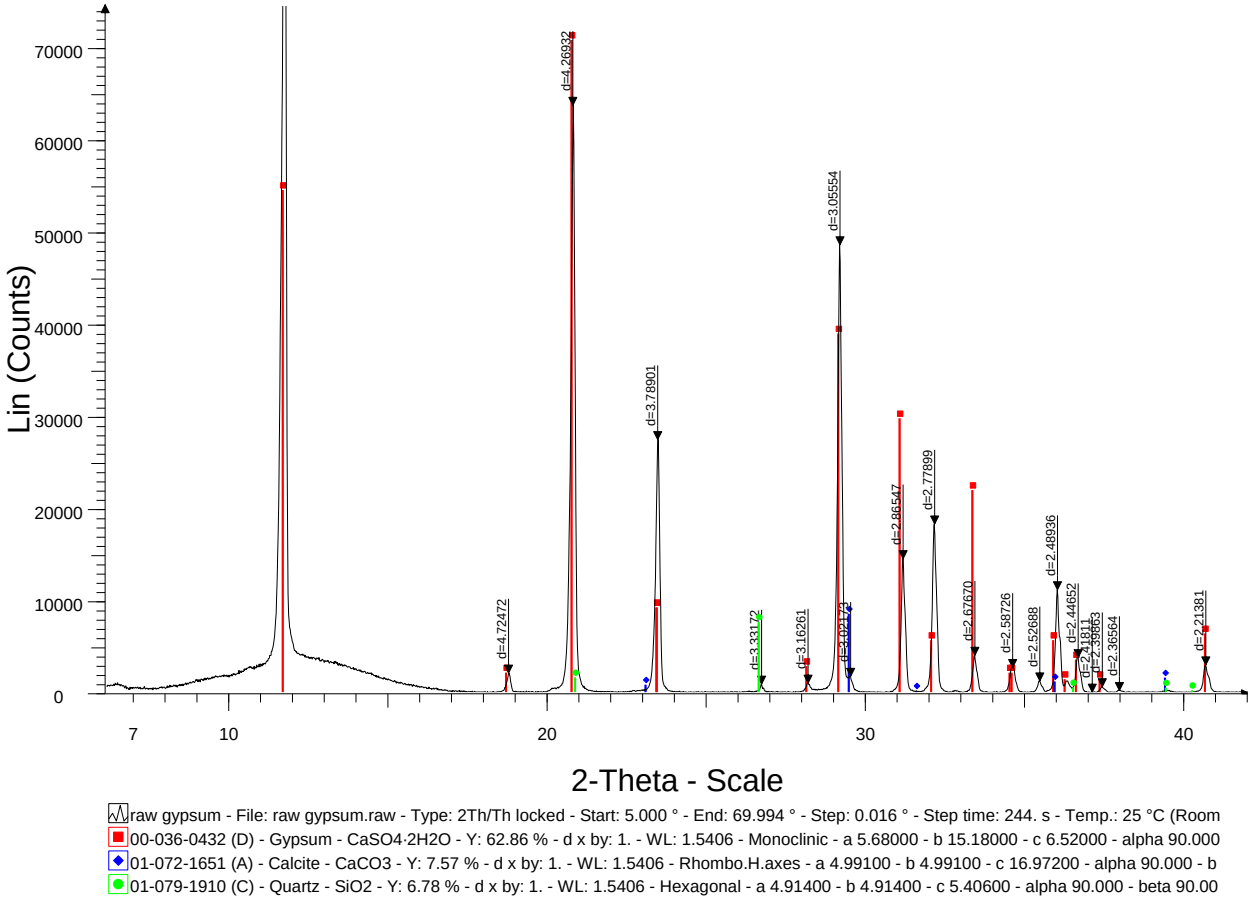

Figure 3. XRD pattern of unreacted FGD gypsum.

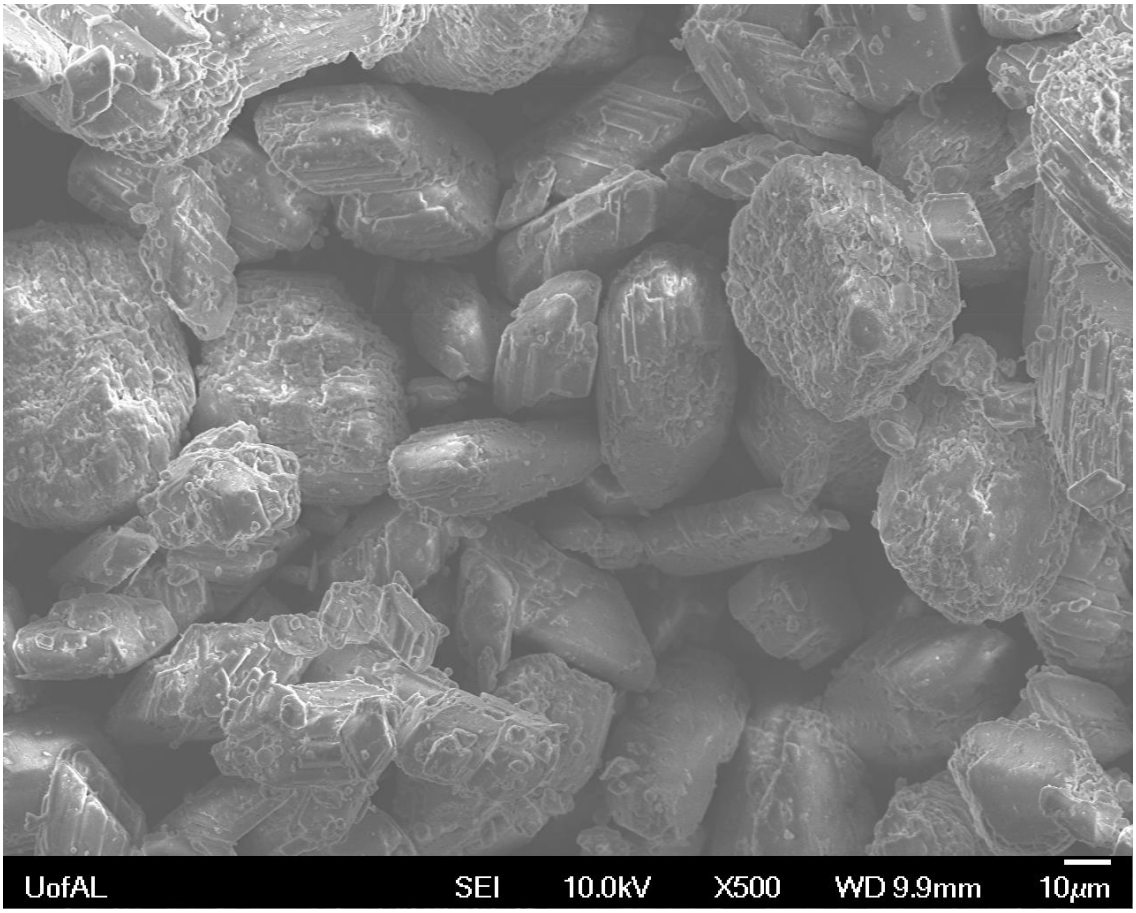

Figure 4. SEM image of unreacted FGD gypsum.

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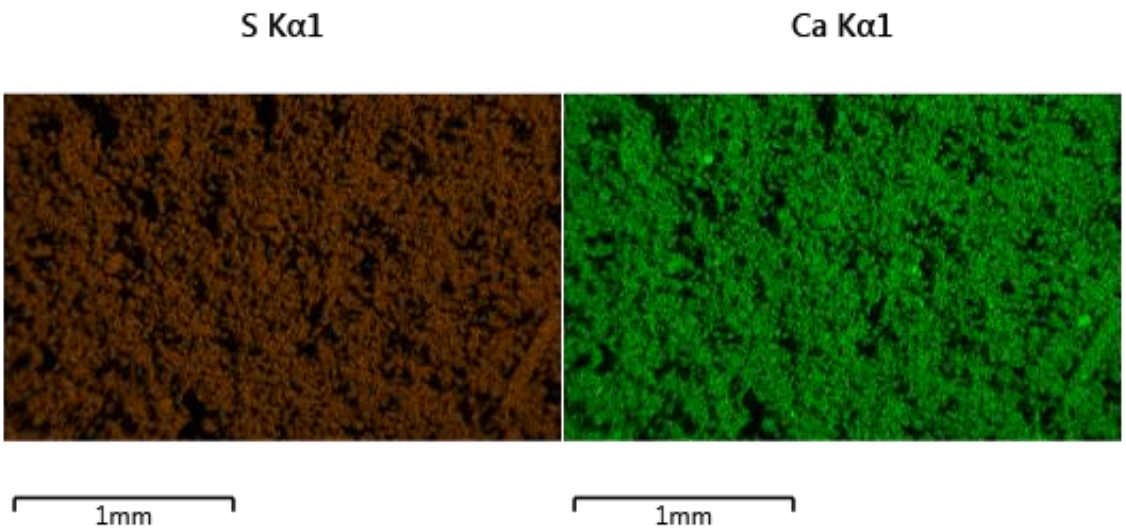

Figure 5. EDS X-ray spectroscopy maps showing the distribution of sulfur (left) and calcium (right) in unreacted FGD gypsum.

Further analysis by Rietveld refinement confirmed the gypsum, calcite and quartz content of unreacted FGD gypsum to be 97.78%, 1.57% and 0.65%, respectively. Therefore, most of the calcium present in the unreacted material is bound in $CaSO_4 \cdot 2H_2O$, while there is a small percentage bound in $CaCO_3$. Using the stoichiometry from Eqns (1) and (2) above, it possible to determine that the maximum possible sequestration capacity of FGD gypsum is 255.607g of CO_2 per kg of FGD gypsum by the following equations (3-9):

$$1 \text{ mol } CaSO_4 = 1 \text{ mol } Ca^{2+} \quad (3)$$

$$1{,}000 \text{ g } CaSO_4 \cdot 2H_2O = X \text{ mol} \times 154.155 \text{ g/mol} \quad (4.1)$$
$$X = 5.808 \text{ mol } CaSO_4 \cdot 2H_2O \quad (4.2)$$

$$5.808 \text{ mol } CaSO_4 \cdot H_2O = 5.808 \text{ mol } Ca^{2+} \quad (5)$$
$$5.808 \text{ mols } Ca^{2+} = 5.808 \text{ mol } CaCO_3 \quad (6)$$

$$5.808 \text{ mol } CaCO_3 \times 100.09 \text{ g/mol} = 581.305 \text{g } CaCO_3 \quad (7)$$

$$5.808 \text{ mol } CaCO_3 = 5.808 \text{ mol } CO_2 \quad (8)$$

$$5.808 \text{ mol } CO_2 = X \text{ g } CO_2 / 44.01 \text{ g/mol } CO_2 \quad (9.1)$$
$$X = 255.607 \text{ g } CO_2 \quad (9.2)$$

However, because the unreacted material is not pure gypsum, the sequestration capacity is therefore 249.933 g of CO_2 per kg FGD gypsum, 97.78% of its theoretical capacity.

A 0.1001 g sample of homogenized FGD gypsum was digested in 13 mL of aqua regia (3 mL HCl + 10 mL NHO_3), and the digestate solution was analyzed by ICP-OES. The bulk chemical composition of the FGD gypsum is shown in Table 2.

Table 2. Chemical composition of FGD gypsum.

	Al	B	Ba	Ca	Co	Cr	Fe	Mg	Mn
mg/kg	5.8254	0.5277	0.1317	1888.1	0.0481	0.0881	5.1581	3.7303	0.0810
	Sb	**Sr**	**Tl**	**Ti**	**V**	**Zn**	**Si**	**K**	**Na**
mg/kg	0.3414	2.1436	0.2878	0.1892	0.1350	0.1186	3.5997	1.1061	1.1226

ICP-OES analysis of a 0.1 m (molal) NaOH solution (Table 3) produced a trace element concentration baseline that was subtracted from each experiment's aqueous solution composition to determine which elements were released by the carbonation of FGD gypsum.

Table 3. Trace elements present in 0.1 molal NaOH solution.

	Ba	Cd	Fe	Sr	Tl	Zn	K
mg/L	0.00883	0.007649	0.009080	0.003969	0.012057	0.013065	0.316205

3.2 Effect of Initial pH on CO_2 Mineralization

Mineralization experiments performed at initial pH values of 12, 13, 13.5, and 14 showed conversion rates from 0% conversion to $CaCO_3$ at pH = 12 to 84-99% conversion at pH = 13.5 and 14 after 360 min of reaction time (Figures 6 and 7) (see Appendix II for complete data).

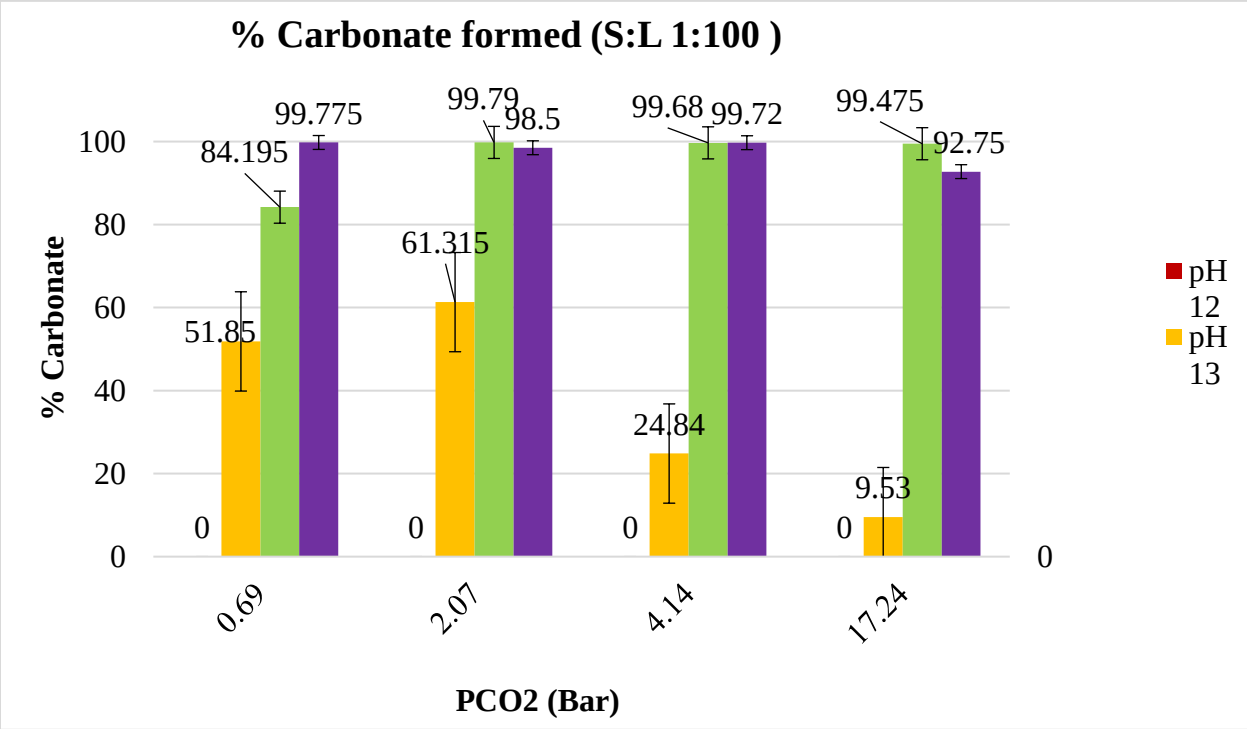

Figure 6. Percent of carbonate formed vs P_{CO_2} at initial pH (S:L = 1:100, reaction time = 360 min). Error bars represent the standard deviation calculated from experimental duplicates.

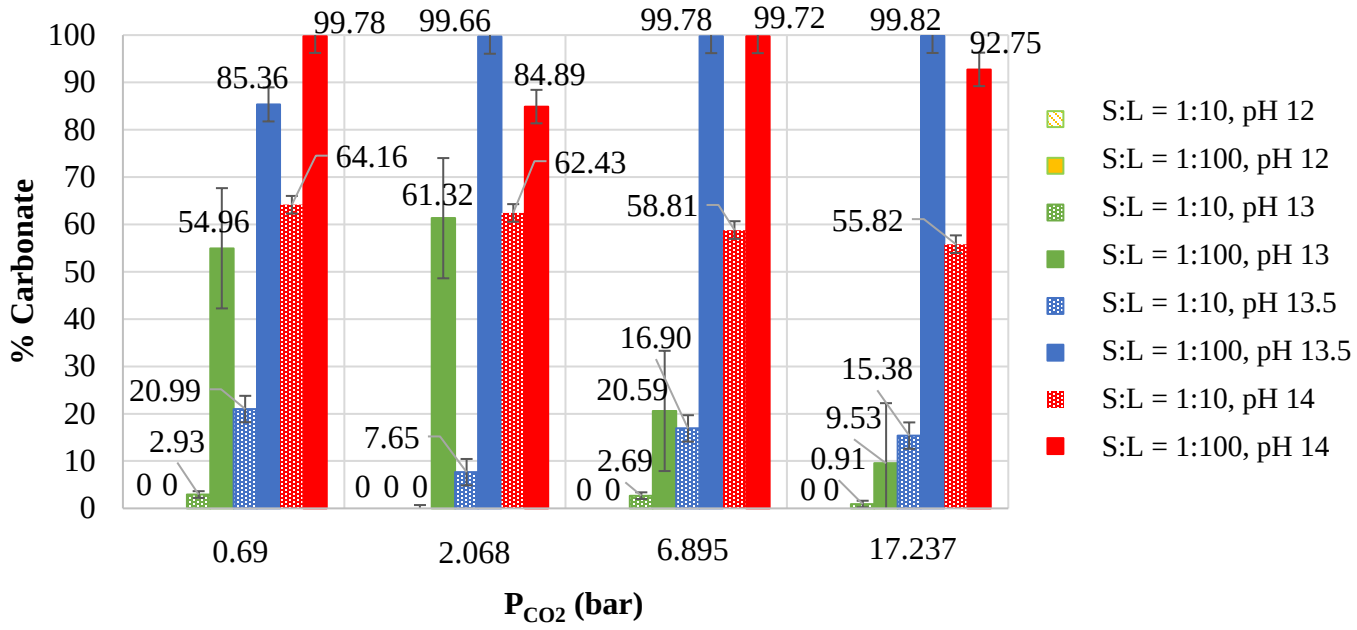

Figure 7. Percent Carbonate formed vs P_{CO_2} at initial pH (S:L = 1:10 and 1:100, reaction time = 360 min). Error bars represent the standard deviation calculated from experimental duplicates.

Mineralization of CO_2 using FGD gypsum predominantly produced calcium carbonate. For example, in experiments conducted at initial pH = 14, P_{CO_2} = 4.14 bar, and S:L = 1:100, the XRD pattern (Figure 8) shows complete conversion of FGD gypsum to calcite. Rietveld refinement of this XRD pattern calculated calcite to constitute 99.72% of the total mass, with trace quartz (0.28%). SEM images confirmed the presence of calcite crystals (Figure 10). However, a few experiments produced calcite along with a rare $CaCO_3$ polymorph, vaterite. The presence of vaterite was confirmed both by XRD (Figure 9) and by SEM. Figure 11 shows the distinctive morphology of vaterite for experiments performed at initial pH = 13.5, P_{CO_2} = 4.14 bar, and S:L = 1:10, where the total carbonate formed was 16.95%, with calcite forming 6.89% of the total carbonate and vaterite making up the remaining 10.06%.

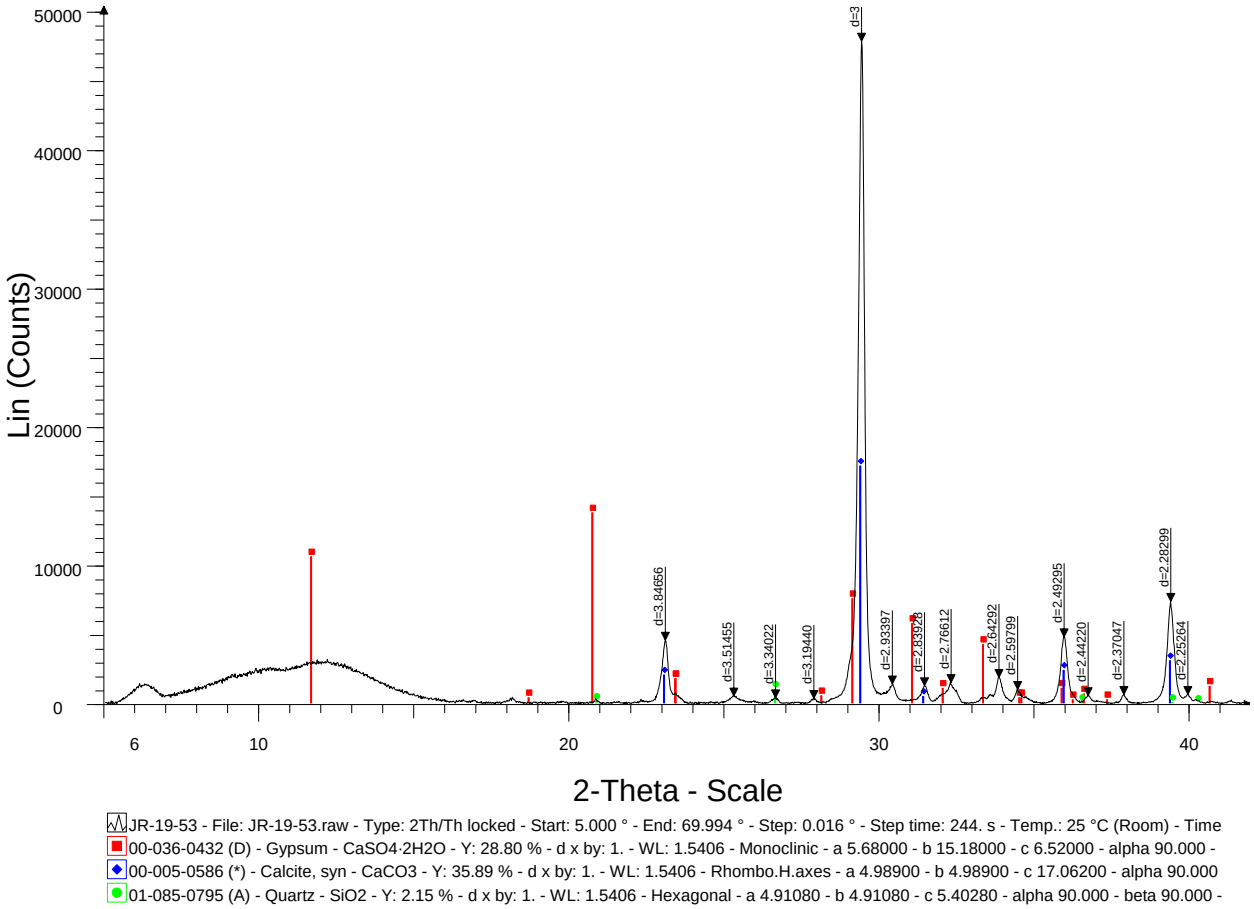

Figure 8. XRD pattern of solid phase produced at pH = 14, S:L ratio = 1:100, P_{CO_2} = 4.14 bar and reaction time = 360 min.

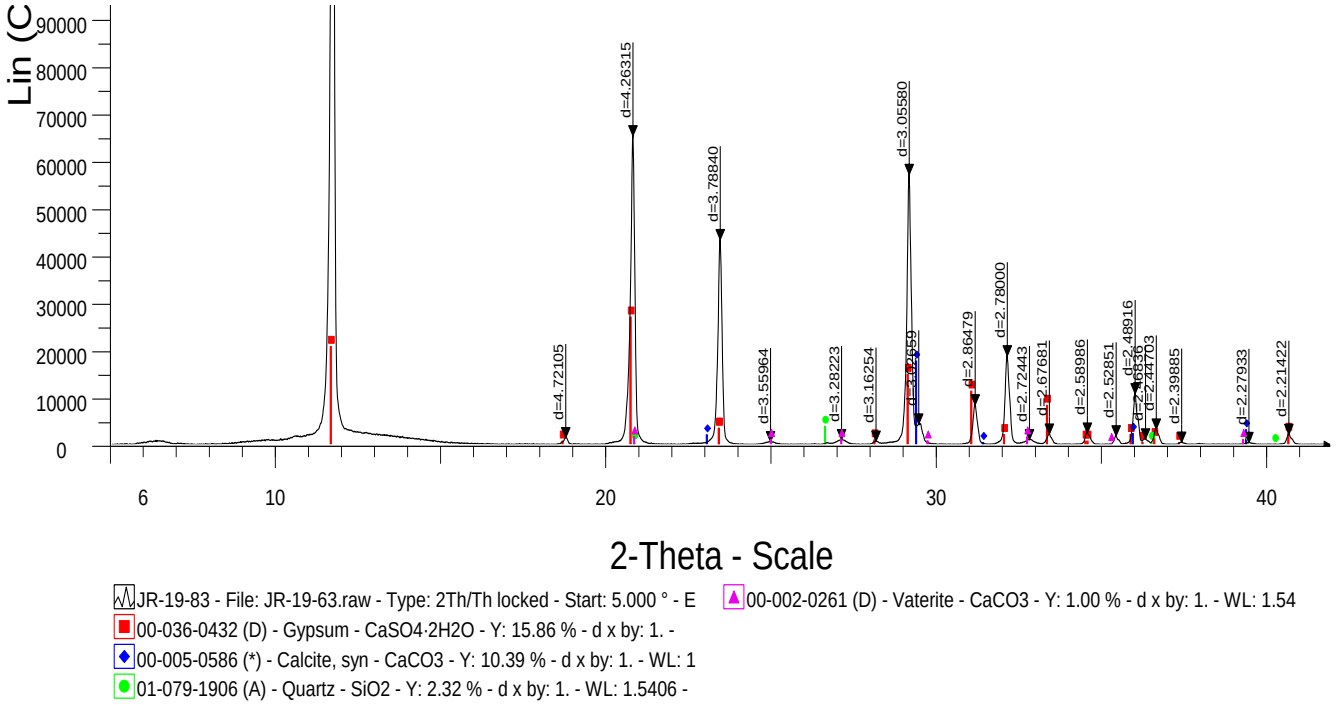

Figure 9. XRD pattern showing calcite and vaterite formed at pH = 13.5, S:L = 1:10, P_{CO_2} = 4.14 bar and reaction time = 360 min.

Figure 10. Calcite crystals formed by carbonation of FGD gypsum at pH = 14, S:L = 1:10, P_{CO_2} = 4.14 bar and reaction time = 360 min.

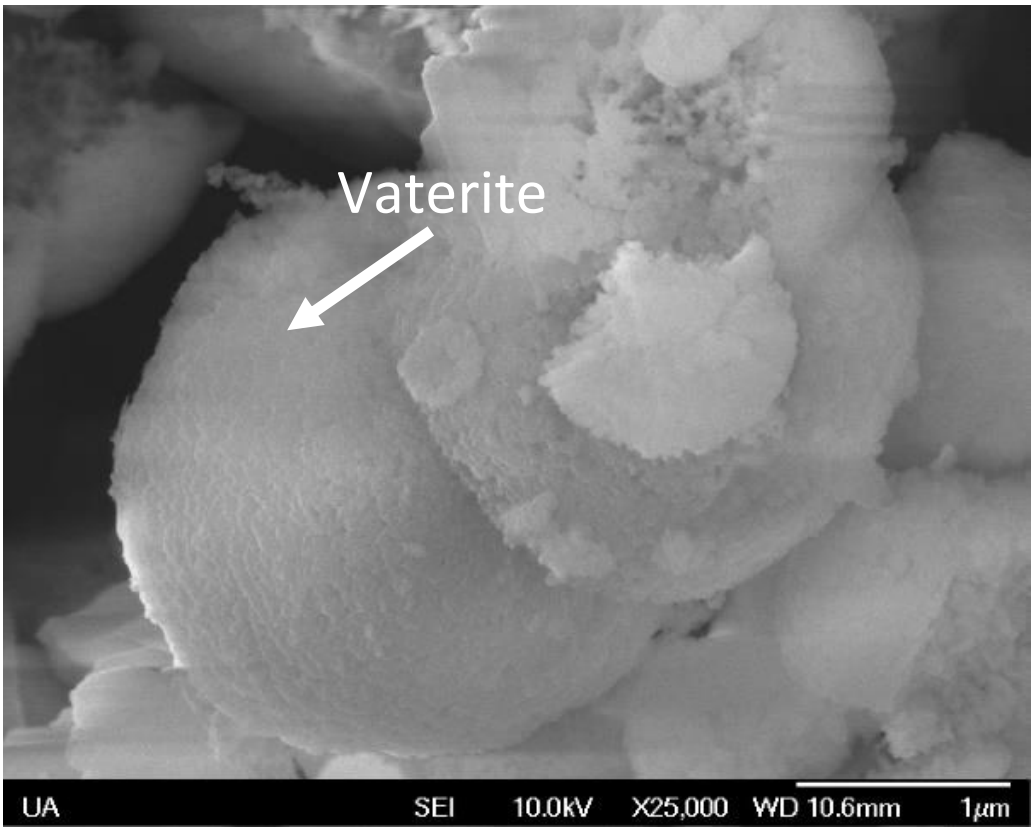

Figure 11. Vaterite formed at pH = 13.5, S:L = 1:10 , P_{CO_2} = 4.14 bar and reaction time = 360 min.

While these experiments demonstrate that it is possible to convert FGD gypsum into $CaCO_3$, the initial pH must be sufficiently high. For experiments with initial pH = 12, no $CaCO_3$ was produced, regardless of the S:L ratio, P_{CO_2} and reaction time used, as shown in Figures 7 and 12. Rietveld analysis confirmed that 0% $CaCO_3$ was formed in all experiments conducted at pH = 12 (see Appendix II, Table II.1 and Table II.2).

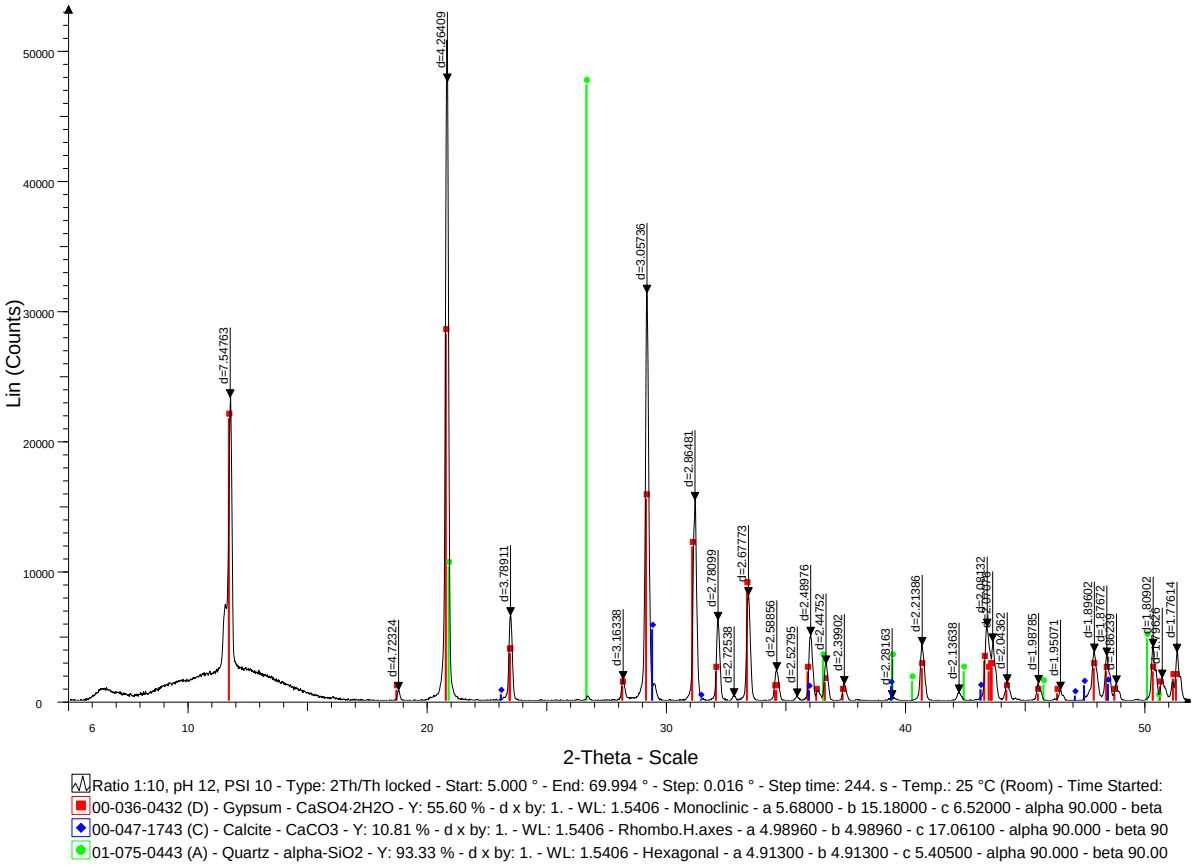

Figure 12. XRD pattern of solid phase produced at pH = 12, P_{CO_2} = 4.14 bar, S:L = 1:10 and reaction time = 360 min.

3.3 Effect of Reaction Time on CO_2 Mineralization and Final pH

Time series experiments of 10, 15, 20, and 360 min reaction time were performed at pH = 13, using P_{CO_2} = 2.07 bar and varying the S:L ratio (1:10, 1:40, 1:80 and 1:100). It was determined that increasing reaction time decreases the final pH of the solution and ultimately decreases the amount of calcite that forms (Figure 14). For S:L = 1:100, a reaction time of 10 min produced 37% $CaCO_3$. As reaction time increased, the amount of $CaCO_3$ produced increased to 74.72% at 15 min; however, after 20 mins of reaction time, $CaCO_3$ production decreased to

62.24%. The $CaCO_3$ content continued to decrease to 61.31% as reaction time increased to 360 min.

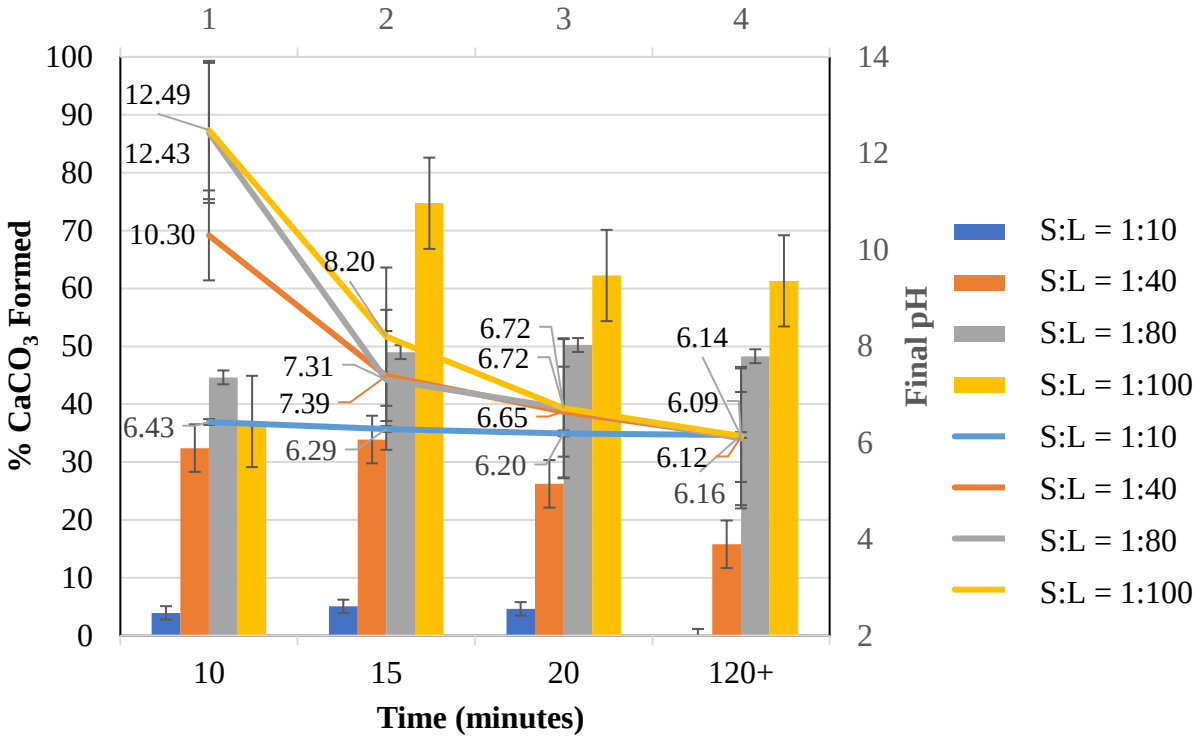

Figure 13. Percent $CaCO_3$ formed in Time Series Experiments at initial pH = 13, P_{CO_2} = 2.07 bar, various S:L ratios, and reaction time = 10 to 120+ mins. Error bars represent the standard deviation calculated from experimental duplicates.

3.4 Effect of Solid-to-Liquid Ratio on CO_2 Mineralization

The most significant factor controlling the final percent carbonate formed in the CO_2 mineralization experiments was the S:L ratio used. In every instance, a lower S:L ratio produced a higher amount of $CaCO_3$. This effect is apparent in both the Time Series Experiments (Figure 13) and the pH variation experiments (Figure 7). Figure 7 shows that for pH > 12, there is always substantially greater CO_2 mineralization at S:L = 1:100 than at S:L = 1:10. For example, at P_{CO_2} = 0.69 bar and pH = 13, the final amount of calcite formed at S:L = 1:100 was 54.96% while

only 2.93% of the solid phase was calcite at S:L = 1:10. During the Time Series Experiments, the effect of S:L ratio was even more pronounced. Experiments performed at P_{CO_2} = 2.07 bar and 15 min reaction time showed this effect dramatically (Figure 13). For experiments using S:L ratios of 1:10, 1:40, 1:80, and 1:100, the final amount of calcite formed was 5.06%, 33.895%, 48.995% and 74.72%, respectively. This same trend can also be seen across the other Time Series Experiments, except for those performed with a reaction time of 10 min (see Figure 13 and Appendix II, Table II.IX – Table II.XI).

3.5 Wastewater Composition

Two beaker experiments were performed reacting FGD gypsum with a solution at initial pH = 12 and S:L = 1:10 and 1:100 to obtain a baseline wastewater composition. The reactants were exposed to ambient air while being mixed with a magnetic stirrer for 360 min. Analysis of the resulting wastewater solutions showed there was little-to-no mobilization of trace elements from the solid phase into solution (Tables 4 and 5).

Table 4. Composition of wastewater produced by reacting FGD gypsum with a solution having initial pH = 12 and S:L = 1:10, exposed to atmospheric CO_2 for 360 min.

	Al	As	B	Ba	Ca	Co	Cr	Fe	Mg
mg/L	<LOD	<LOD	0.898	0.0395	563.50	7.353E-3	1.966E-4	0.647	0.0316
	Mo	**Se**	**Sb**	**Sr**	**Tl**	**V**	**Si**	**K**	**Na**
mg/L	0.0651	0.0624	0.0332	1.609	0.0529	9.29E-3	0.9473	1.5176	227.77

Table 5. Composition of wastewater produced by reacting FGD gypsum with a solution having initial pH = 12 and S:L = 1:100, exposed to atmospheric CO_2 for 360 min.

	Al	As	B	Ba	Ca	Co	Cr	Fe	Mg
mg/L	0.3209	2.898E-3	0.9766	0.0367	533.34	0.0058	4.83 E-4	<LOD	0.0435
	Mo	**Se**	**Sb**	**Sr**	**Tl**	**V**	**Si**	**K**	**Na**
mg/L	0.0336	0.06736	0.0381	1.6450	0.0587	0.0122	1.1932	1.5973	220.73

However, during reactions between the solution and FGD gypsum at elevated CO_2 pressures, elements are ionized from the solid phase into the aqueous phase. Table 6 shows that for FGD gypsum reacted with a solution having initial pH = 12 and S:L = 1:10 at elevated P_{CO_2}, the wastewater has increased levels of most detectable elements (see Appendix VII for full results). Figures 14 and 15 demonstrate that Al, Si, Mn, and Mo concentrations increase with increasing P_{CO_2}. Wastewater Ni concentrations show a similar trend (Table 6). This same pattern continues across most initial pH levels (see Appendices VI, VII, VIII, and IX).

Table 6. Composition of wastewater produced by reacting FGD gypsum with a solution having initial pH = 12 and S:L = 1:10, exposed to elevated P_{CO_2} for 360 min. Concentrations are in mg/L.

	Al	**As**	**B**	**Ba**	**Ca**	**Co**	**Cr**	**Fe**	**Mg**
P_{CO_2} (bar)									
0.69	1.046	<LOD	1.200	0.037	654.363	0.009	0.003	0.000	15.796
2.07	1.475	<LOD	1.118	0.040	675.799	0.020	0.004	0.009	15.703
4.16	1.975	<LOD	1.107	0.043	747.107	0.019	0.007	0.003	16.738
17.24	2.825	<LOD	1.223	0.042	880.847	0.185	0.034	0.021	18.340

	Mn	**Mo**	**Ni**	**Se**	**Sb**	**Sr**	**Tl**	**V**
P_{CO_2} (bar)								
0.69	0.121	0.032	0.016	0.148	0.054	2.099	0.077	0.024
2.07	0.178	0.104	0.444	0.170	0.058	2.104	0.090	0.022
4.14	0.242	0.116	0.637	0.155	0.051	2.480	0.077	0.027
17.24	0.471	0.973	7.883	0.174	0.041	2.407	0.099	0.000

	Si	**K**	**Zn**	**Na**
P_{CO_2} (bar)				
0.69	1.457	1.682	0.149	226.763
2.07	1.592	1.657	0.434	213.096
4.14	2.033	1.609	0.102	212.836
17.24	2.756	1.680	2.400	209.624

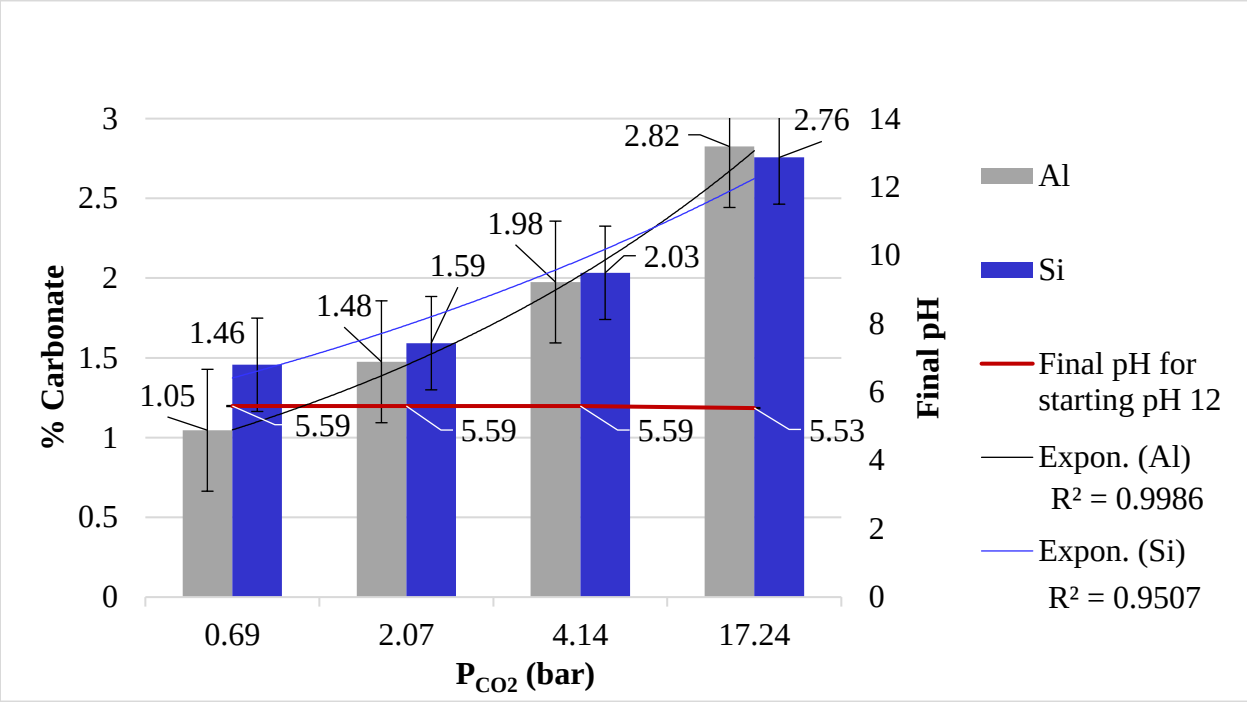

Figure 14. Wastewater Al and Si concentrations vs P_{CO_2} (pH = 12, S:L = 1:10, 360 min). Error bars represent the standard deviation calculated from experimental duplicates.

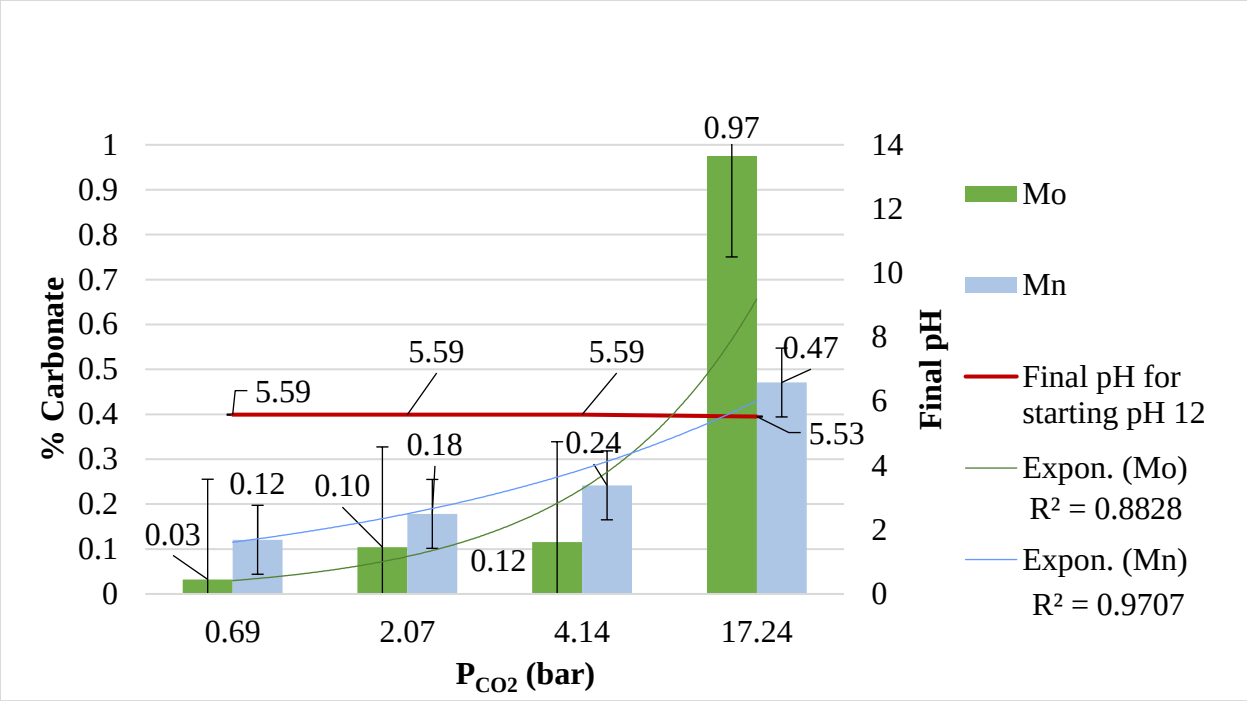

Figure 15. Wastewater Mo and Mn concentrations versus P_{CO_2} (pH = 12, S:L = 1:10, 360 min). Error bars represent the standard deviation calculated from experimental duplicates.

DISCUSSION

4.1 The role of P_{CO_2} in the Carbonation of FGD Gypsum

In this study, it was shown that P_{CO_2} plays a large role in the final pH when other experimental variables are the same. Figure 16 shows that with an initial pH of 13 and a reaction time of 15 min, the final pH steadily dropped as P_{CO_2} increased, reaching its lowest value of 6.1 at a P_{CO_2} = 17.24 bar across all S:L ratios. As pressure increases, the amount of dissolved CO_2 in the solution can be described quantitatively by Henry's Law. Using the Henry's Law constant for CO_2 (K_H^{CO2} = 29 L·atm/mol at 25°C) (Stumm and Morgan, 1996), the amount of dissolved CO_2 can calculated, as shown by Equations 10 through 12 (Table 7). The concentration of aqueous CO_2 controls the amount of carbonic acid (H_2CO_3) present in the system (Krauskopf and Bird, 2009)(Eqn 13):

$$CO_{2(aq)} + H_2O \leftrightarrow H_2CO_3 \qquad (13)$$

Although H_2CO_3 is a weak acid, it dissociates to form bicarbonate (HCO_3^-) ion and releases a proton (H^+) that lowers the pH of the solution by neutralizing some of the alkalinity contributed by NaOH(Eqn 14):

$$H_2CO_3 + OH^- \leftrightarrow HCO_3^- + H_2O \qquad (14)$$

At pH > 6.35, H_2CO_3 becomes fully dissociated (Figure 17). Calcium carbonate solubility increases with decreasing pH (Krauskopf and Bird, 2009)(Eqn 15):

$$CaCO_3 + H_2CO_3 \leftrightarrow Ca^{2+} + 2HCO_3^- \qquad (15)$$

Thus, increased P_{CO_2} lowers the solution pH, inhibiting the formation of calcite. In these cases, gypsum would be unable to convert to calcite. However, given a sufficiently high initial pH, the buffering of solution alkalinity by H_2CO_3 cannot significantly decrease the pH and calcite can begin to form (Figure 7). Taking all these factors into consideration, the best CO_2 pressure conditions for the formation of calcite is around 2.07 bar.

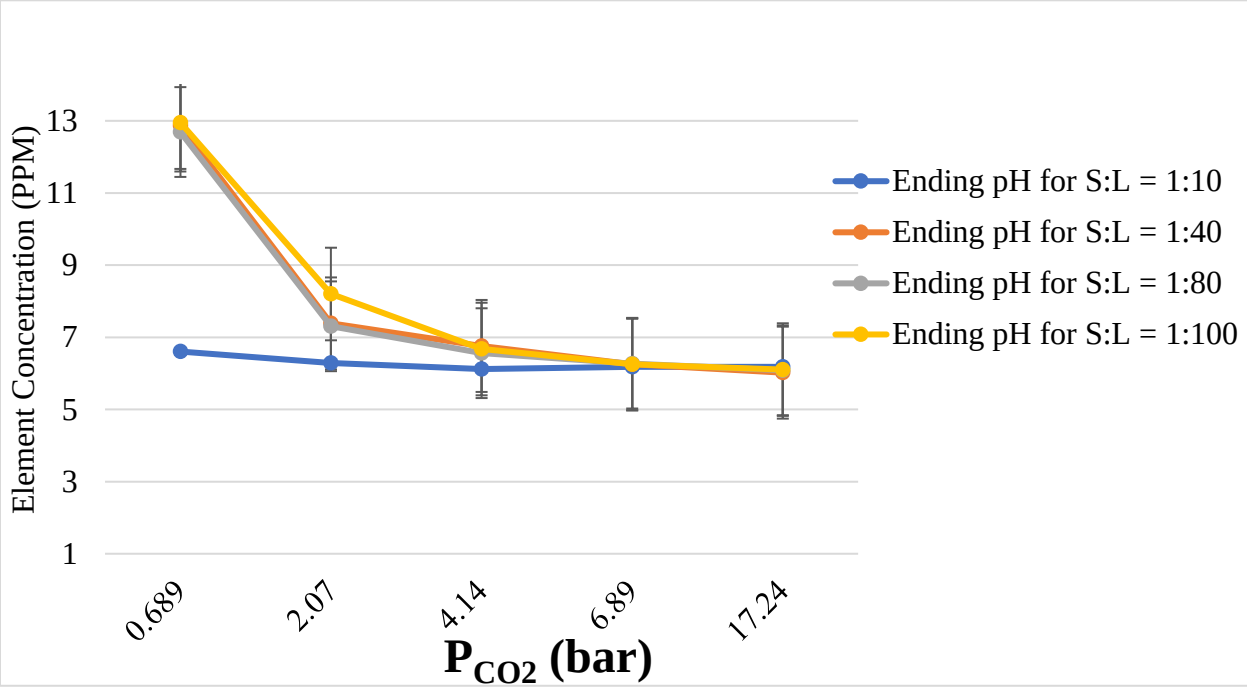

Figure 16 Final pH vs P_{CO_2} at initial pH = 13 across S:L ratios. Error bars represent the standard deviation calculated from experimental duplicates.

Table 7. Concentration of CO_2 under various pressures at 25°C

$$CO_2(g) + H_2O \rightleftharpoons CO_2(aq) \quad (10)$$

$$K_{CO2} \rightleftharpoons \frac{P_{CO2}}{[CO_2(aq)]} \quad (11)$$

$$[CO_2(aq)] = \frac{P_{CO2}}{K_{CO2}} \quad (12)$$

K_{CO_2} = 29 L·atm/mol at °C			
P_{CO_2} = 0.69 atm	$[CO_2(aq)] = \frac{P_{CO2}}{K_{CO2}}$	$[CO_2(aq)] = \frac{0.680\ atm}{29\ L \cdot atm/mol}$	$[CO_2$ (aq)] = 0.0234 mol/L
P_{CO_2} = 2.04 atm	$[CO_2(aq)] = \frac{P_{CO2}}{K_{CO2}}$	$[CO_2(aq)] = \frac{2.04\ atm}{29\ L \cdot atm/mol}$	$[CO_2$ (aq)] = 0.0703 mol/L
P_{CO_2} = 4.08 atm	$[CO_2(aq)] = \frac{P_{CO2}}{K_{CO2}}$	$[CO_2(aq)] = \frac{4.08\ atm}{29\ L \cdot atm/mol}$	$[CO_2$ (aq)] = 0.1407 mol/L
P_{CO_2} = 6.80 atm	$[CO_2(aq)] = \frac{P_{CO2}}{K_{CO2}}$	$[CO_2(aq)] = \frac{6.80\ atm}{29\ L \cdot atm/mol}$	$[CO_2$ (aq)] = 0.2345 mol/L
P_{CO_2} = 17.01 atm	$[CO_2(aq)] = \frac{P_{CO2}}{K_{CO2}}$	$[CO_2(aq)] = \frac{17.01\ atm}{29\ L \cdot atm/mol}$	$[CO_2$ (aq)] = 0.5866 mol/L

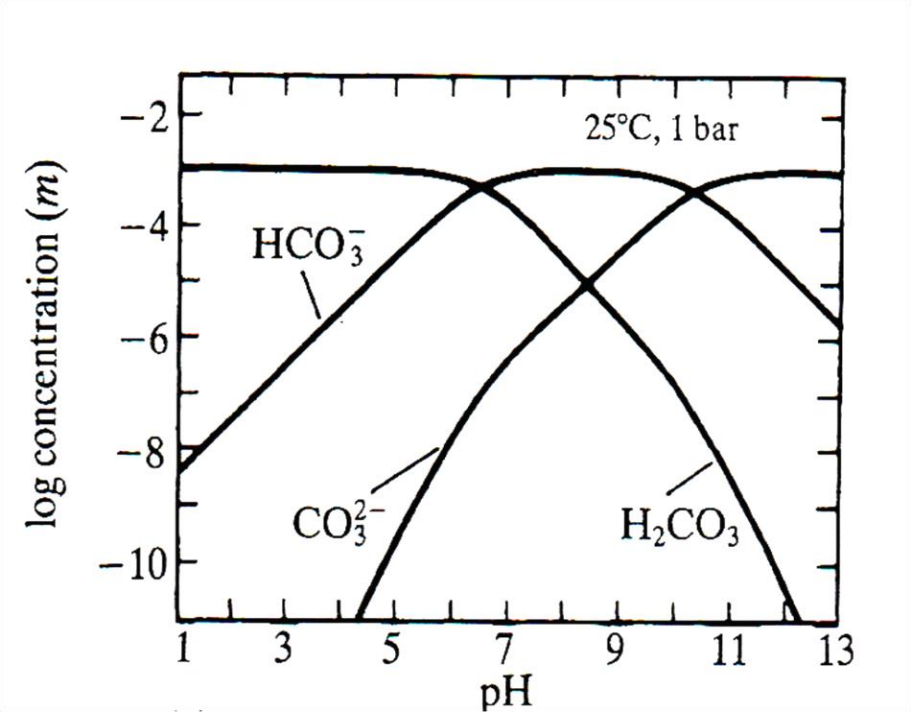

Figure 17 Concentrations of carbonate species in solutions that have total carbonate = 0.001 m at 25°C and 1 bar. (Krauskopf and Bird, 2006)

4.2 The Control of Reaction Time on FGD Gypsum Carbonation

The time series experiments conducted at pH = 13 and P_{CO2} = 2.07 bar demonstrated that pH decreased rapidly with increasing reaction time for S:L ratios of 1:40, 1:80 and 1:100 (Figure 13). Solution pH was highest at 10 min reaction time but decreased to around half its initial value by 20 min. A reaction time of 15 min produced the greatest conversion of FGD gypsum to $CaCO_3$ for all S:L ratios studied, except at S:L = 1:80 where slightly more carbonation occurred at 20 min reaction time. At a S:L ratio of 1:100 the pH was still 8.20 after 15 min of reaction time; this ratio and time also coincided with the highest amount of gypsum carbonation at 74.72% $CaCO_3$. Increasing reaction time beyond 15 or 20 min resulted in decreased $CaCO_3$ production for all S:L ratios.

Section 4.1 describes how increasing P_{CO_2} increases the amount of H_2CO_3 present. Reaction time acts in a similar manner: as reaction time increases, more H_2CO_3 is produced and initially formed calcite begins to dissolve (Figure 13).

However, the effect of reaction time can be mitigated if the initial pH is high enough, i.e., pH = 13.5 and 14 for the Time Series Experiments. This observation can be explained because NaOH and $CaCO_3$ act as buffers for continued CO_2 dissolution into the solution. Buffer systems work to resist changes in pH (Pankow, 1991). A buffer is a solution that can absorb substantial H^+ or OH^- ions, while not showing much change in pH (Krauskopf and Bird, 2006). At the beginning of the mineralization experiments, OH^- is quickly consumed by the gypsum to calcite reaction (Eqn. 16):

$$CaSO_4 \cdot 2H_2O + 2OH^- + CO_2 \leftrightarrow CaCO_3 + SO_4^{=} + 3H_2O \qquad (16)$$

Once OH^- is exhausted, gypsum carbonation ends. Unless the experiment is stopped at this point, continued CO_2 dissolution forms $H2CO_3$ and solution pH would begin to drop (Eqn. 13). At this

point, the only material left in the system to act as a buffer against increasing acidity is $CaCO_3$. The time series experiment data support this mechanism (Figure 13), showing decreasing pH over time because of the formation of H_2CO_3. The solubility of $CaCO_3$ increases with decreasing pH (Eqn. 15), which is the reason why the % $CaCO_3$ values were observed to drop after 15 min of reaction time. As reaction time increases and CO_2 continues to interact with the solution, dissolution of $CaCO_3$ would continue to buffer the addition of H_2CO_3 until it completely dissolves (Krauskopf and Bird, 2006).

Considering the results of the Time Series Experiments performed for this study, it is apparent that a short reaction time of around 15 min is optimum to maximize FGD gypsum carbonation and prevent $CaCO_3$ dissolution. This observation could also be a benefit for industrial application of the CO_2 mineralization process where shorter reaction times would mean that more material can be processed quickly.

4.3 Effect of Solid to Liquid Ratio

The S:L ratio was observed to be a secondary control on how much gypsum was converted to $CaCO_3$ when other experimental variables were held constant. The greatest percent $CaCO_3$ formed always occurred at S:L = 1:100, at a pH = 13, and P_{CO_2} = 2.07 bar across all reaction time intervals (Figure 13). For example, at 15 min reaction time, $CaCO_3$ formation decreased from a high of 74.72% to only 5.06% as the S:L ratio decreased from 1:100 to 1:10 (Table 8). This same control can be seen in experiments conducted at other pH conditions, with S:L = 1:100 always producing more $CaCO_3$ (Figure 7).

Table 8. Percent $CaCO_3$ formed at pH = 13, reaction time = 15 min, P_{CO_2} = 2.07 bar.

S:L ratio	Solid Phase Mineral Percentages (Std Dev)
1:10	5.06 (1.590)
1:40	33.895 (0.875)
1:80	48.995 (4.485)
1:100	74.72 (3.690)

However, this large difference in the extent of FGD gypsum carbonation can be mitigated if the initial pH is high enough (Figure 18). At an initial pH = 14, S:L = 1:10 had its highest $CaCO_3$ formed at a maximum value of 64.16%. This amount was reduced as P_{CO_2} increased for the reasons discussed in Section 4.1, above. The pH levels also remained higher due to the buffering effects of NaOH. So, the optimum S:L ratio depends on the initial pH. Thus, higher, or more basic, initial pH conditions can enable more extensive FGD gypsum carbonation at a lower S:L ratio.

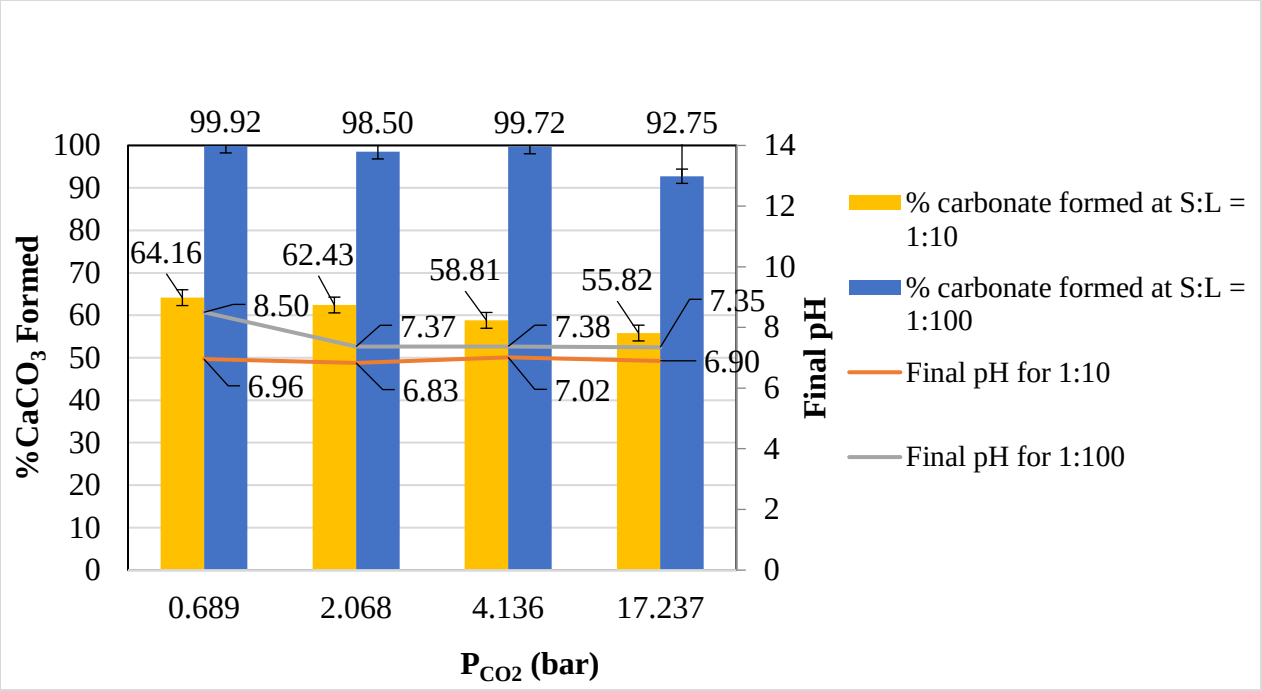

Figure 17 Percentage $CaCO_3$ formed P_{CO_2} for S:L = 1:10 and S:L = 1:100 at initial pH 14 and reaction time = 360 min. Error bars represent the standard deviation calculated from experimental duplicates.

4.4 Controls on Wastewater Composition

The ICP-OES analyses of the digested FGD gypsum (Table 2) and the 0.1 m NaOH solution (Table 3) show that most of the trace elements in the wastewater solutions are derived from the gypsum. Trace elements are bound in FGD gypsum as sulfate complexes (Querol *et al.*, 1996) such as $CaSeSO_3$ (Shah *et al.*, 2008), and become mobilized during its dissolution. This can be seen in Figure 14, 15, 18 and 19. As reaction time increases, solution pH drops and the amount of each element released into the solution increases (Figures 19-22) (see Appendices V through VII for all graphs). One case in which this is can be easily seen is in the Time Series Experiments conducted at pH = 13, P_{CO_2} = 2.07 bar, and S:L = 1:100. Elements; Mg, Al, Sb, Tl, Co, and Mo, mobilized and have an R^2 values >0.8500 (Appendix VII). Similar trends are present many elements in most of the Time Series Experiments across a range of S:L ratios.

On the other hand, if the final solution pH remains high enough, trace element mobilization is minimized (Figure 19). This follows the trend of leachability as analyzed by (Izquierdo and Quero, 2012). Leachability of elements like thallium tend to peak at low to neutral pH (Izquierdo and Quero, 2012). While other elements, like selenium, have been shown to be easily leachable with only water, but more easily leachable at lower pH values (Izquierdo and Quero, 2012). The mid- to high-pH conditions are critical for the concentrations of trace elements such as thallium to remain closer to, but still exceeding, drinking water MCL levels. Wastewater thallium concentrations were as low as 0.0023 mg/L for the Time Series Experiment with pH = 13, S:L = 1:100, P_{CO_2} = 2.07, and reaction time = 10 min. While in other 10 min Time Series Experiments thallium values ranged from 0.15 mg/L to as low as 0.0024 mg/L (Figure 19).

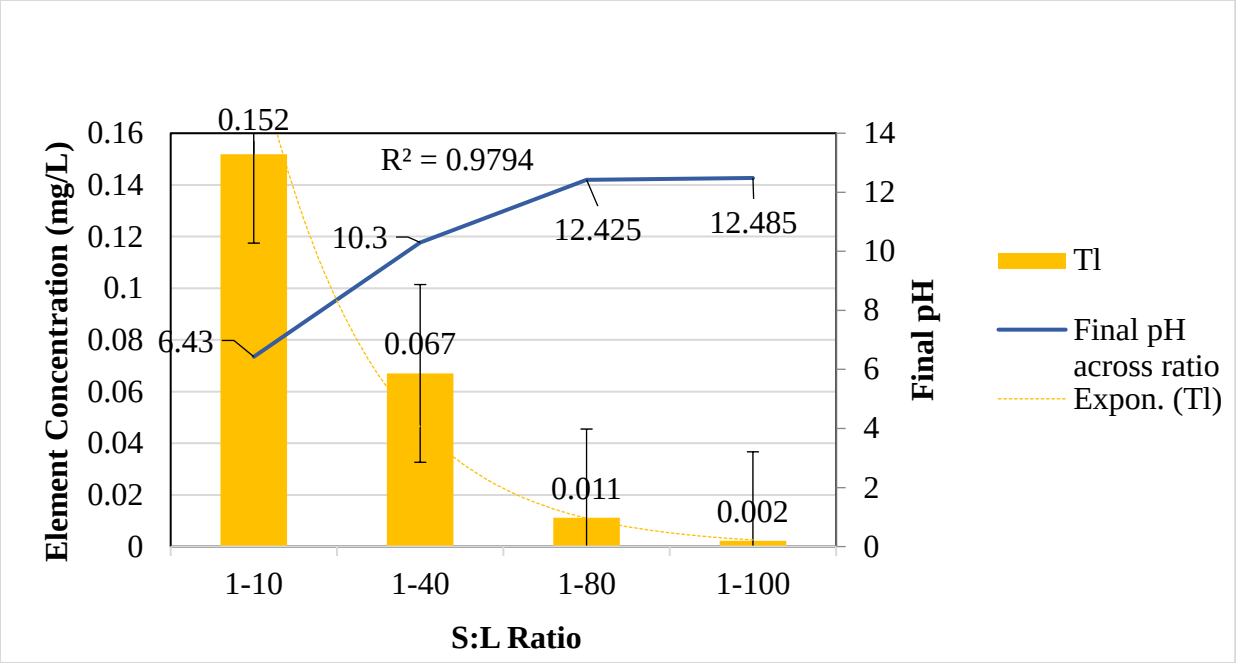

Figure *18* Wastewater thallium concentration vs S:L ratio (pH = 13, Pco_2 = 2.07 bar, reaction time = 10 min). Error bars represent the standard deviation calculated from experimental duplicates.

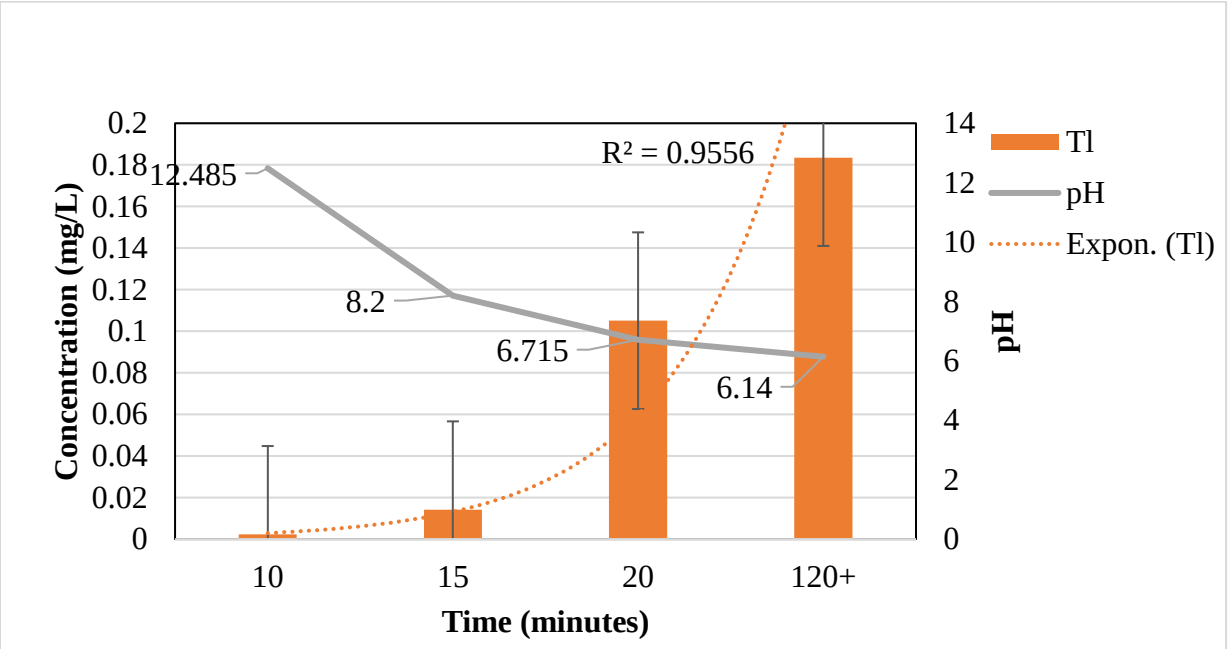

Figure *19* Wastewater thallium concentration vs Time, showing final pH (pH = 13, P_{CO_2} = 2.07 bar, S:L = 100) for Time Series Experiments. (Additional graphs are shown in Appendix V.) Error bars represent the standard deviation calculated from experimental duplicates.

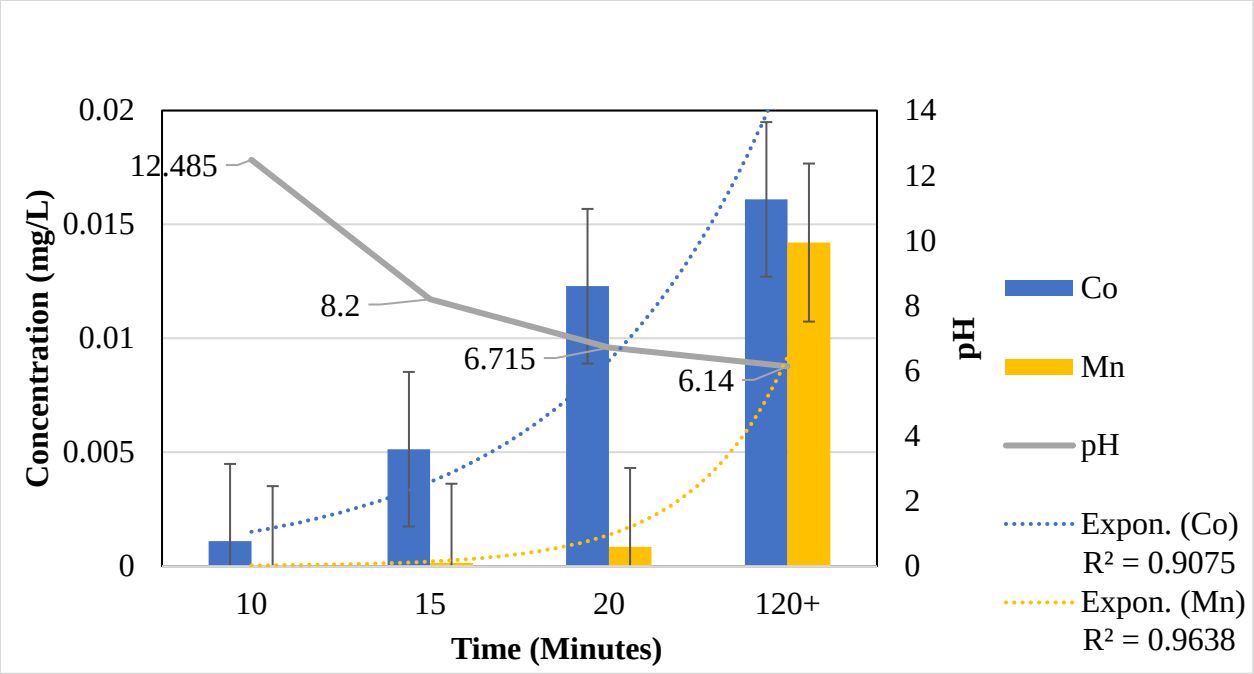

Figure *20* Wastewater concentrations of Co and Mn vs time (pH = 13, S:L = 1:100, and Pco_2 = 2.07 bar). Error bars represent the standard deviation calculated from experimental duplicates.

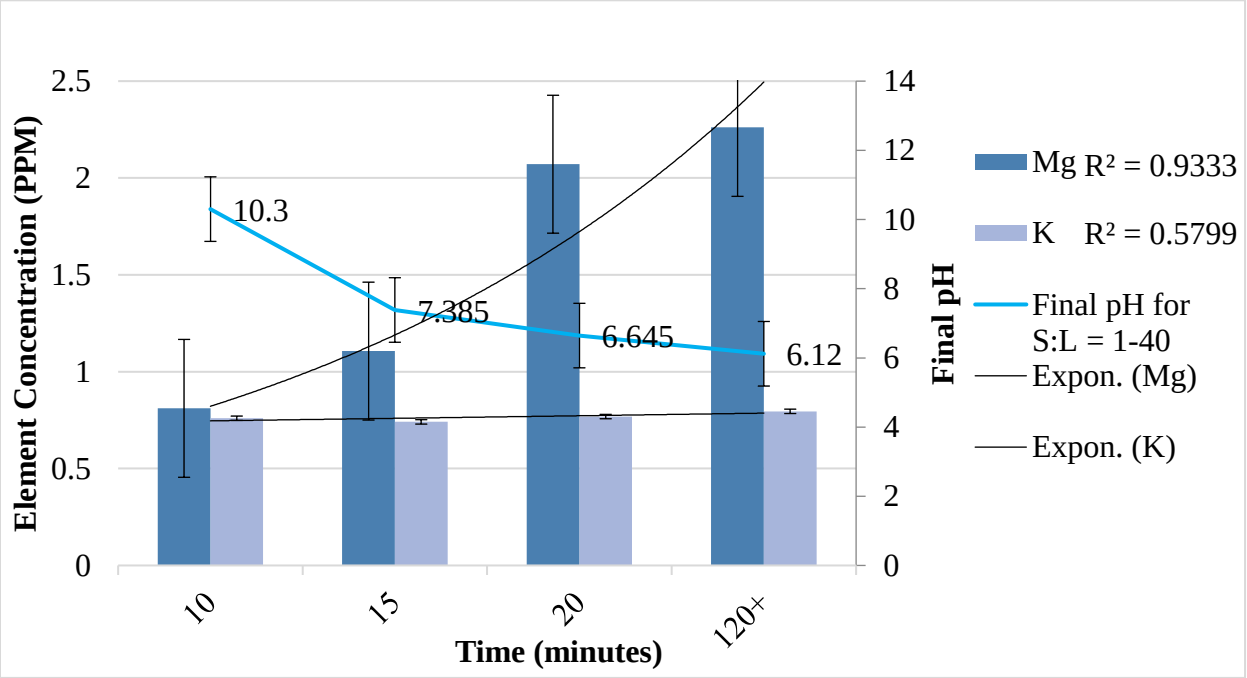

Figure *21* Wastewater concentrations of Mg and K vs time (pH = 13, S:L = 1:40, and P_{CO_2} = 2.07 bar). Error bars represent the standard deviation calculated from experimental duplicates.

The trace elements of greatest concern are those that appear in the US EPA National Primary Drinking Water Regulations (USEPA, 2020). As, Ba, Cd, Cr, Se, and Tl were all present in wastewater for at least one of the duplicate experiments conducted for this study. The US EPA maximum contaminant level goal (MCLG) and maximum contaminant level (MCL) for these trace elements are listed in Table 8. For Ba there were no occurrences above the drinking water MCL of 2 mg/L and for Cr, there was only one occurrence slightly above the MCL at 0.108 mg/L, for run pH = 12, S:L = 1:100, P_{CO_2} = 17.24 bar, and 360 min reaction time. Cd was also above the MCL level in only one experiment at 0.0116 mg/L, for pH = 12, S:L = 1:10, P_{CO_2} = 17.24 bar, and 360 min reaction time. As occurred sporadically above the MCL for a few experiments, but was more typically below detection.

Table 9. US EPA National Primary Drinking Water Standards, selected elements (USEPA, 2020).

Contaminant	MCLG (mg/L)	MCL or TT (mg/L)
Arsenic	0	0.010
Barium	2	2
Cadmium	0.005	0.005
Chromium (total)	0.1	0.1
Selenium	0.05	0.05
Thallium	0.0005	0.002

The two most concerning trace elements released to the wastewater solution are Se and Tl. Se and Tl were observed in nearly every run and their concentrations almost always exceeded the drinking water MCL values(Table 9; full wastewater compositions are given in Appendix IX). Wastewater Tl levels were as high as 0.348 mg/L (pH = 13.5, S:L = 1:10, P_{CO_2} = 2.07 bar,

reaction time = 360 min), over 160 times the MCL value. Even the 0.1 m NaOH solution had Tl concentrations of 0.012 mg/L, more than 6 times above the MCL. Finally, Se MCL levels have a limit of 0.05 mg/L and the resulting experiments produced concentrations as high as 0.802 mg/L (pH = 13.5, P_{CO_2} = 2.07 bar, S:L = 1:10, reaction time = 360 min), 16 times the MCL.

While the experimental parameters that produced the highest conversion of FGD gypsum to $CaCO_3$ (pH = 13, S:L = 1:100, P_{CO_2} = 2.07 bar, reaction time = 15 min) also produced the lowest wastewater Tl concentration (Table 10), that concentration still exceeded the drinking water MCL by 70 times.

Table 10. Wastewater toxic metal concentrations in mg/L for pH = 13, S:L = 1:100, P_{CO_2} = 2.07 bar, reaction time = 15 min.

Arsenic	<LOD
Cadmium	<LOD
Chromium (total)	<LOD
Selenium	0.02
Thallium	0.14

4.4 Polymorphs of $CaCO_3$

$CaCO_3$ has three different polymorphs: calcite, vaterite, and aragonite. The crystal forms for of these polymorphs are rhombohedral for calcite, hexagonal for vaterite and orthorhombic for aragonite. At ambient temperatures and pressures calcite is the most stable phase of $CaCO_3$ (Song *et al.*, 2020). Metastable phases can commonly be found at ambient conditions due to growth kinetics (Zhao *et al.*, 2019). Aragonite is the high-pressure, low-temperature polymorph of $CaCO_3$. Aragonite is metastable at Earth surface conditions but is sometimes produced during biomineralization by organisms. Vaterite is the most unstable of the three polymorphs at 25°C and 1 bar pressure, but it can form under the right conditions. Oswald's Law states that more disordered phases typically have lower activation energy barriers for precipitation. A metastable polymorph, like vaterite or aragonite, may form over the stable polymorph because it has a higher solubility (Kralj, D. *et al*. 1997). Ultimately, the metastable $CaCO_3$ polymorph will convert into calcite.

Precipitation of vaterite is influenced by several variables such as stirring speed, pH levels and temperature. Song *et al.* (2020) demonstrated that stirring speeds of over 1200 rpm and short reaction times of 5 min can lead to the precipitation of vaterite at ambient temperatures of 20°C. Vaterite forms under more acidic pH conditions than the other $CaCO_3$ polymorphs and can convert to calcite at higher pH values ($\geq$11).

During the conversion of FGD gypsum into $CaCO_3$, calcite was the primary polymorph of $CaCO_3$ to form. However, in some experiments the other $CaCO_3$ polymorphs formed, including vaterite in several experiments and aragonite in one instance(Table 11).

Experiments in which vaterite formed do not appear to share a common set of parameters. There were occasions when even duplicate experiments did not form the same

polymorph of $CaCO_3$. As a result, no conclusions can be reached about the main driving force(s) leading to its formation. In some instances, vaterite formed at low pressure (P_{CO_2} = 0.69 and 2.07 bar), low S:L ratio (1:80 and 1:100), and initial pH = 13, during reaction times of 15 min, 20 min and 360 min (Table 7). In other instances, vaterite formed at moderate to high pressures (P_{CO_2} = 4.14 and 17.24 bar), high S:L ratio (1:10), and higher initial pH conditions (13.5 and 14), at 360 min reaction time. Similarly, final pH is unlikely to have played a role, as the final pH for experiments that formed vaterite ranged from a slightly basic final pH of 8.2 to a slightly acidic final pH of 6.23. In the two experiments where vaterite formed but calcite did not, both were performed at S:L = 1:10 and pH = 13.5 for 360 min at moderate to high P_{CO_2} (4.14 and 17.24 bar). However, calcite and vaterite both formed in the duplicate experiments.

A possible explanation could be the fact that the three $CaCO_3$ polymorphs are extremely close in their thermodynamic stability, with only a 0.5 – 3 kJ/mol difference in their Gibbs Free Energy of formation values (Wolf *et al.*, 2000). Because the $CaCO_3$ polymorphs are so close in stability, slight variations in experimental conditions, such as pressure or the presence of impurities, can change their stability ranges. Such changes can shift the positions of the polymorph transition boundaries, and therefore vaterite will slowly turn to the more stable carbonate, calcite (Navrotsky, 2004). In the end, there is so much variation in the experimental conditions that led to vaterite formation, no conclusions can be reached about what parameters controlled its precipitation.

Table 11. Experimental conditions under which the metastable $CaCO_3$ polymorphs vaterite or aragonite formed. *Average of duplicate experiments, including instances where a metastable polymorph was not formed in both. **Duplicate experiments where both formed a metastable polymorph of $CaCO_3$.

Time (Min)	S:L Ratio	Initial pH	P_{CO_2} (bar)	Gypsum	Calcite	Vaterite	Aragonite	Total % Carbonate	Final pH
360*	1:100	13	0.69	37.14	51.85	**3.105**	0	54.955	6.23
360**	1:10	13.5	4.14	81.84	6.84	**11.32**	0	18.16	6.73
360**	1:10	13.5	4.14	84.27	0	**6.94**	0	15.73	6.76
360**	1:10	13.5	17.24	82.42	9.06	**8.425**	0	17.485	6.75
360**	1:10	13.5	17.24	82.79	0	**11.17**	0	17.02	6.76
360*	1:100	14	17.24	82.05	6.95	**11.00**	0	55.82	6.9
360*	1:100	14	0.69	0	99.775	0	**0.14**	99.915	8.5
15*	1:80	13	2.07	45.22	44.79	**4.205**	0	48.995	7.305
15*	1:100	13	2.07	21.185	65.155	**9.565**	0	74.72	8.2
20*	1:80	13	2.07	44.335	34.9	**15.325**	0	50.225	6.72
20*	1:100	13	2.07	30.815	40.34	**21.895**	0	62.235	6.72

CONCLUSION

This study experimentally examined the feasibility of carbon sequestration by CO_2 mineralization using FGD gypsum as a feedstock. It was shown that complete conversion of FGD gypsum into $CaCO_3$ can be achieved within 15 min by using appropriate pH, S:L ratio and P_{CO_2} conditions. 100% conversion of $CaSO_4 \cdot 2H_2O$ in the FGD gypsum to $CaCO_3$ was observed at elevated pH conditions of 13.5-14, short reaction times of around 15 min, and low P_{CO_2} of approximately 2.0 bar. It was also demonstrated that the carbonation of FGD gypsum is favored at lower S:L ratio (1:100). Low S:L ratio, low P_{CO_2} and short reaction time also reduced the concentrations of potentially toxic trace elements such as Tl, in the wastewater solutions.

The fact that carbonation of FGD gypsum occurred with no additional heating, using low CO_2 pressures and minimal material processing demonstrates that CO_2 mineralization can be achieved with low energy input. Under optimal conditions it would be possible to sequester 49.933 g of CO_2 per kg of FGD gypsum. At the current U.S. production rate of 120 Mton of FGD gypsum per year from FGD systems (Panday *et al.*, 2019), a sequestration capacity of nearly 30 Mton of CO_2 per year could be realized. This figure does not even consider the amount of FGD gypsum that is already in storage. In addition, the availability of waste FGD gypsum at point sources for CO_2 emissions such as coal-fired power plants, eliminates feedstock transportation expenses. Utilization of FGD gypsum as a feedstock for CO_2 mineralization would provide a beneficial use and reduce or eliminate the need to store this underutilized coal

combustion product CCP waste material. Carbonation of FGD gypsum therefore has the potential to permanently sequester CO_2 as part of a larger effort to mitigate the current global warming trend.

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APPENDIX I: Pressure Unit Conversion Chart

Table I.I - Conversion of PSI to atmosphere and bar.

PSI	Atm	Bar
10	0.680	0.69
30	2.04	2.07
60	4.08	4.14
100	6.80	6.89
250	17.01	17.24

APPENDIX II: Experimental Parameters and Solid Phase Data

Table II.I - pH = 12, S:L = 1:10, reaction time = 360 min

P_{CO_2}	Gypsum	Solid Phase Mineral Percentages* (Std. Dev.)		
(bar)	**(g)**	**Gypsum**	**Calcite**	**Quartz**
0	7.27	99.845(0.045)	0(0)	0.155(0.045)
0.69	7.27	99.045(0.605)	0(0)	0.335(0.015)
2.07	7.27	99.81(0.07)	0(0)	0.19(0.07)
6.89	7.27	99.575(0.125)	0(0)	0.425(0.125)
17.24	7.27	99.595(0.095)	0(0)	0.405(0.095)
P_{CO_2}	**Solid Phase Mineral Percentages* (Std. Dev.)**			**Final pH(Std. Dev.)**
(bar)	**Thendardite**	**Vaterite**	**$CaCO_3$ (total)**	
0	0(0)	0(0)	0(0)	12(0)
0.69	0(0)	0(0)	0(0)	5.87(0)
2.07	0(0)	0(0)	0(0)	5.925(0.005)
6.89	0(0)	0(0)	0(0)	5.95(0.1)
17.24	0(0)	0(0)	0(0)	5.93(0.07)

(*determined by Rietveld refinement)

Table II.II – pH = 12, S:L = 1:100, reaction time = 360 min

P_{CO_2}	Gypsum	Solid Phase Mineral Percentages* (Std. Dev.)		
(bar)	**(g)**	**Gypsum**	**Calcite**	**Quartz**
0	0.8	99.55(0.06)	0(0)	0.45(0.06)
0.69	0.8	99.605(0.255)	0(0)	0.395(0.255)
2.07	0.8	100(0)	0(0)	0(0)
6.89	0.8	99.8(0.01)	0(0)	0.2(0.01)
17.24	0.8	99.305(0.385)	0(0)	0.695(0.385)
P_{CO_2}	**Solid Phase Mineral Percentages**			**Final pH(Std. Dev.)**
(bar)	**Thendardite**	**Vaterite**	**$CaCO_3$ Formed**	
0				
0.69	0(0)	0(0)	0(0)	12(0)
2.07	0(0)	0(0)	0(0)	5.655(0.065)
4.14	0(0)	0(0)	0(0)	5.64(0.05)
17.24	0(0)	0(0)	0(0)	5.595(0.005)

Table II.III – pH = 13, S:L = 1:10, reaction time = 360 min

P_{CO_2}	Gypsum	Solid Phase Mineral Percentages* (Std. Dev.)		
(bar)	(g)	Gypsum	Calcite	Quartz
0.69	0.8	96.88(0.1600)	2.925(0.0950)	0.19(0.0700)
2.07	0.8	99.69(0.2000)	0(0)	0.31(0.2000)
6.89	0.8	97.005(0.0150)	2.685(0.0350)	0.305(0.0550)
17.24	0.8	98.675(0.7850)	0.91(0.9100)	0.41(0.1300)
P_{CO_2}	Solid Phase Mineral Percentages			Final pH(Std. Dev.)
(bar)	Thendardite	Vaterite	$CaCO_3$ Formed	
0.69	0(0)	0(0)	2.925(0.0950)	6.3(0.0500)
2.07	0(0)	0(0)	0(0)	6.16(0.1600)
4.14	0(0)	0(0)	2.685(0.0350)	6.305(0.0250)
17.24	0(0)	0(0)	0.91(0.9100)	6.365(0.0250)

Table II.IV – pH = 13, S:L = 1:100, reaction time = 360 min

P_{CO_2}	Gypsum	Solid Phase Mineral Percentages* (Std. Dev.)		
(bar)	(g)	Gypsum	Calcite	Quartz
0.69	0.8	37.14(27.0200)	51.85(29.11)	0.305(0.1450)
2.07	0.8	34.77(6.9600)	61.315(6.015)	0.395(0.1150)
6.89	0.8	69.53(4.6200)	24.84(4.25)	0.645(0.2650)
17.24	0.8	83.135(10.0350)	9.53(4.55)	0.22(0.2200)
P_{CO_2}	Solid Phase Mineral Percentages			Final pH(Std. Dev.)
(bar)	Thendardite	Vaterite	$CaCO_3$ Formed	
0.69	7.6(0.87)	3.105(3.105)	54.955(26.0050)	6.23(0.14)
2.07	3.52(0.83)	0	61.315(6.0150)	6.14(0.01)
4.14	4.98(0.63)	0	24.84(4.2500)	6.485(0.015)
17.24	7.11(5.26)	0	9.53(4.5500)	6.445(0.005)

Table II.V – pH = 13.5, S:L = 1:10, reaction time = 360 min

P_{CO_2}	Gypsum	Solid Phase Mineral Percentages* (Std. Dev.)		
(bar)	(g)	Gypsum	Calcite	Quartz
0.69	0.8	78.94(0.700)	20.495(0.495)	0.56(0.200)
2.07	0.8	87.375(4.445)	12.125(4.475)	0.5(0.030)
6.89	0.8	83.055(1.215)	6.89(0.050)	0(0)
17.24	0.8	82.42(0.370)	9.06(2.110)	0.095(0.095)
P_{CO_2}	Solid Phase Mineral Percentages			Final pH(Std. Dev.)
(bar)	Thendardite	Vaterite	$CaCO_3$ Formed	
0.69	0(0)	0	20.495(0.495)	6.57(0.040)
2.07	0(0)	0	12.125(4.475)	6.74(0.070)
4.14	0(0)	10.055(1.265)	16.945(1.215)	6.745(0.015)
17.24	0(0)	8.425(2.575)	17.485(0.465)	6.75(0.010)

Table II.VI – pH = 13.5, S:L = 1:100, reaction time = 360 min

P_{CO_2}	Gypsum	Solid Phase Mineral Percentages* (Std. Dev.)		
(bar)	(g)	Gypsum	Calcite	Quartz
0.69	0.8	15.58(1.25)	84.195(1.165)	0.23(0.090)
2.07	0.8	0(0)	99.79(0.130)	0.21(0.130)
6.89	0.8	0(0)	99.68(0.100)	0.32(0.100)
17.24	0.8	0(0)	99.475(0.345)	0.575(0.295)
P_{CO_2}	Solid Phase Mineral Percentages			Final pH(Std. Dev.)
(bar)	Thendardite	Vaterite	$CaCO_3$ Formed	
0.69	0(0)	0(0)	84.195(1.165)	6.765(0.045)
2.07	0(0)	0(0)	99.79(0.130)	6.82(0.060)
4.14	0(0)	0(0)	99.68(0.100)	6.825(0.065)
17.24	0(0)	0(0)	99.475(0.345)	6.66(0.010)

Table II.VII – pH = 14, S:L = 1:10, reaction time = 360 min

P_{CO_2}	Gypsum	Solid Phase Mineral Percentages* (Std. Dev.)		
(bar)	(g)	Gypsum	Calcite	Quartz
0.69	0.8	30.29(0.530)	64.155(0.365)	0.295(0.005)
2.07	0.8	32.225(0.765)	62.425(0.595)	0.35(0.050)
6.89	0.8	34.355(0.275)	58.81(0.330)	0.415(0.155)
17.24	0.8	36.5(2.010)	53.56(4.340)	0.48(0.160)
P_{CO_2}	Solid Phase Mineral Percentages			Final pH(Std. Dev.)
(bar)	Thendardite	Vaterite	$CaCO_3$ Formed	
0.69	5.255(0.175)	0(0)	64.155(0.3650)	6.955(0.045)
2.07	4.995(0.225)	0(0)	62.425(0.5950)	6.83(0.020)
4.14	6.42(0.750)	0(0)	58.81(0.3300)	7.015(0.005)
17.24	7.2(0.090)	2.26(2.260)	55.82(2.0800)	6.9(0.030)

Table II.VIII – pH = 14, S:L = 1:100, reaction time = 360 min

P_{CO_2}	Gypsum	Solid Phase Mineral Percentages* (Std. Dev.)			
(bar)	(g)	Gypsum	Calcite	Quartz	Thendardite
0.69	0.8	0(0)	99.775(0.165)	0.085(0.025)	0(0)
2.07	0.8	1.37(0.93)	98.5(0.900)	0.14(0.030)	0(0)
6.89	0.8	0(0)	99.72(0.250)	0.28(0.250)	0(0)
17.24	0.8	7.02(7.02)	92.75(6.790)	0.23(0.230)	0(0)
P_{CO_2}	Solid Phase Mineral Percentages			Final pH(Std. Dev.)	
(bar)	Vaterite	Aragonite	$CaCO_3$ Formed		
0.69	0(0)	0.14(0.14)	99.915(0.025)	8.5(0.010)	
2.07	0(0)	0(0)	98.5(0.900)	7.37(0.010)	
4.14	0(0)	0(0)	99.72(0.250)	7.375(0.065)	
17.24	0(0)	0(0)	92.75(6.790)	7.345(0.045)	

Table II.IX – pH = 13, reaction time = 10 min, P_{CO2} = 2.07 bar

S:L ratio	Gypsum	Solid Phase Mineral Percentages* (Std. Dev.)		
	(g)	Gypsum	Calcite	Quartz
1:10	0.8	95.3(0.83)	3.935(0.855)	0.765(0.025)
1:40	0.8	56.69(1.78)	32.415(3.235)	0.785(0.265)
1:80	0.8	45.745(0.575)	44.63(0.05)	0.595(0.075)
1:100	0.8	54.38(1.81)	37.015(1.305)	0.3(0.01)
S:L ratio	**Solid Phase Mineral Percentages**			**Final pH(Std. Dev.)**
	Thendardite	**Vaterite**	**$CaCO_3$ Formed**	
1:10	0(0)	0(0)	3.935(0.855)	6.43(0.04)
1:40	10.11(1.19)	0(0)	32.415(3.235)	10.3(1.28)
1:80	9.03(0.7)	0(0)	44.63(0.05)	12.425(0.135)
1:100	8.31(0.51)	0(0)	37.015(1.305)	12.485(0.265)

Table II.X – pH = 13, reaction time = 15 min, P_{CO2} = 2.07 bar

S:L ratio	Gypsum	Solid Phase Mineral Percentages* (Std. Dev.)		
	(g)	Gypsum	Calcite	Quartz
1:10	0.8	94.785(1.645)	5.06(1.59)	0.155(0.055)
1:40	0.8	65.21(0.75)	33.895(0.875)	0.895(0.125)
1:80	0.8	45.22(3.1)	44.79(0.28)	0.63(0.48)
1:100	0.8	21.185(3.635)	65.155(13.255)	0.44(0.02)
S:L ratio	**Solid Phase Mineral Percentages**			**Final pH(Std. Dev.)**
	Thendardite	**Vaterite**	**$CaCO_3$ Formed**	
1:10	0(0)	0(0)	5.06(1.59)	6.285(0.035)
1:40	0(0)	0(0)	33.895(0.875)	7.385(0.025)
1:80	5.15(0.9)	4.205(4.205)	48.995(4.485)	7.305(0.415)
1:100	3.665(0.075)	9.565(9.565)	74.72(3.69)	8.2(0.03)

Table II.XI – pH = 13, reaction time = 20 min, P_{CO2} = 2.07 bar

S:L ratio	Gypsum	Solid Phase Mineral Percentages* (Std. Dev.)		
	(g)	Gypsum	Calcite	Quartz
1:10	0.8	95.14(0.49)	4.635(0.365)	0.225(0.125)
1:40	0.8	61.685(0.325)	26.235(0.915)	0.85(0.1)
1:80	0.8	44.335(0.445)	34.9(0.68)	0.28(0.1)
1:100	0.8	30.815(1.045)	40.34(2.51)	0.62(0.08)
S:L ratio	**Solid Phase Mineral Percentages**			**Final pH(Std. Dev.)**
	Thendardite	**Vaterite**	**$CaCO_3$ Formed**	
1:10	0(0)	0(0)	4.635(0.365)	6.195(0.025)
1:40	11.23(1.14)	0(0)	26.235(0.915)	6.645(0.075)
1:80	5.16(0.43)	15.325(0.765)	50.225(0.085)	6.715(0.025)
1:100	6.34(0.09)	21.895(1.475)	62.235(1.035)	6.715(0.035)

Table II.XI – pH = 13, reaction time = 120+ min, P_{CO_2} = 2.07 bar

S:L ratio	Gypsum	Solid Phase Mineral Percentages* (Std. Dev.)		
	(g)	Gypsum	Calcite	Quartz
1:10	0.8	99.69(0.2)	0(0)	0.31(0.2)
1:40	0.8	83.935(0.095)	15.795(0.075)	0.27(0.02)
1:80	0.8	44.765(0.135)	48.285(1.845)	0.665(0.125)
1:100	0.8	34.77(6.96)	61.315(6.015)	0.395(0.115)
S:L ratio	**Solid Phase Mineral Percentages**			**Final pH(Std. Dev.)**
	Thendardite	**Vaterite**	**$CaCO_3$ Formed**	
1:10	0(0)	0(0)	0(0)	6.16(0)
1:40	0(0)	0(0)	15.795(0.075)	6.12(0.01)
1:80	6.28(1.86)	0(0)	48.285(1.845)	6.09(0.02)
1:100	3.52(0.83)	0(0)	61.315(6.015)	6.14(0)

APPENDIX III: XRD patterns of solid phases produced by experiments performed at variable pH, P_{CO_2} and S:L ratios, and reaction time = 360 min.

III.I - pH 12, S:L = 1:10

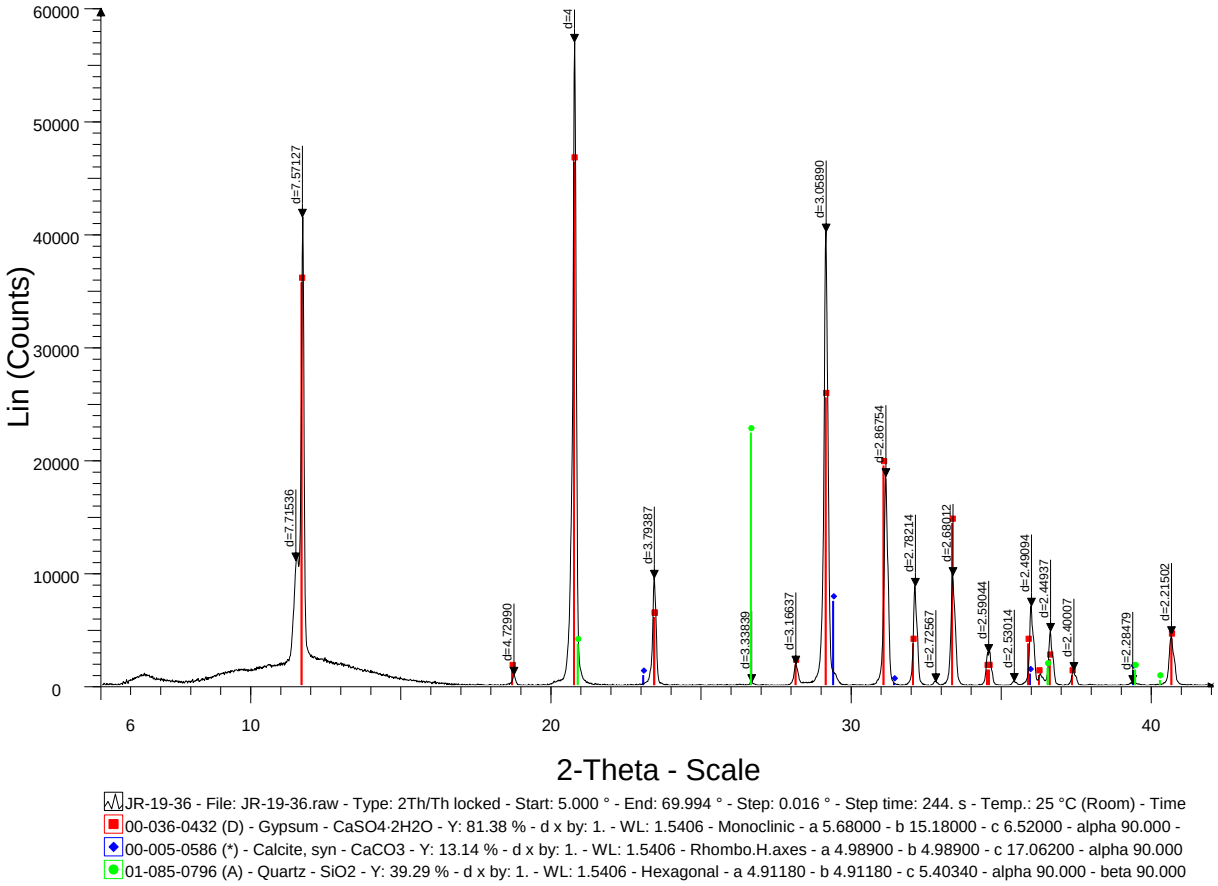


Figure 23. pH = 12, S:L = 1:10, P_{CO_2} = 0 bar

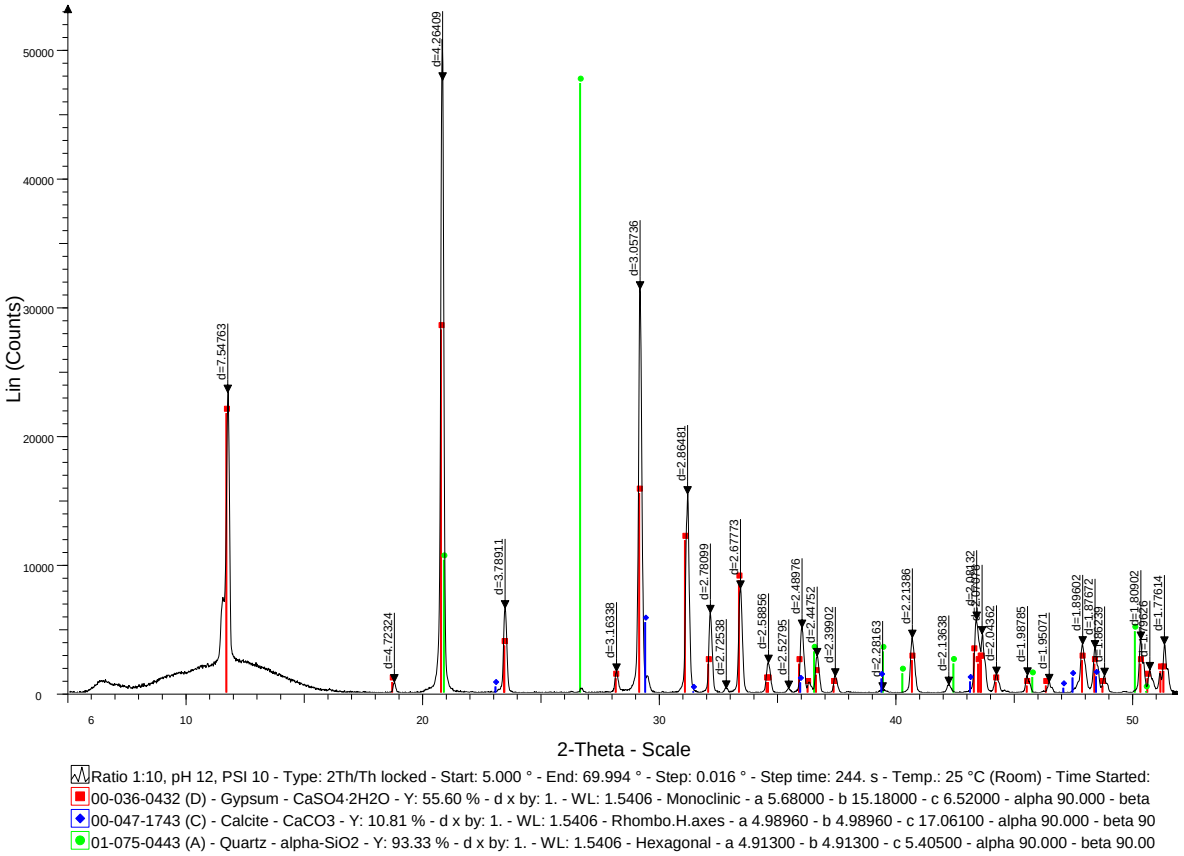


Figure 22. pH = 12, S:L = 1:10, , P_{CO_2} = 0.69 bar

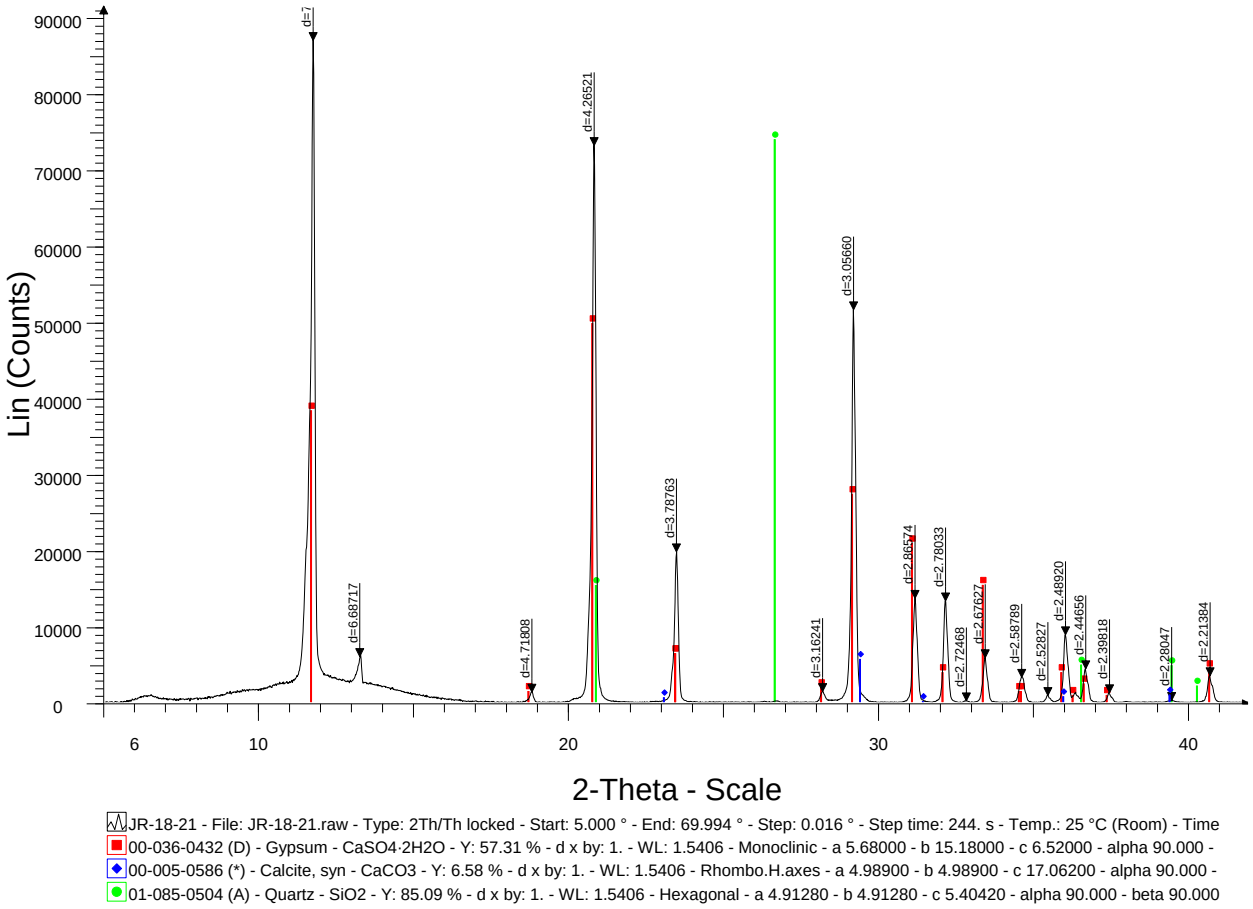


Figure 23 - pH = 12, S:L = 1:10, P_{CO_2} = 2.07 bar

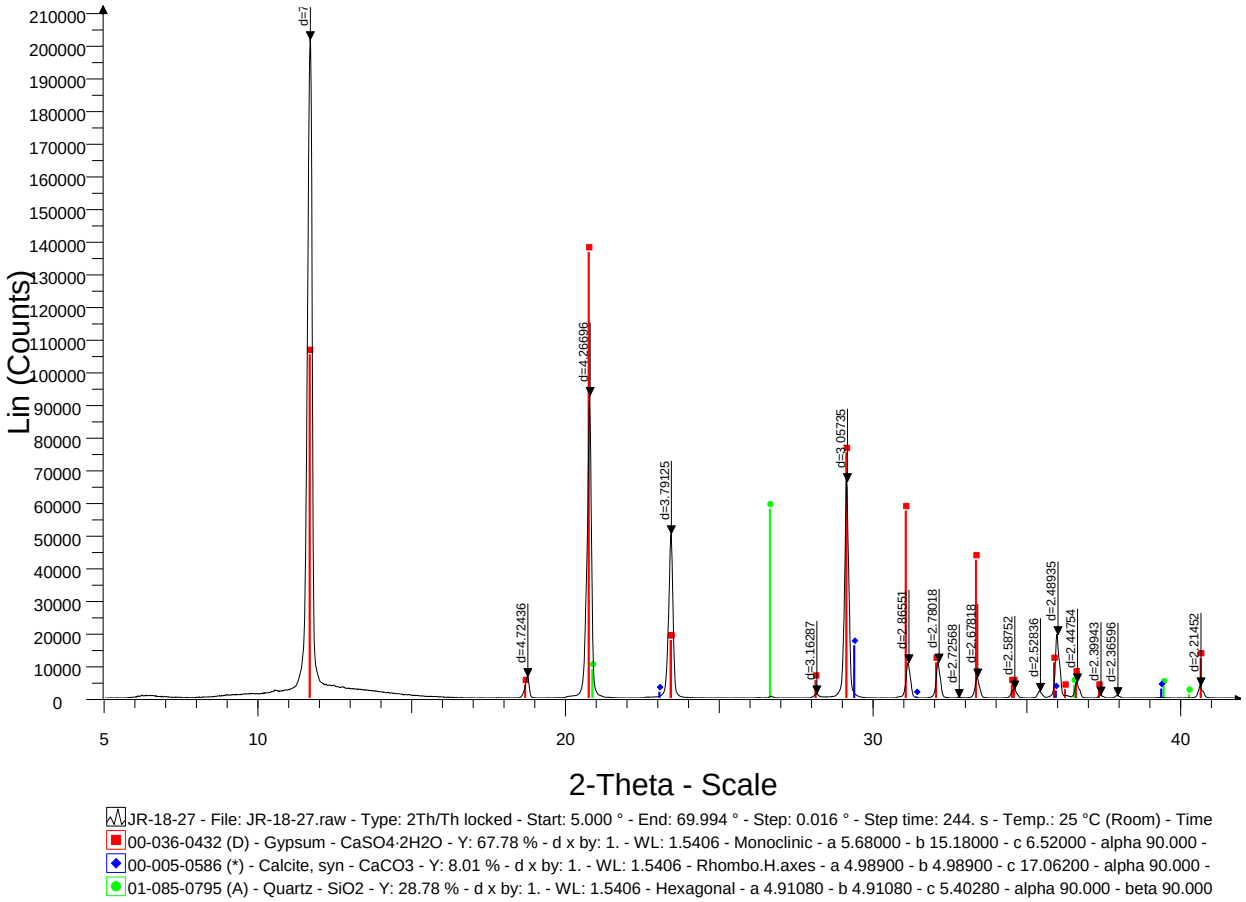


Figure 24 - pH = 12, S:L = 1:10, P_{CO_2} = 4.14 bar

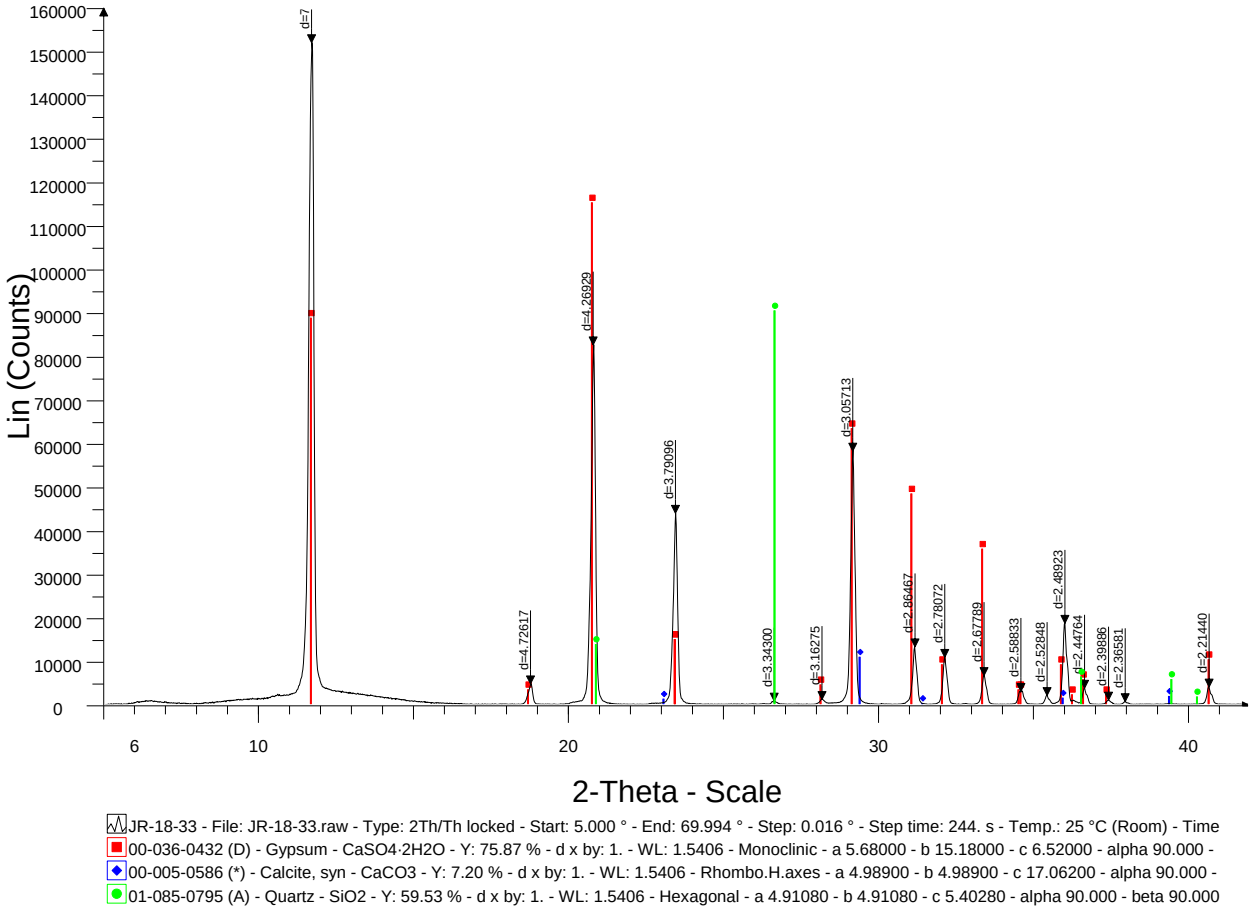


Figure 25 - pH = 12, S:L = 1:10, P_{CO_2} = 17.24 bar

III.II - pH = 12, S:L = 1:100

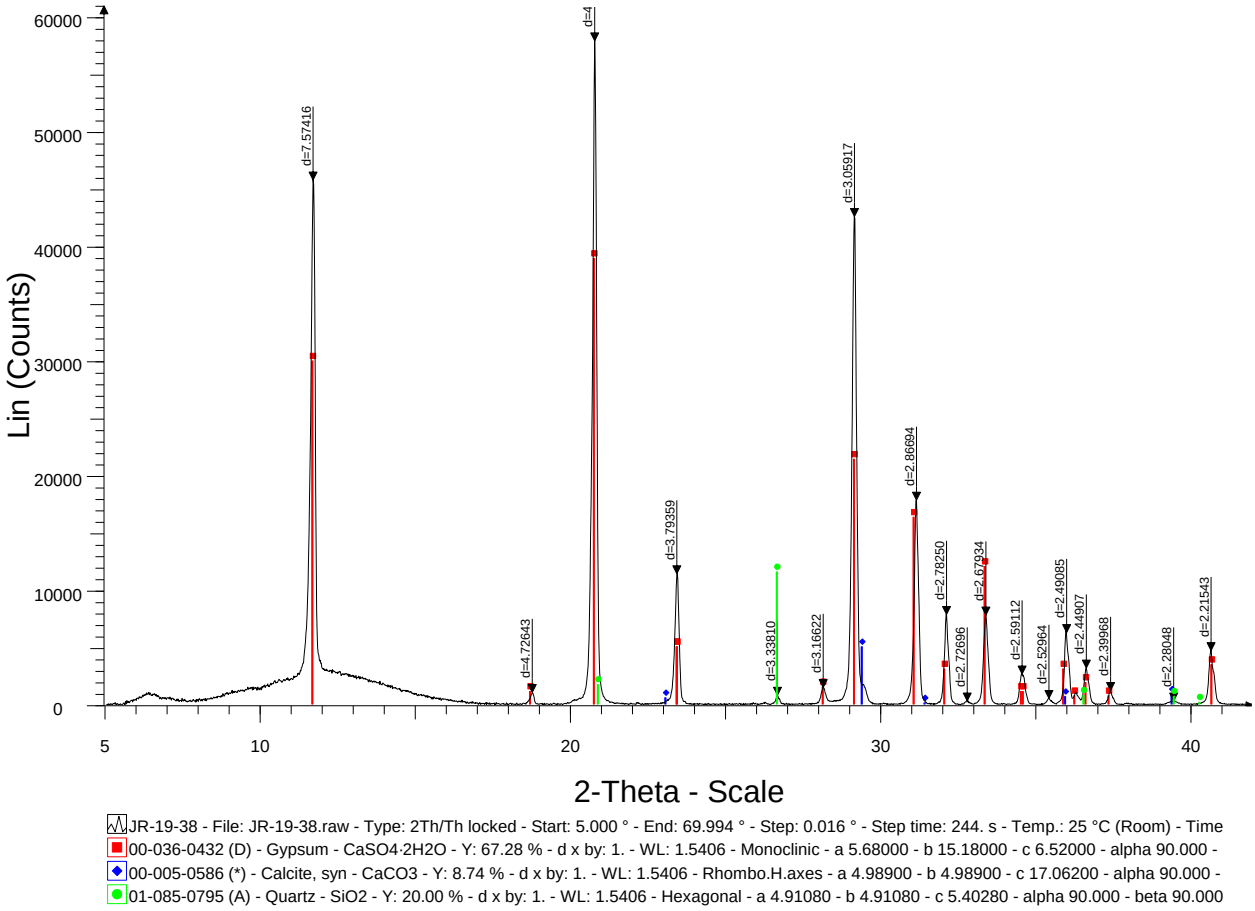


Figure 26 – pH = 12, S:L = 1:100, P_{CO_2} = 0 bar

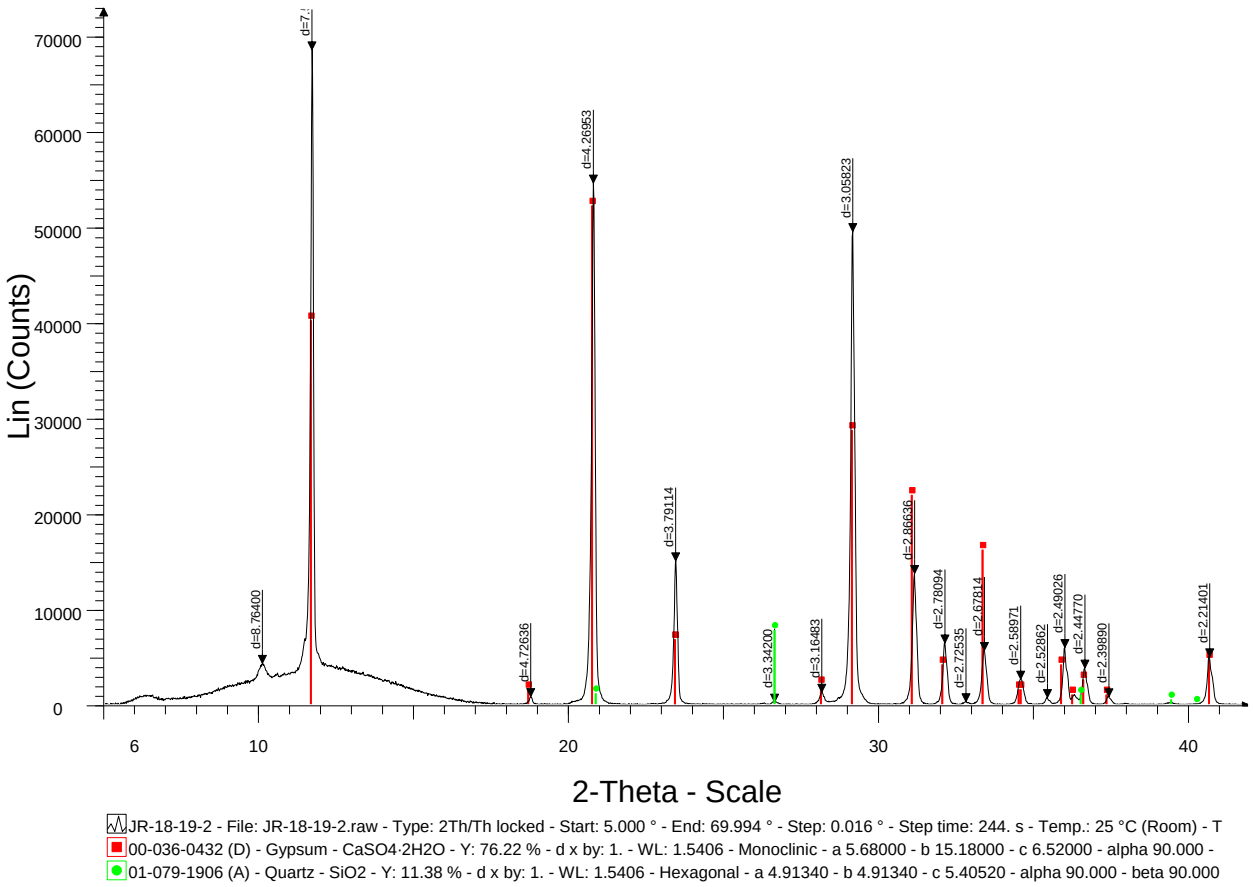


Figure 27 – pH = 12, S:L = 1:100, P_{CO_2} = 0.69 bar

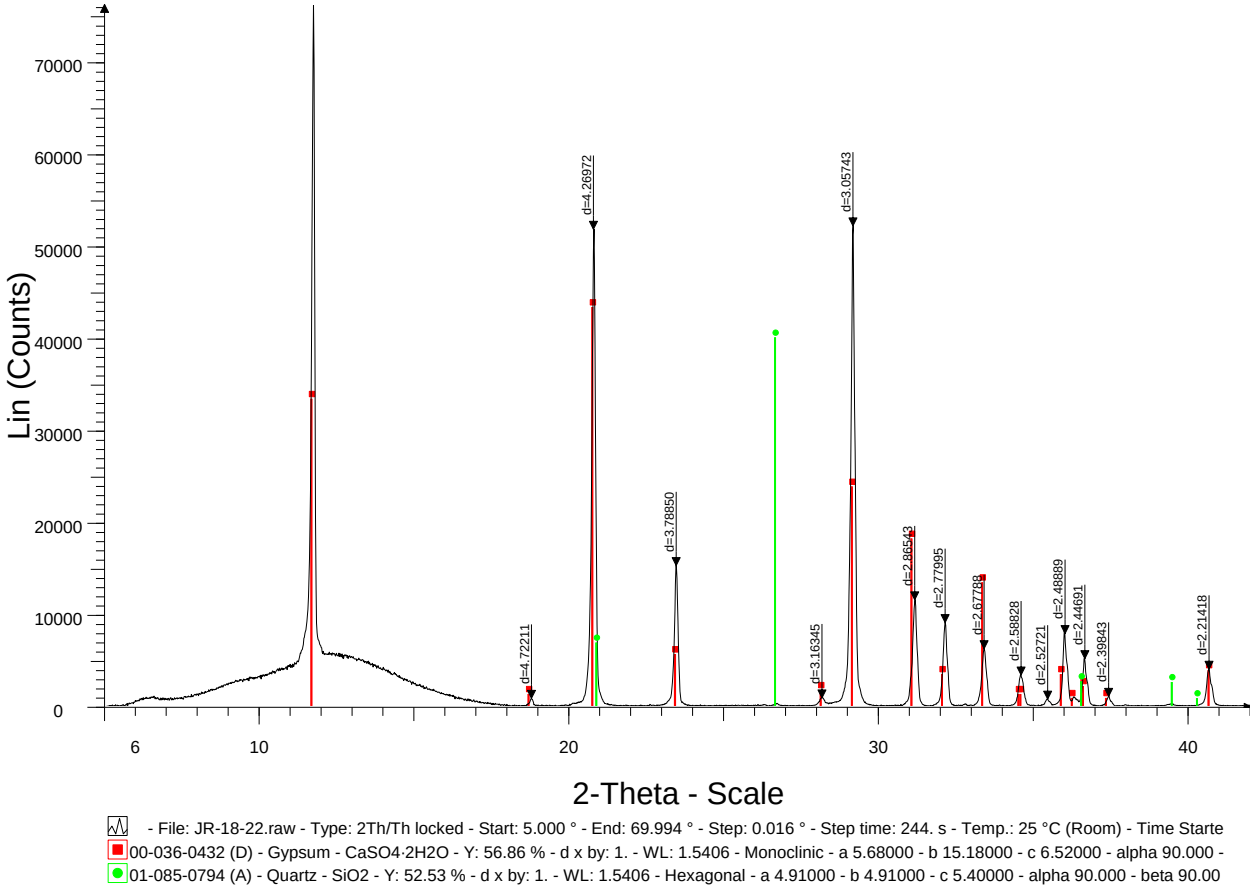


Figure 28 pH = 12, S:L = 1:100, P_{CO_2} = 2.07 bar

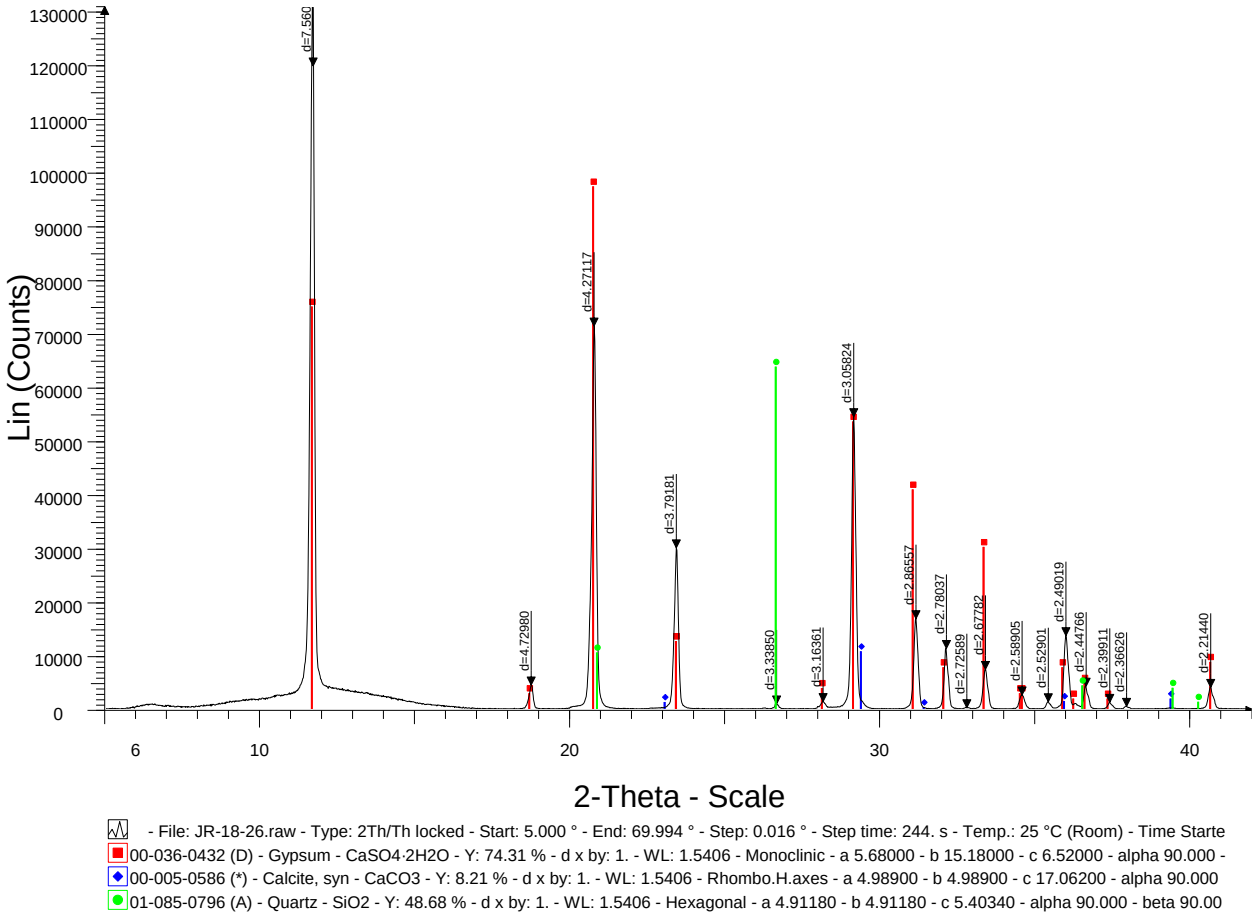


Figure 29 – pH = 12, S:L = 1:100, P_{CO_2} = 4.14 bar

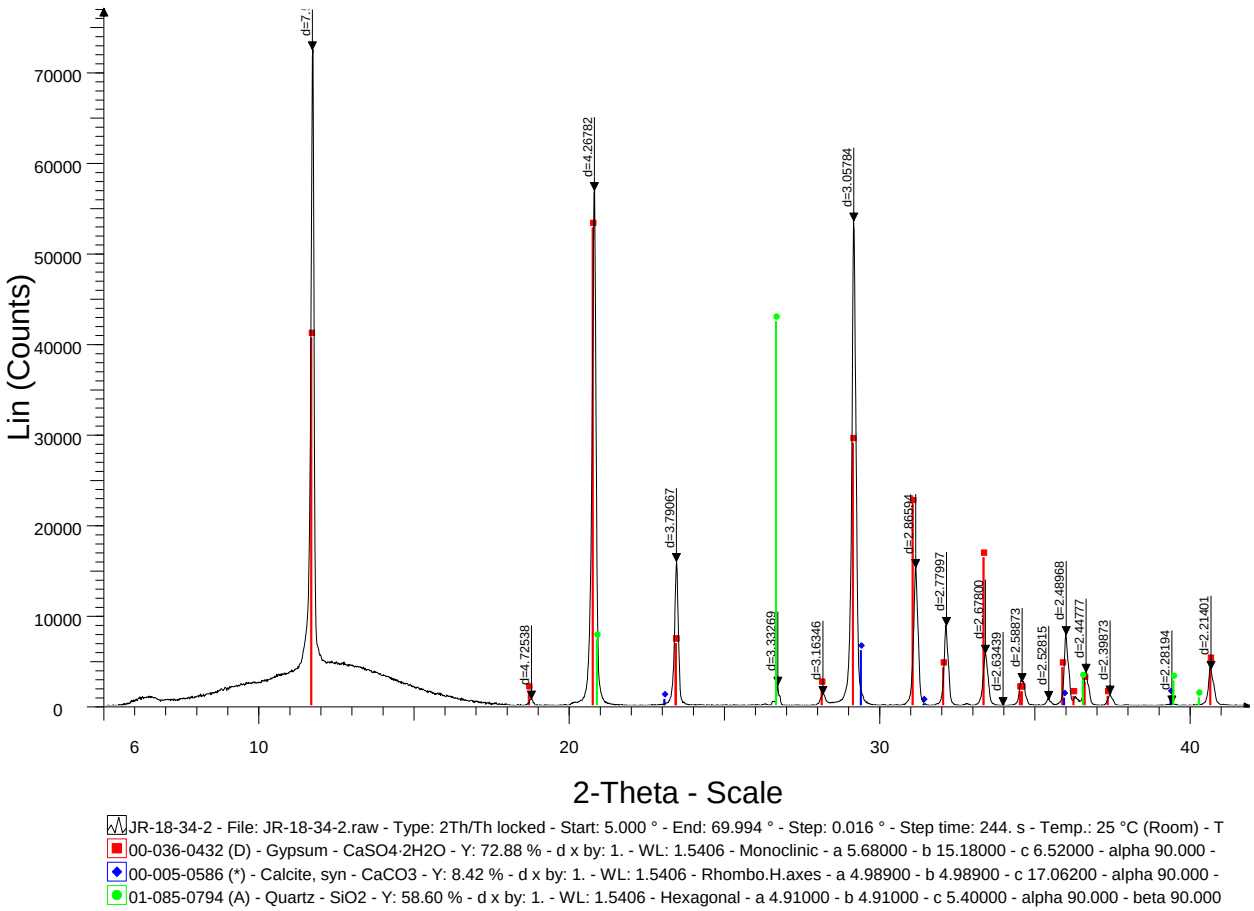


Figure 30 – pH = 12, S:L = 1:100, P_{CO_2} = 17.24 bar

III.III – pH = 13, S:L = 1:10

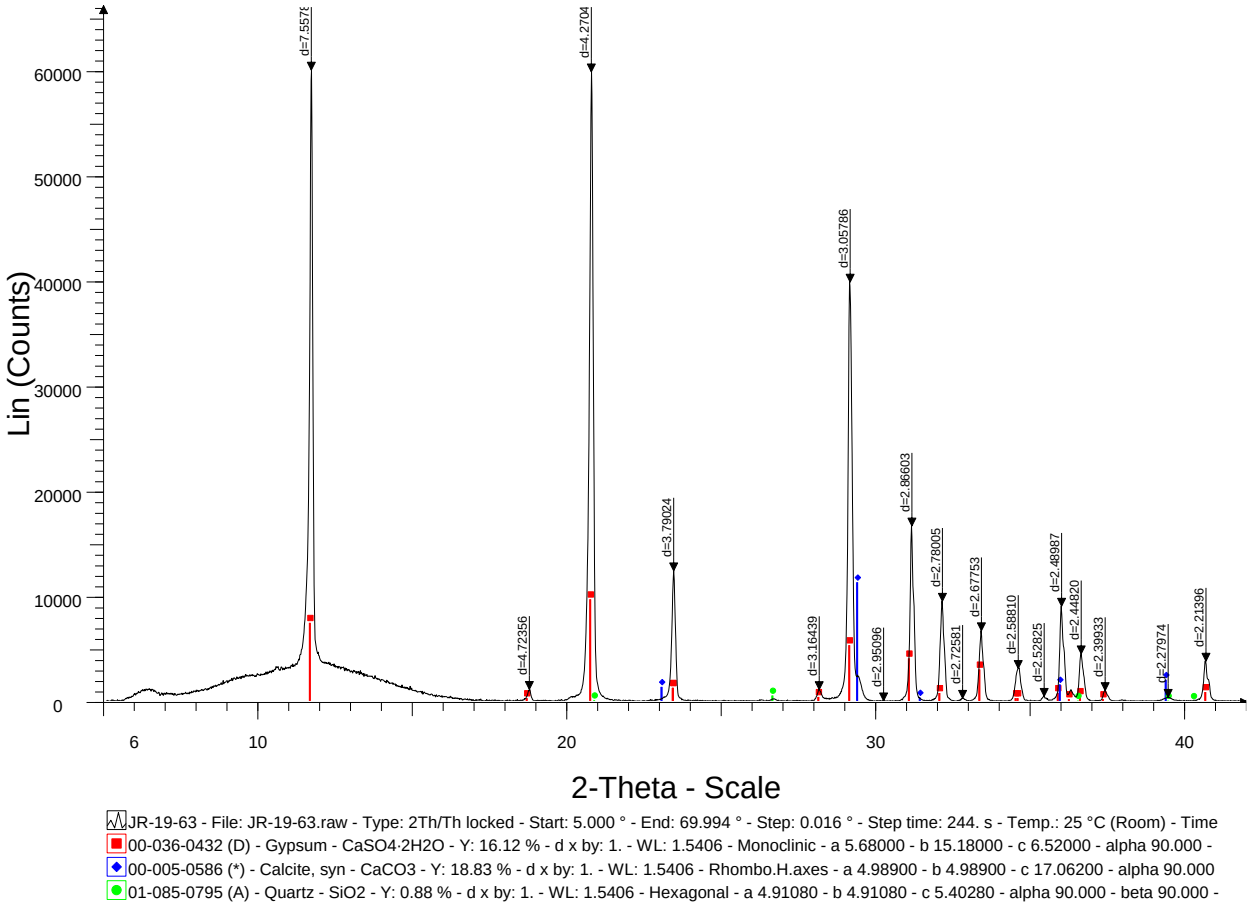


Figure 31 – pH = 13, S:L = 1:10, P_{CO_2} = 0.69 bar

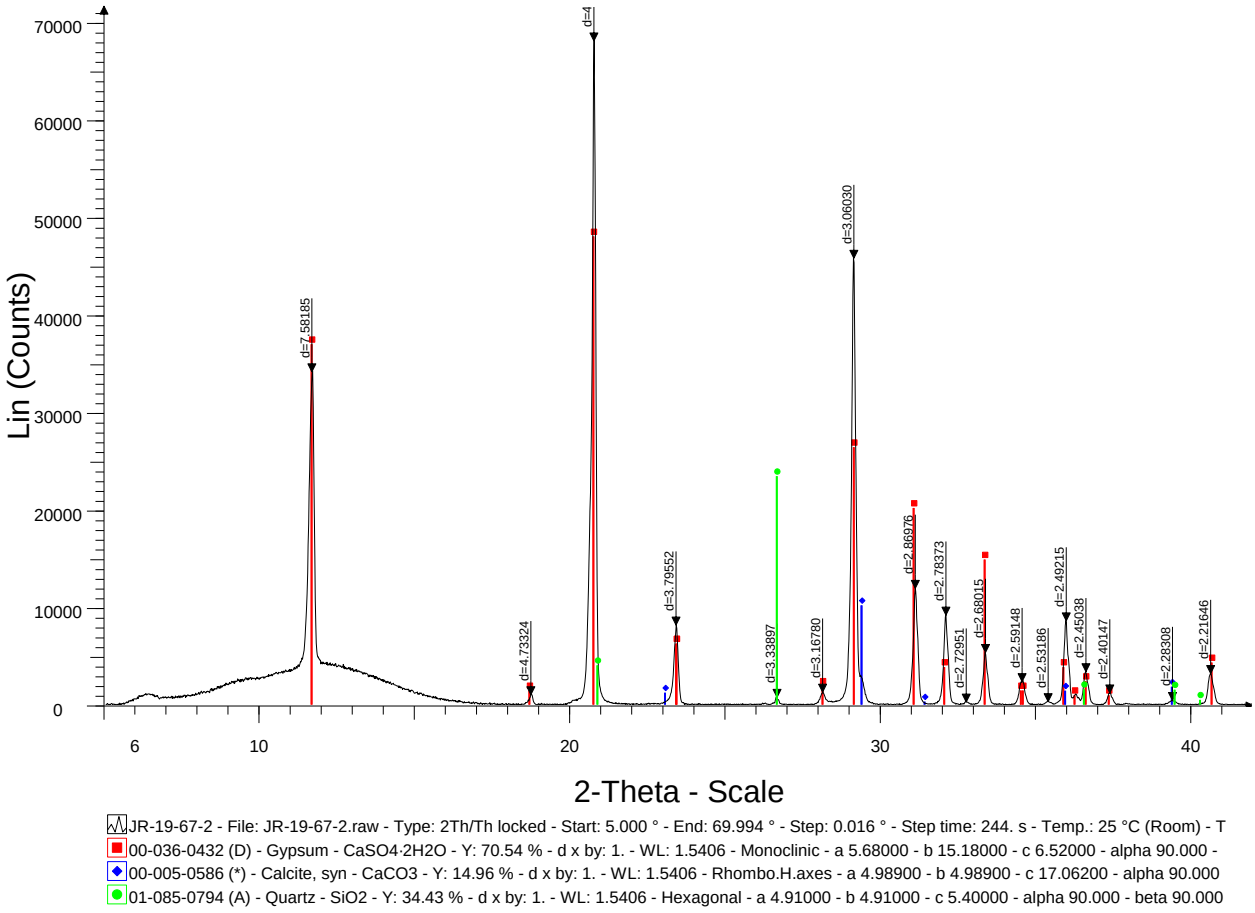


Figure 32 – pH = 13, S:L = 1:10, P_{CO_2} = 2.07 bar

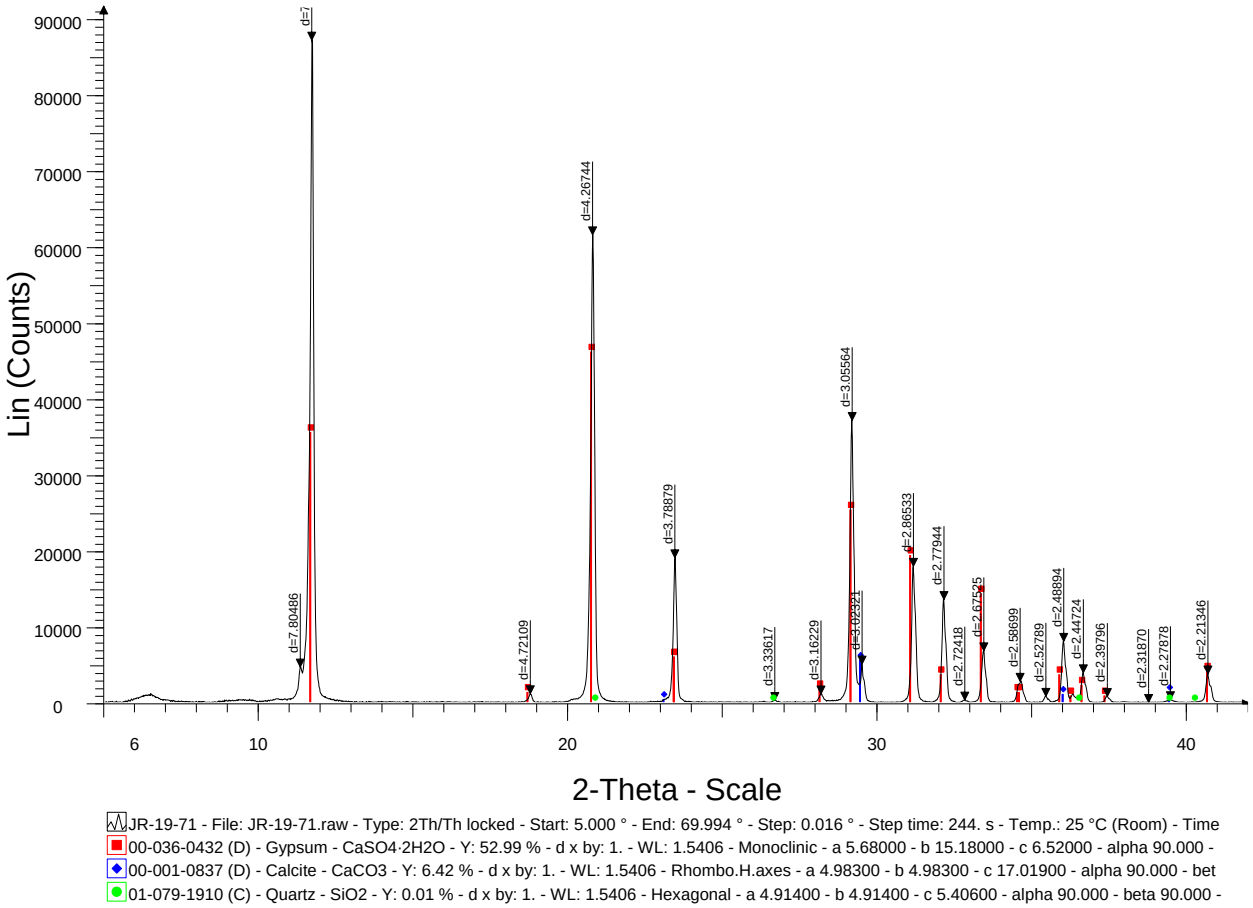


Figure 33 – pH = 13, S:L = 1:10, P_{CO_2} = 4.14 bar

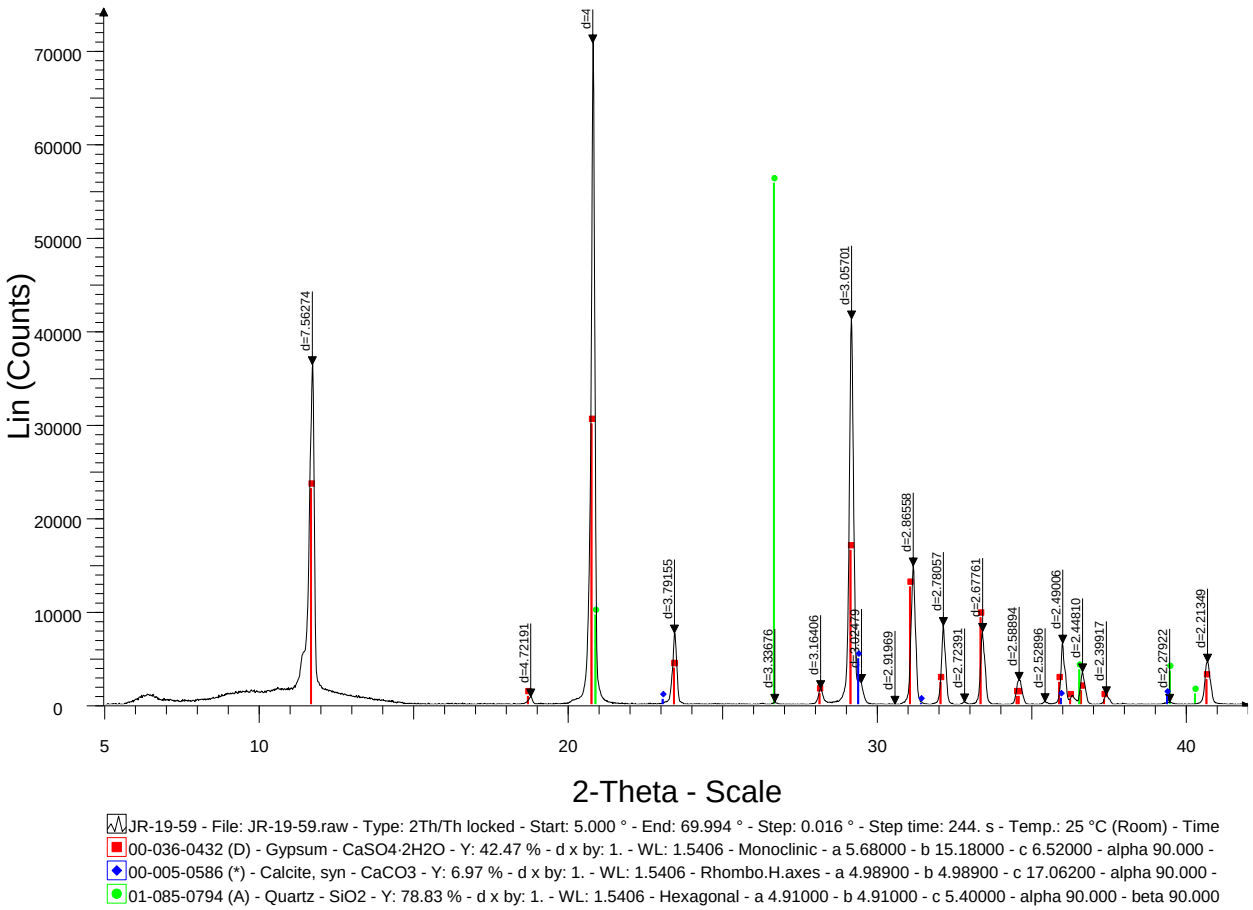


Figure 34 – pH = 13, S:L = 1:10, P_{CO_2} = 17.24 bar

III.IV – pH = 13, S:L = 1:100

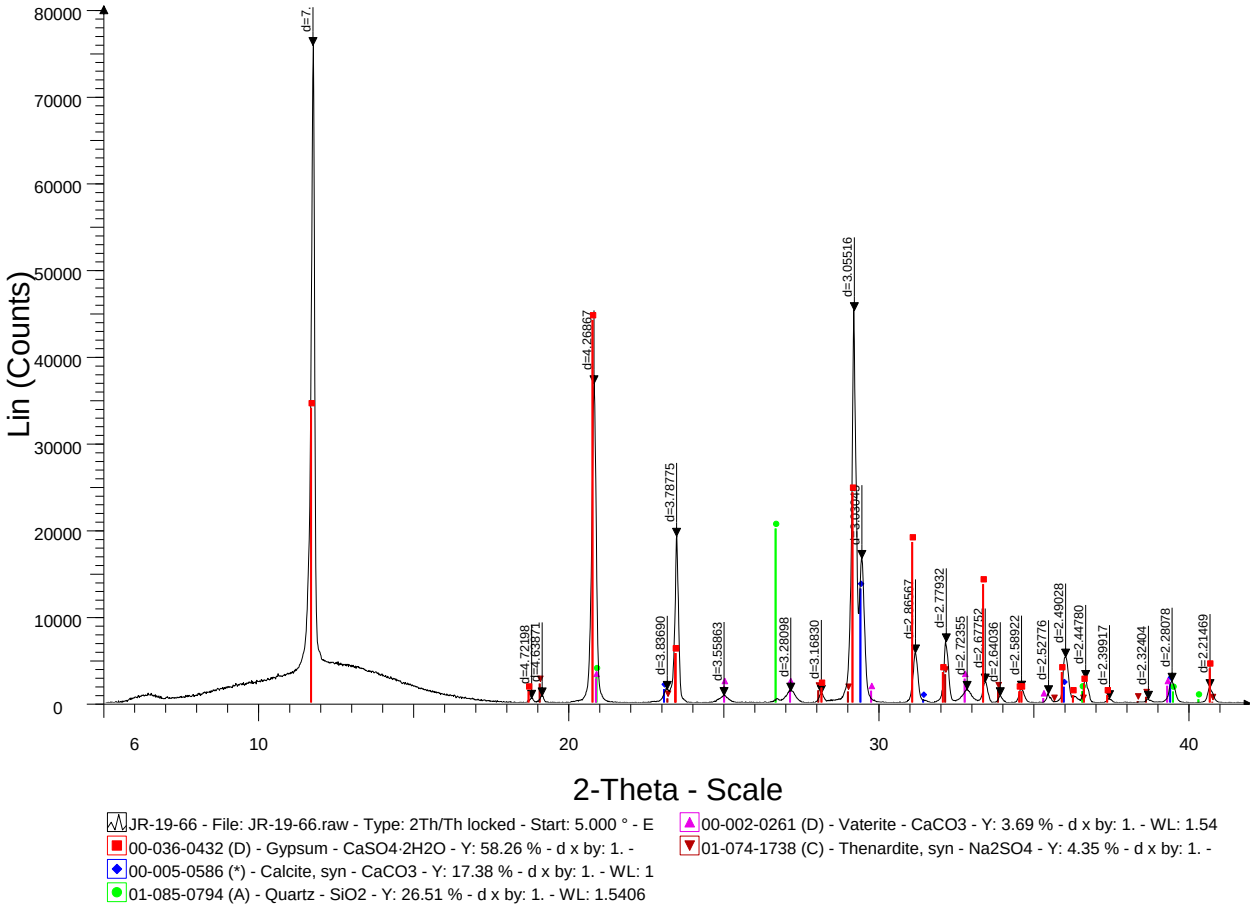


Figure 35 – pH = 13, S:L = 1:100, P_{CO_2} = 0.69 bar

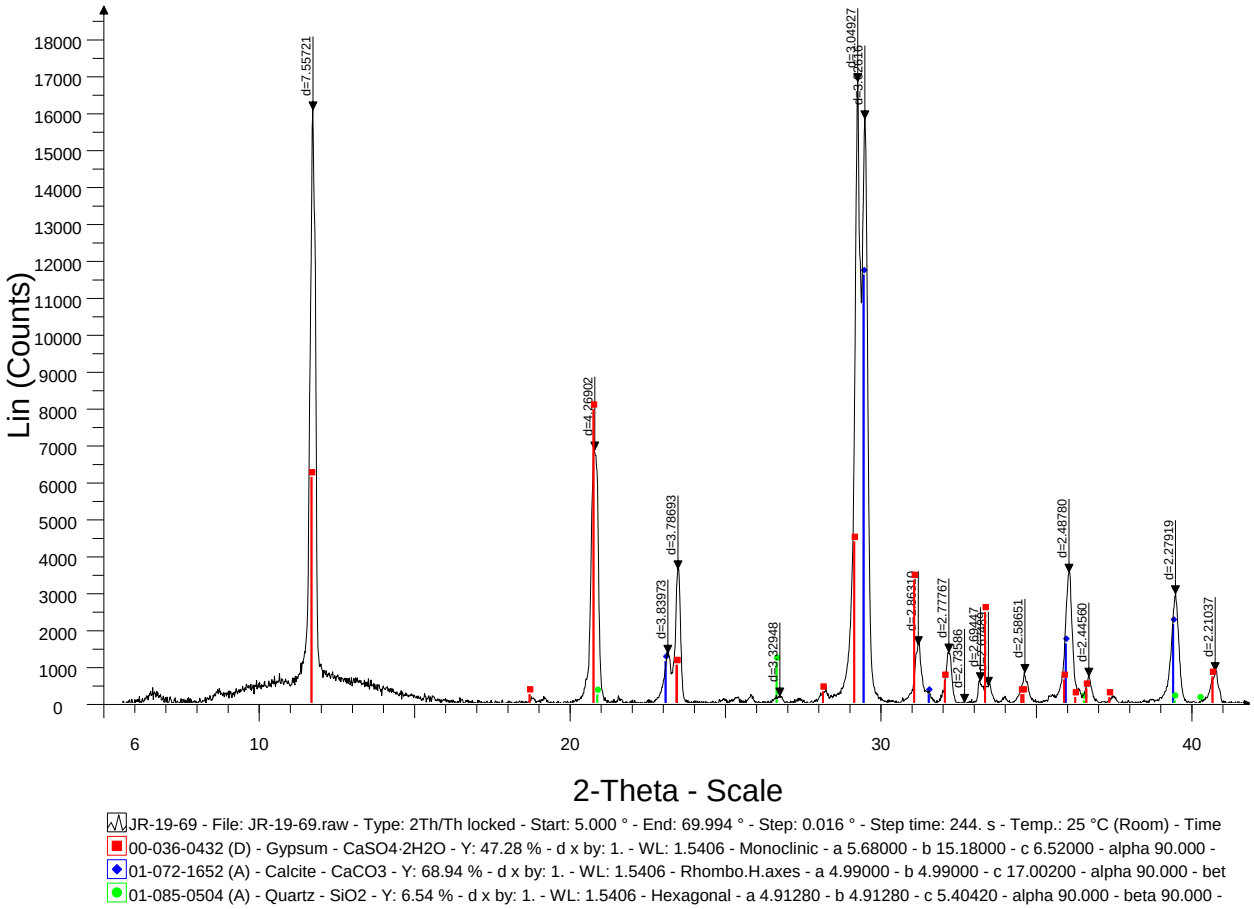


Figure 36 – pH = 13, S:L = 1:100, P_{CO_2} = 2.07 bar

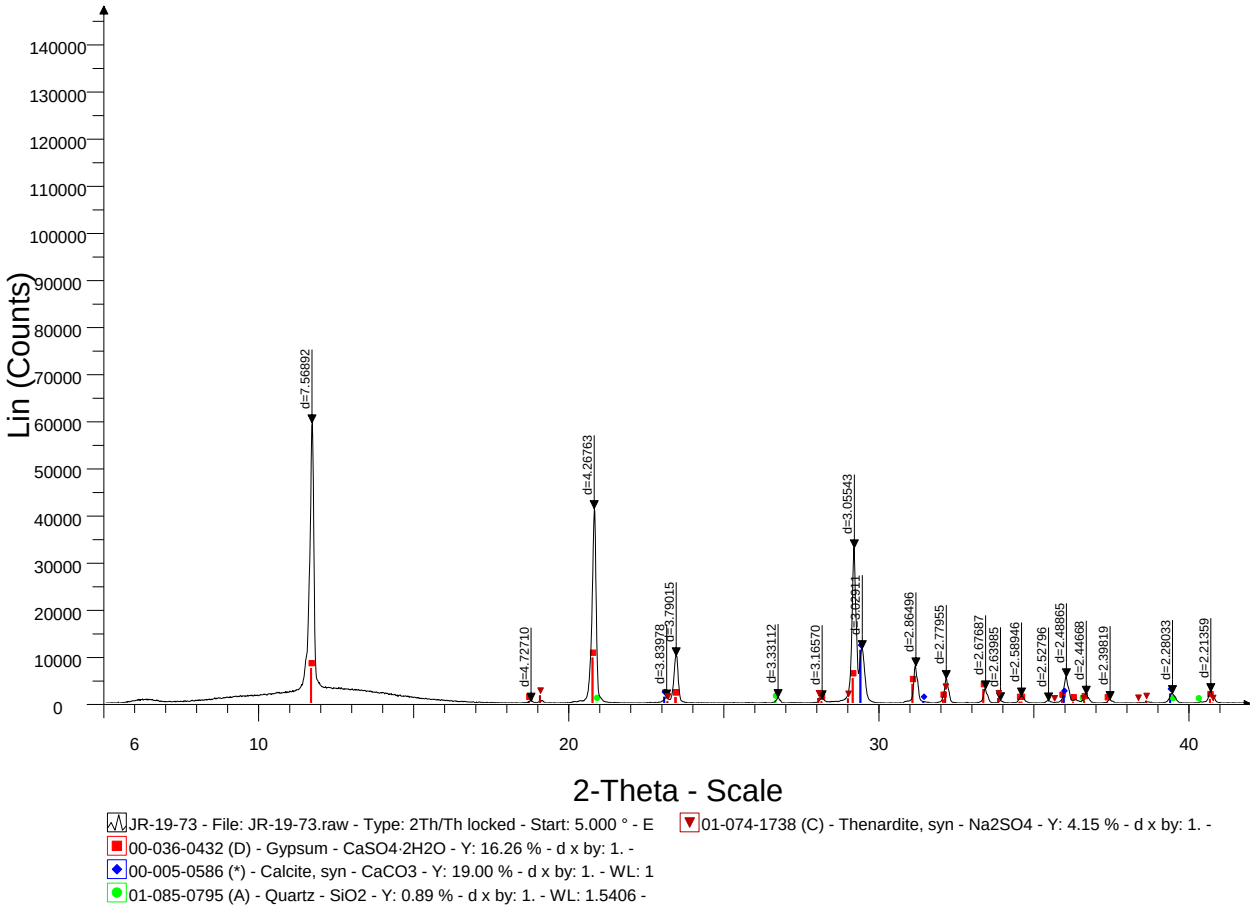


Figure 37 – pH = 13, S:L = 1:100, P_{CO_2} = 4.14 bar

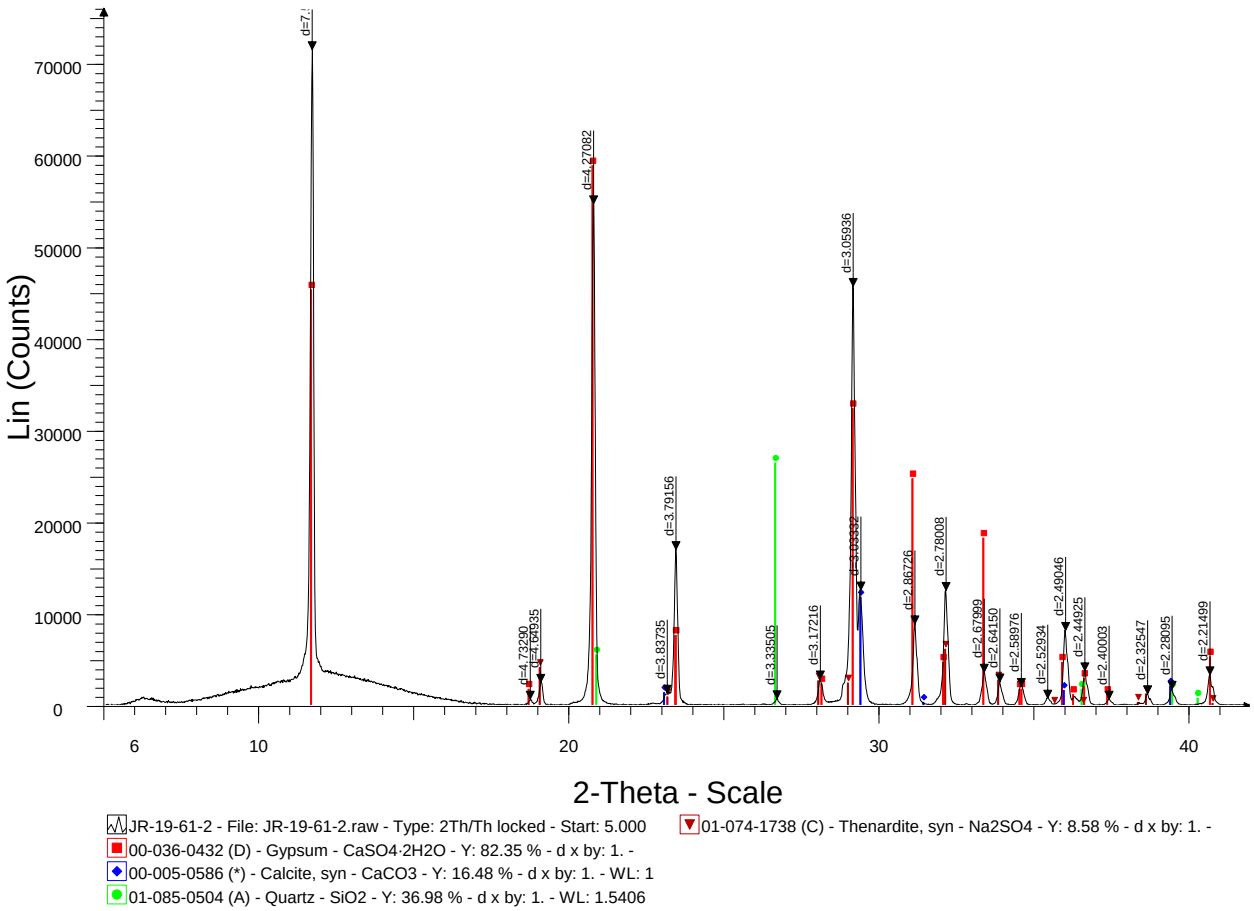


Figure 38 – pH = 13, S:L = 1:100, P_{CO_2} = 17.24 bar

III.V – pH = 13.5, S:L = 1:10

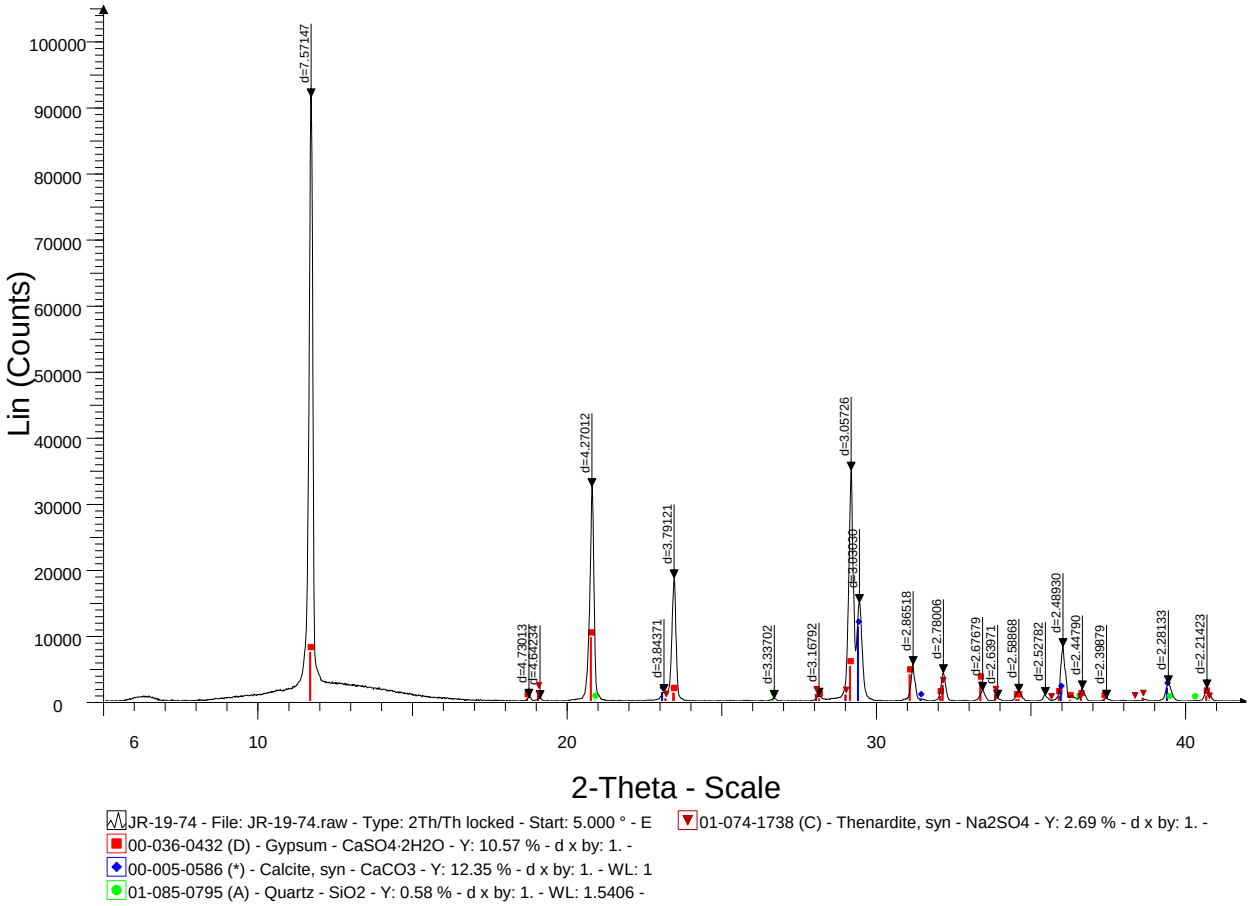


Figure 39 – pH = 13.5, S:L = 1:10, P_{CO_2} = 0.69 bar

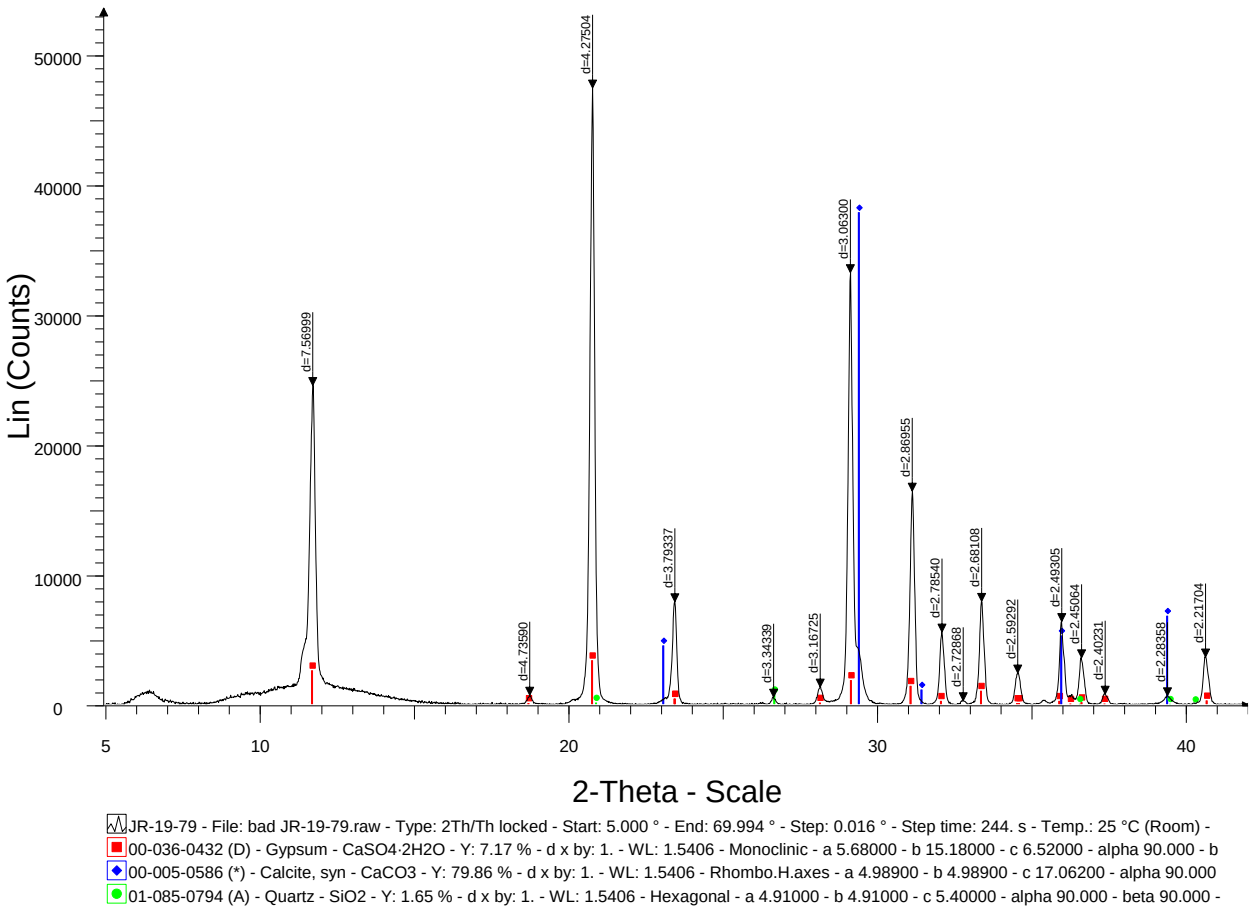


Figure 40 – pH = 13.5, S:L = 1:10, P_{CO_2} = 2.07 bar

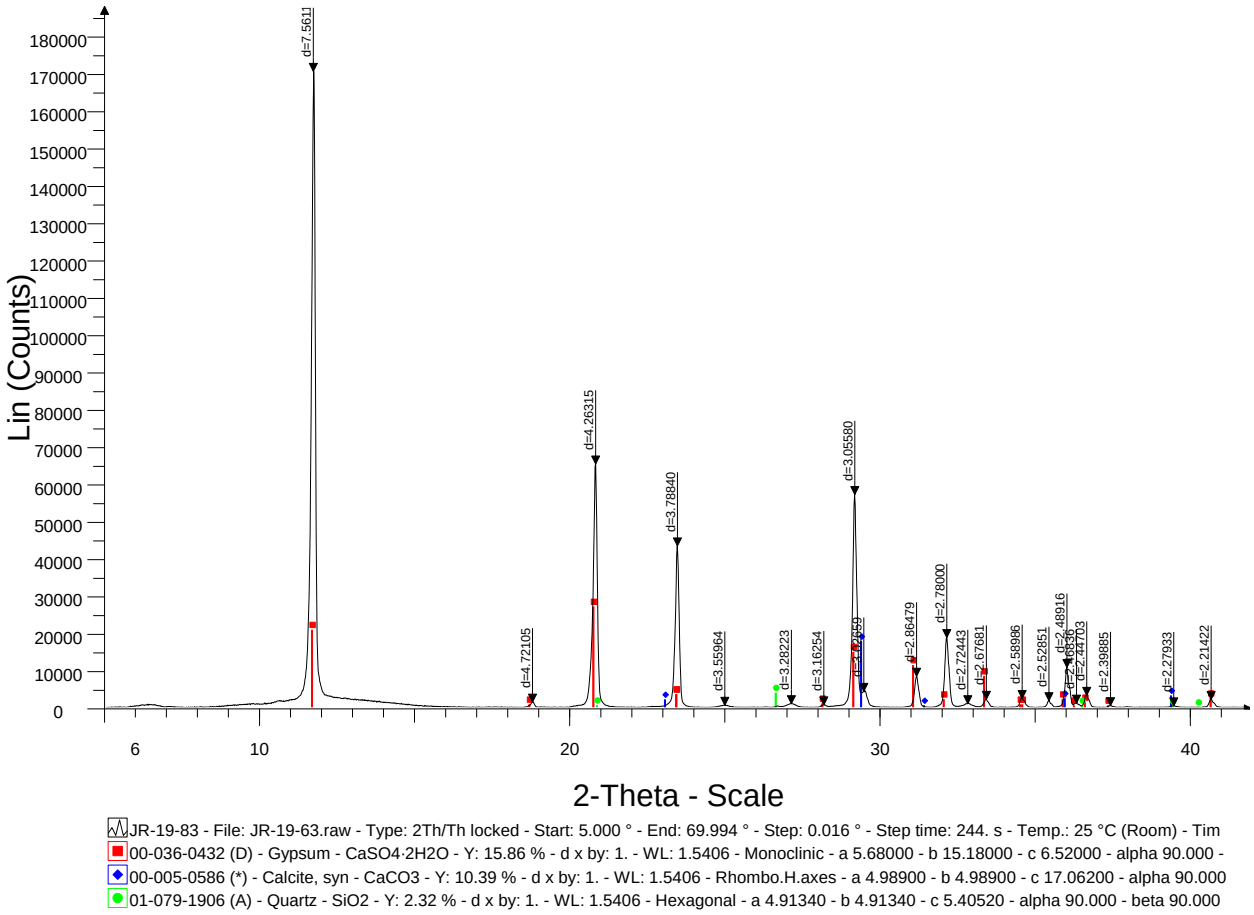


Figure 41 – pH = 13.5, S:L = 1:10, P_{CO_2} = 4.14 bar

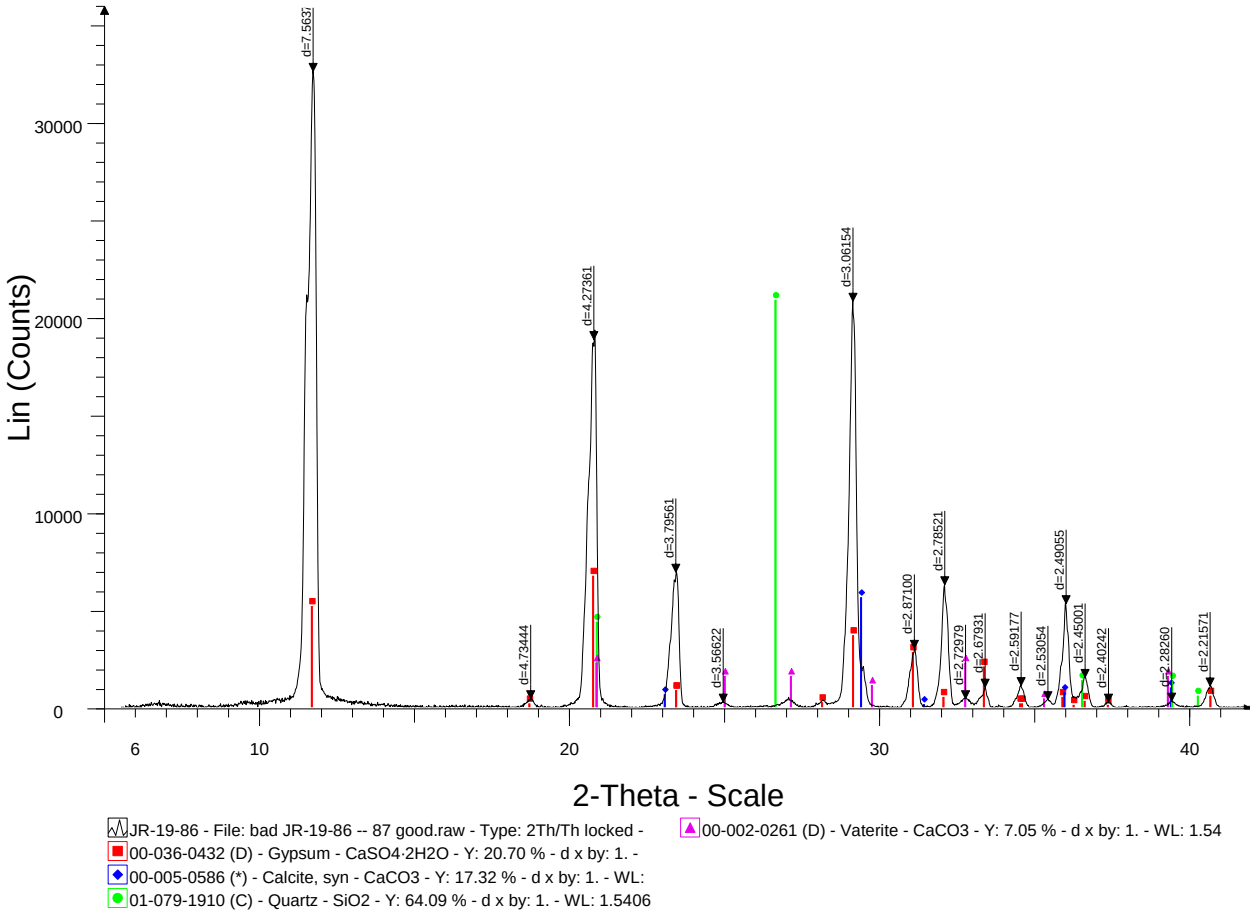


Figure 42 – pH = 13.5, S:L = 1:10, P_{CO_2} = 17.24 bar

III.VI – pH = 13.5, S:L = 1:100

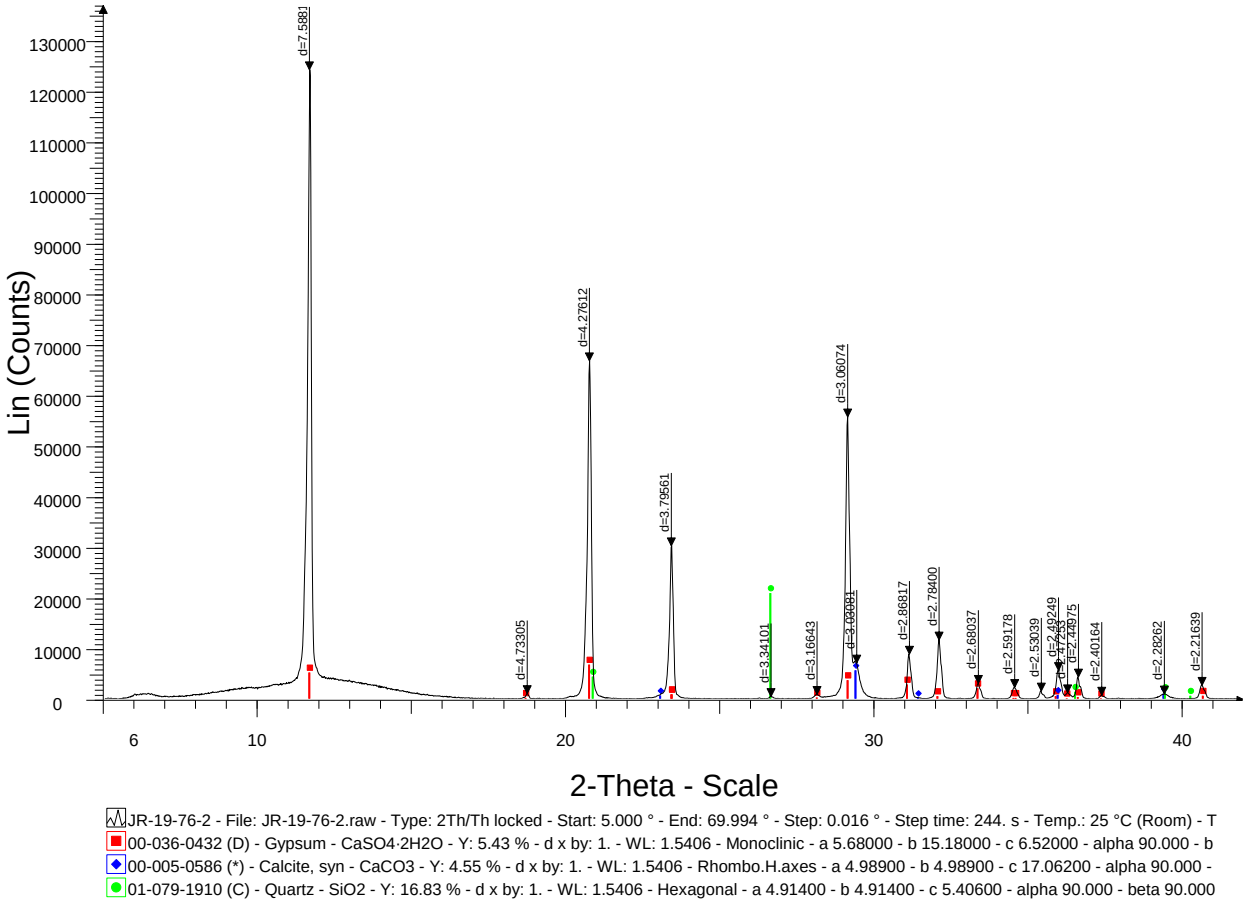


Figure 43 – pH = 13.5, S:L = 1:100, P_{CO_2} = 0.69 bar

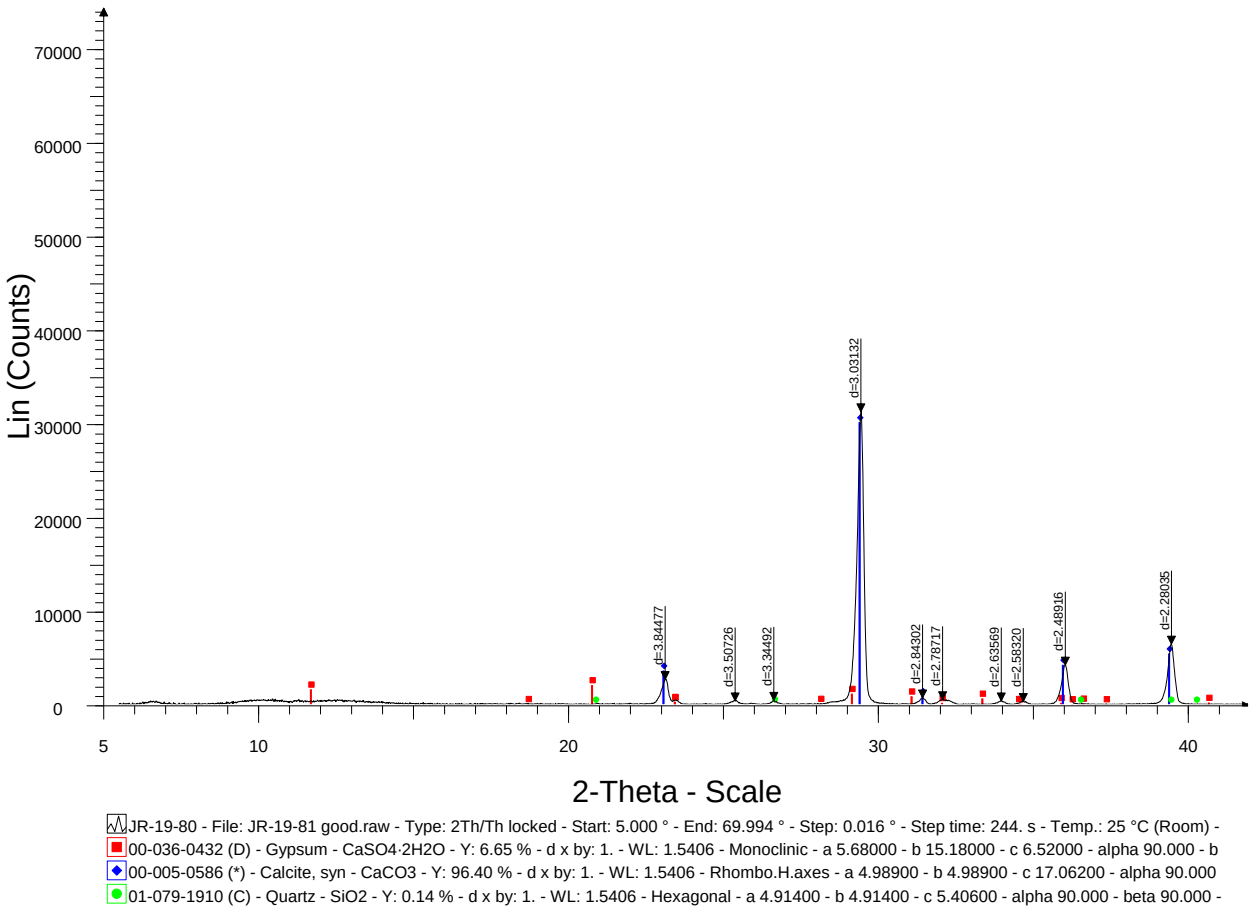


Figure 44 – pH = 13.5, S:L = 1:100, P_{CO_2} = 2.07 bar

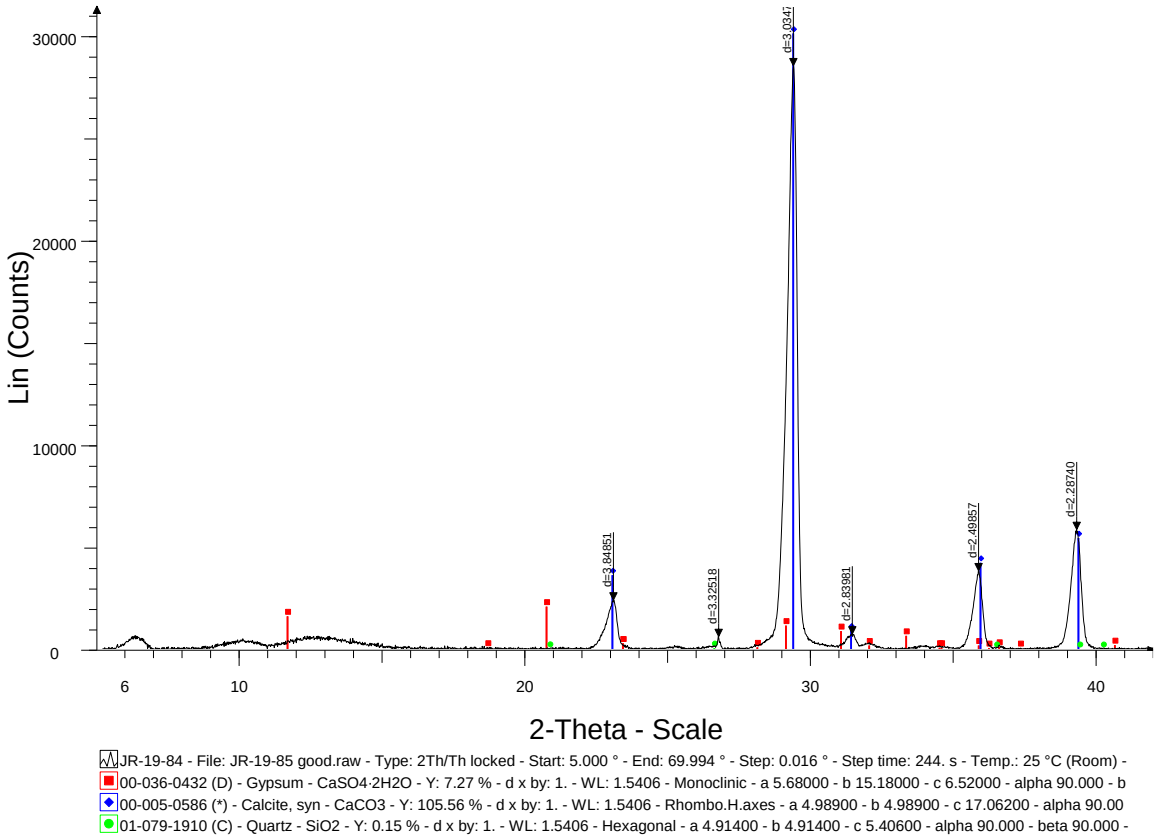


Figure 45 – pH = 13.5, S:L = 1:100, P_{CO_2} = 4.14 bar

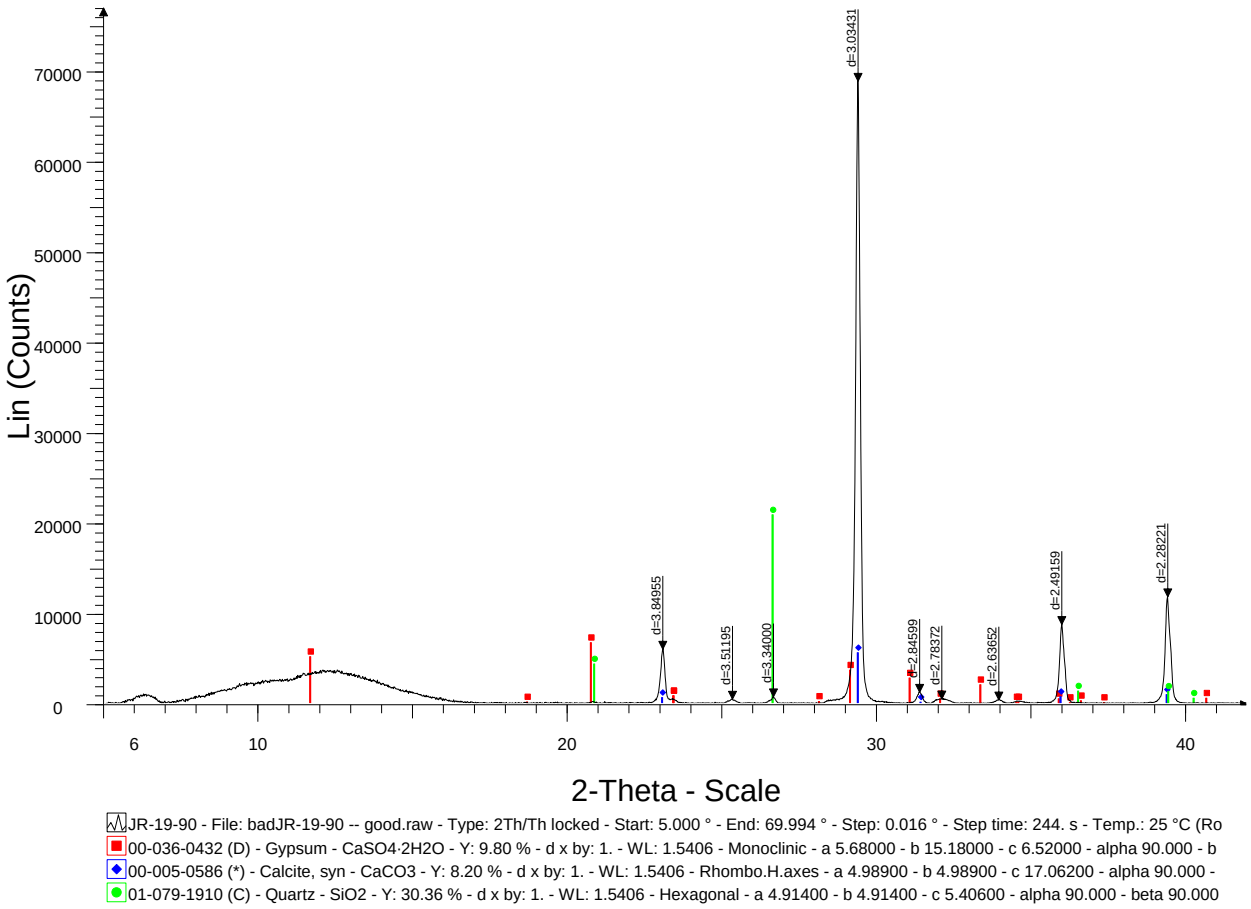


Figure 46 – pH = 13.5, S:L = 1:100, P_{CO_2} = 17.24 bar

III.VII – pH = 14, S:L= 1:10

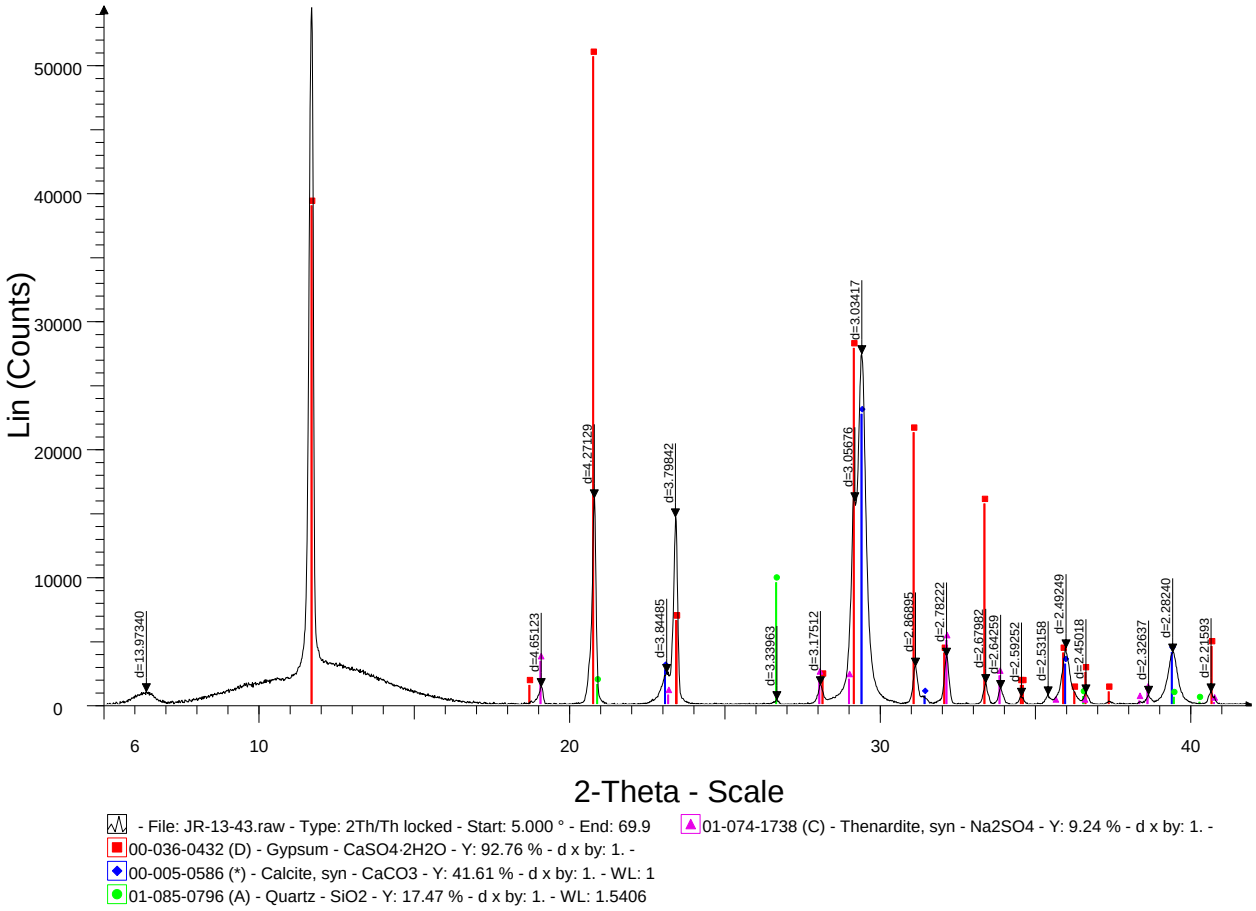


Figure 47 – pH = 14, S:L = 1:10, P_{CO_2} = 0.69 bar

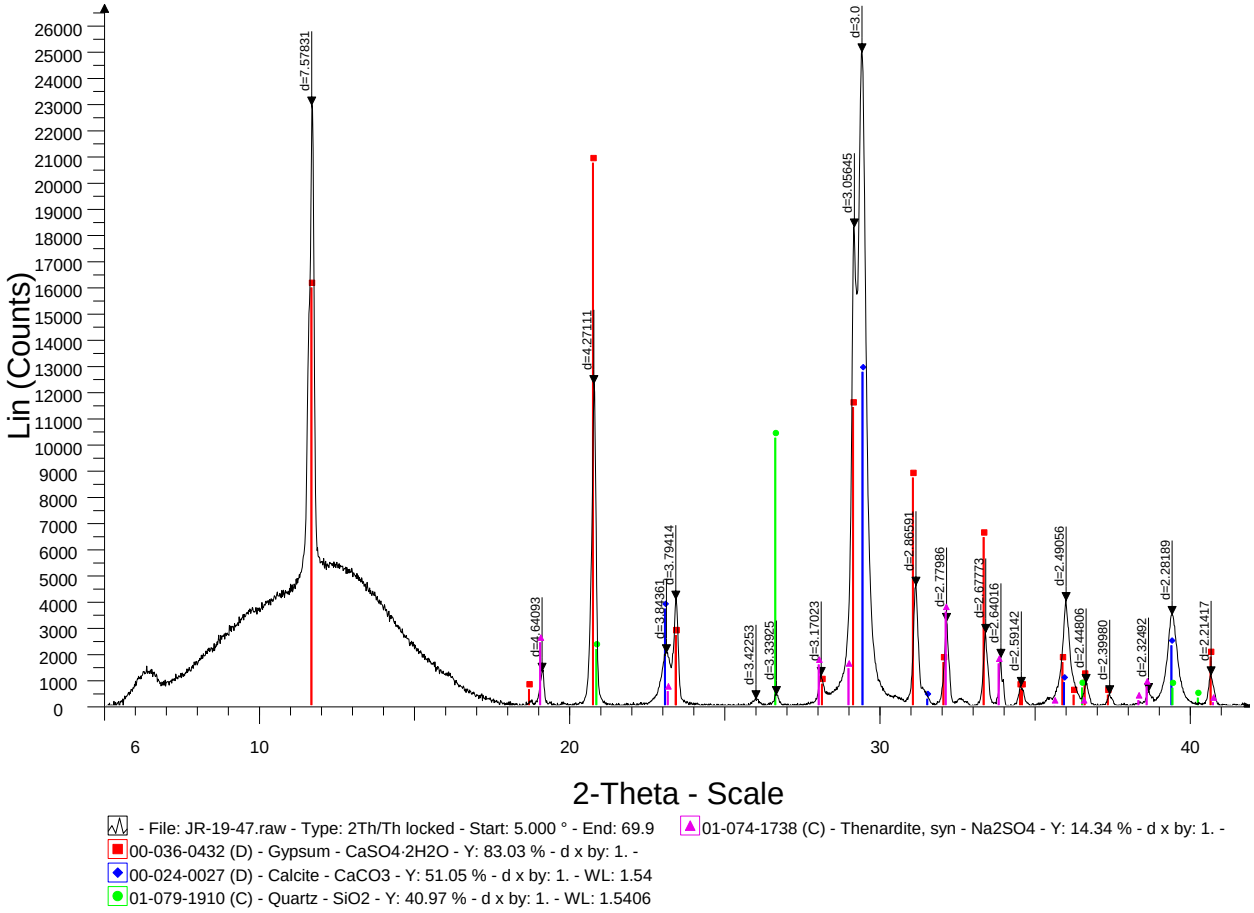


Figure 48 – pH = 14, S:L = 1:10, P_{CO_2} = 2.07 bar

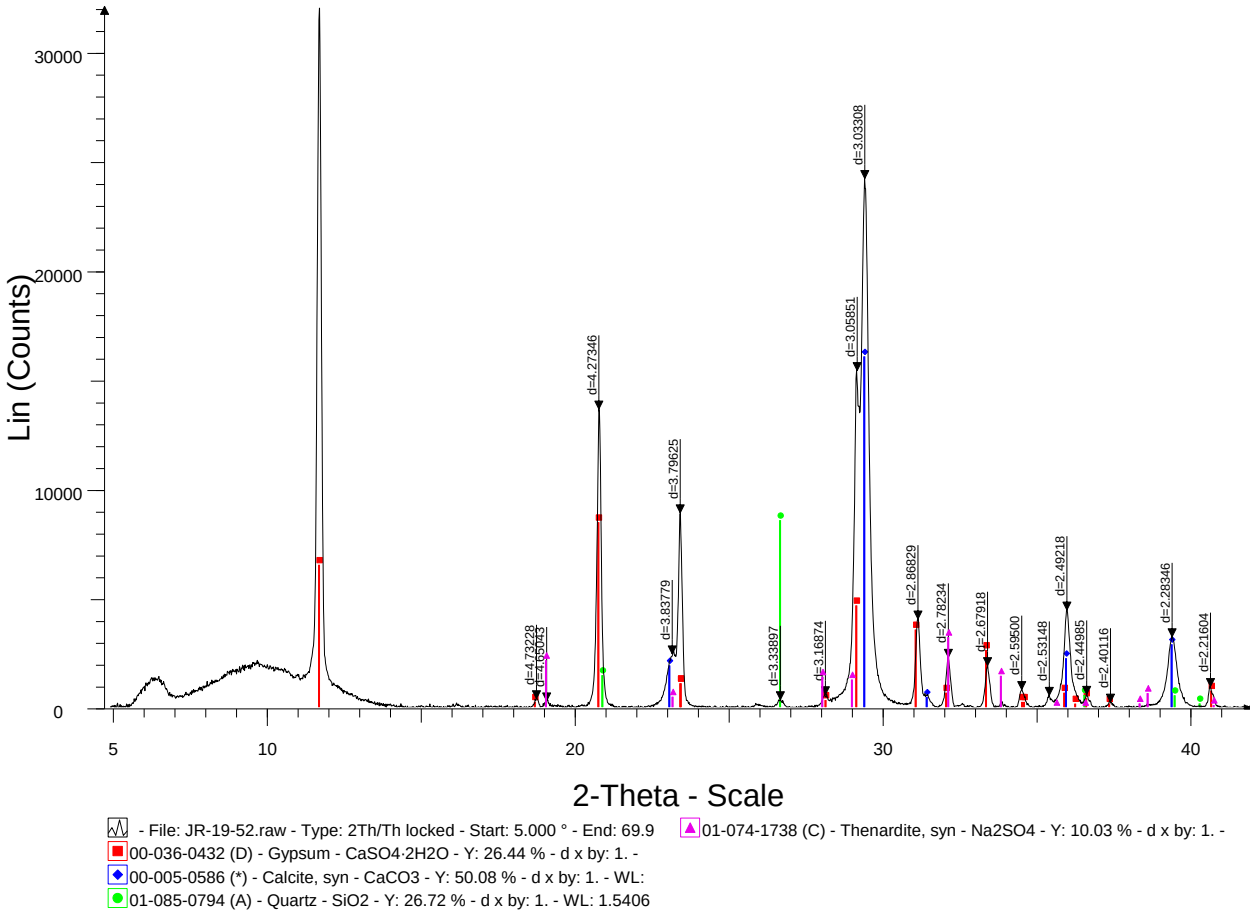


Figure 49 – pH = 14, S:L = 1:10, P_{CO_2} = 4.14 bar

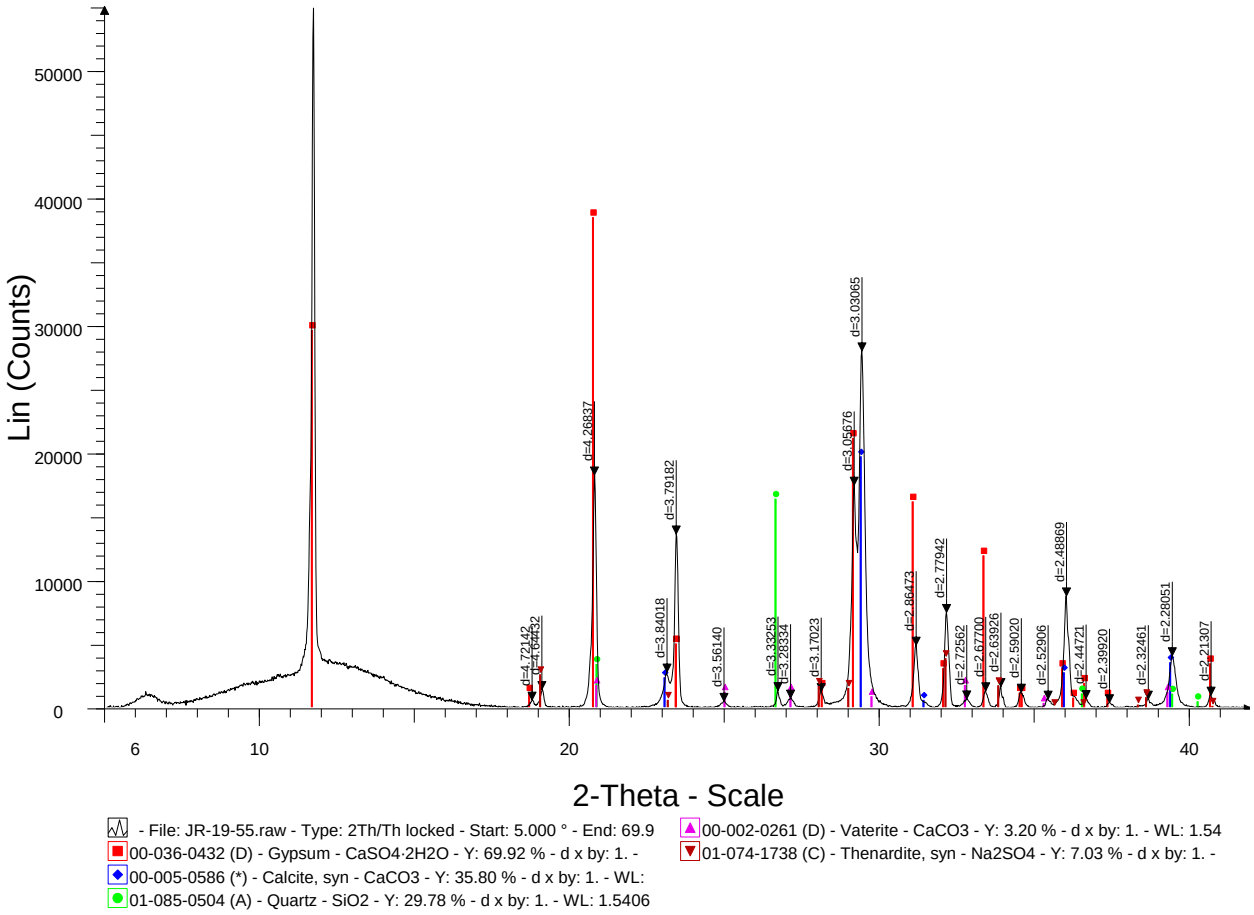


Figure 50 – pH = 14, S:L = 1:10, P_{CO_2} = 17.24 bar

III.VIII – pH = 14, S:L= 1:100

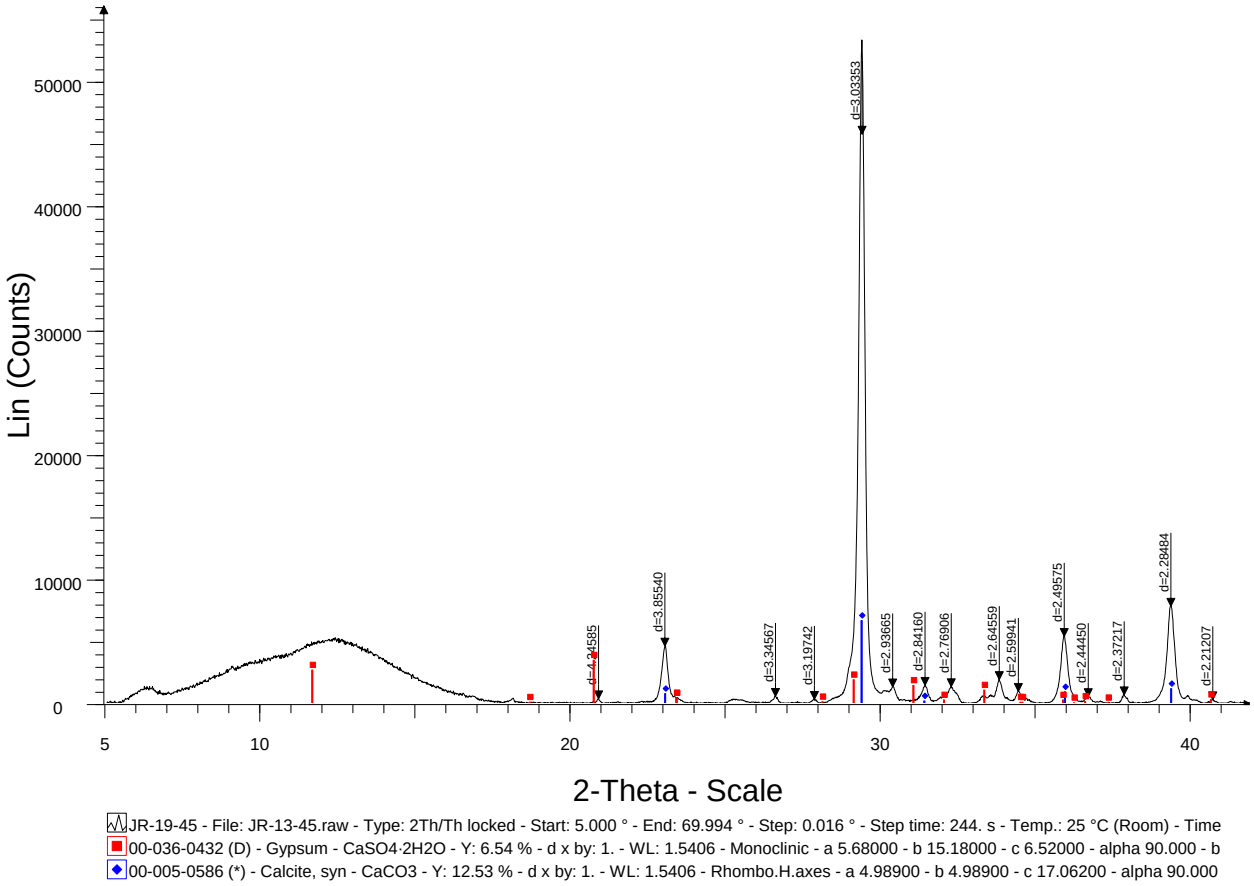


Figure 51 – pH = 14, S:L = 1:100, P_{CO_2} = 0.69 bar

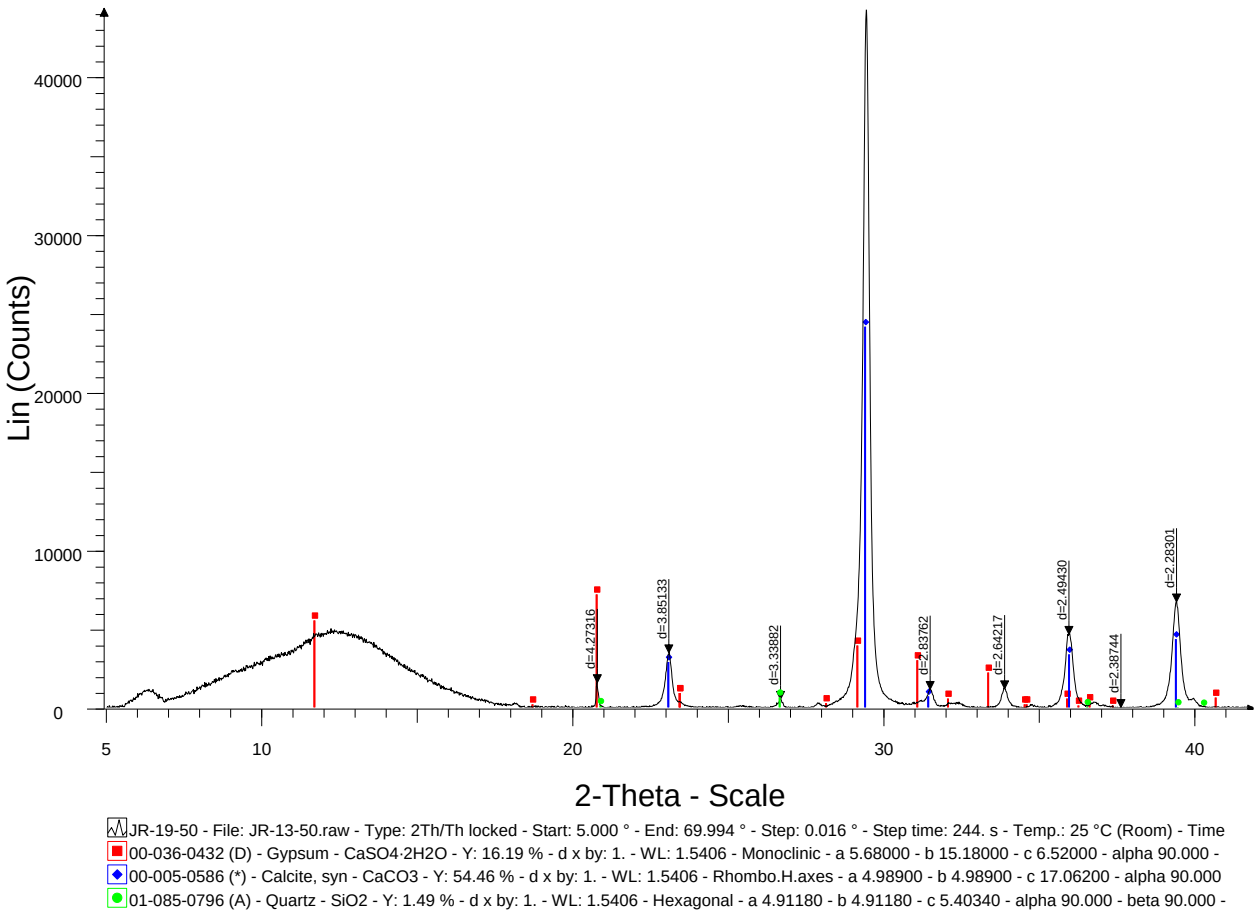


Figure 52 – pH = 14, S:L = 1:100, P_{CO_2} = 2.07 bar

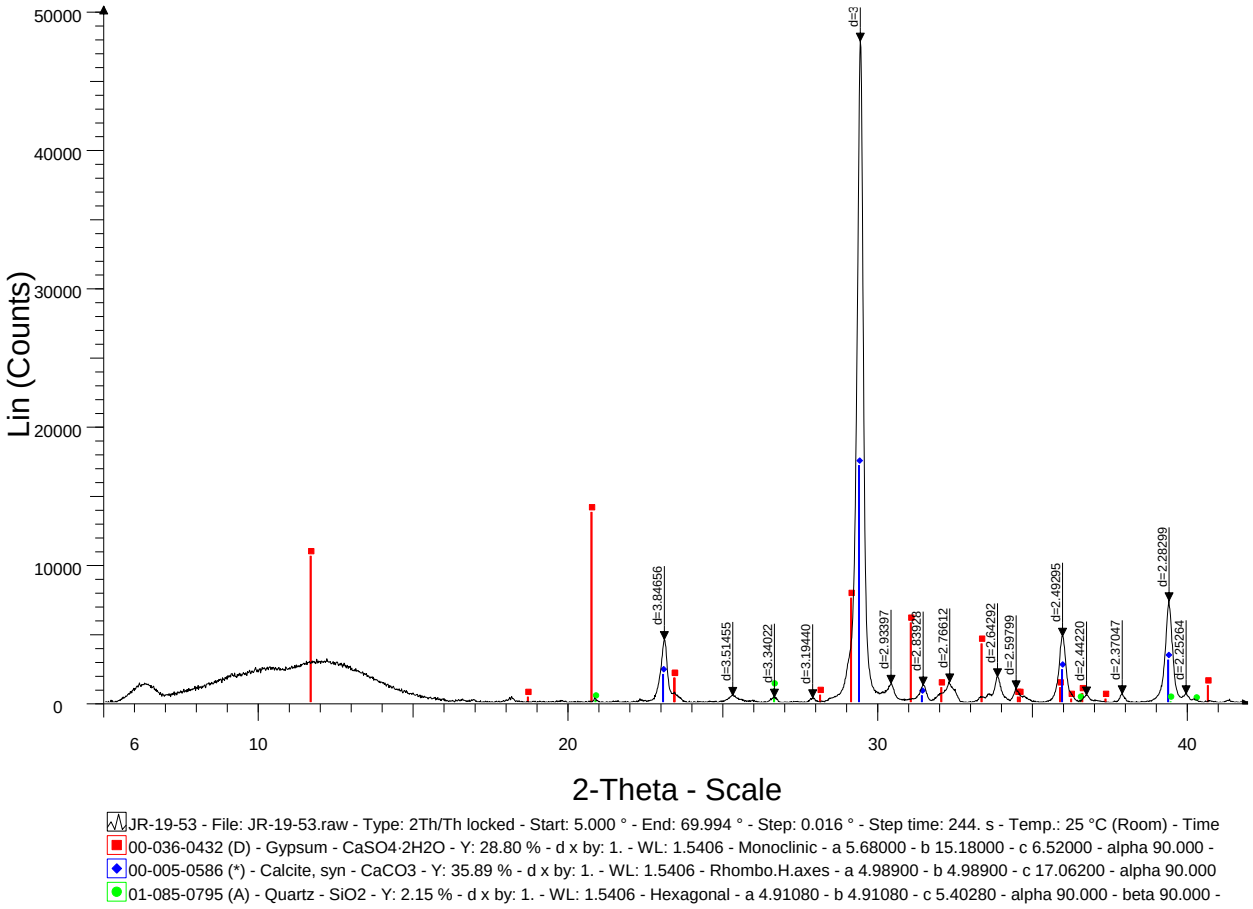


Figure 53 – pH = 14, S:L = 1:100, P_{CO_2} = 4.14 bar

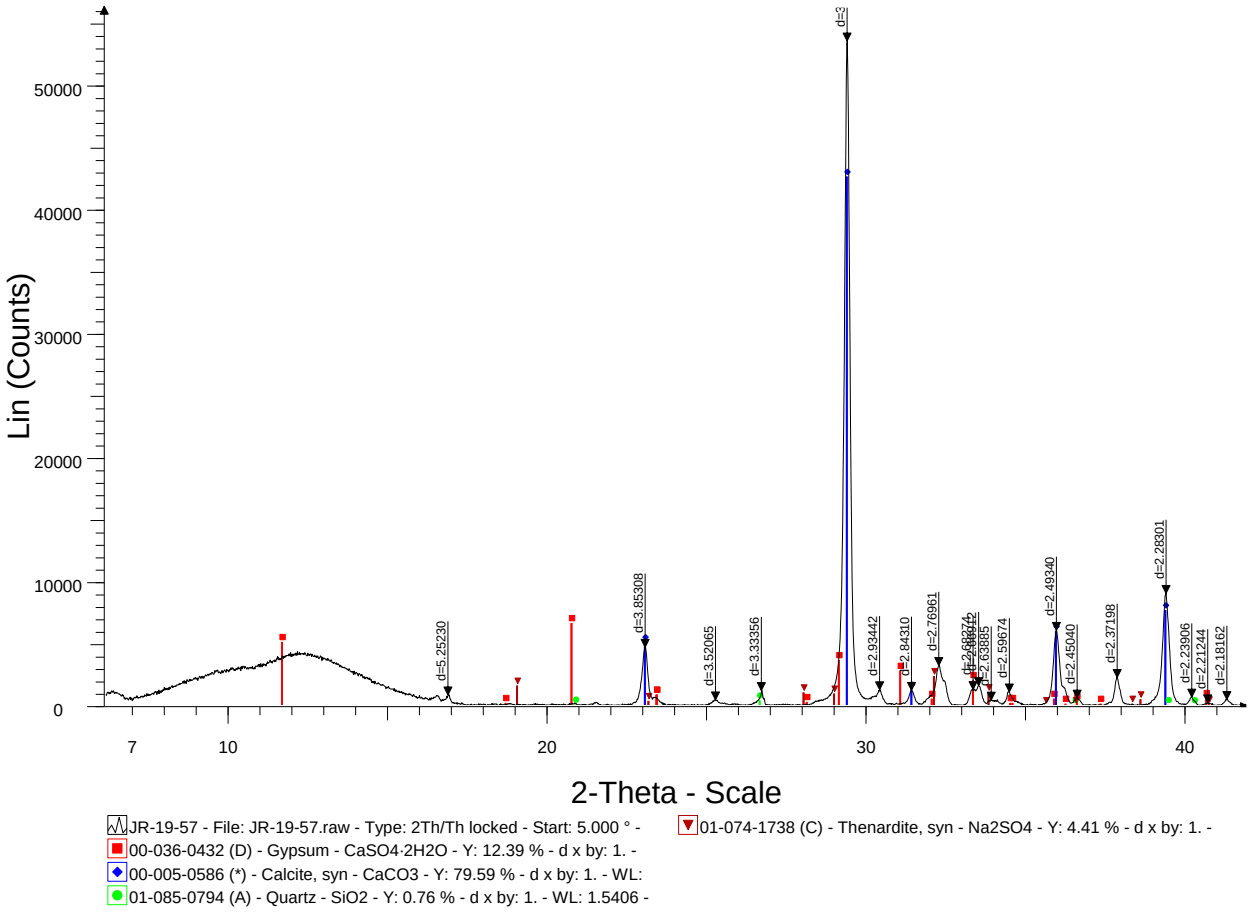


Figure 54 – pH = 14, S:L = 1:100, P_{CO_2} = 17.24 bar

APPENDIX IV: XRD patterns of solid phases produced by Time Series Experiments performed at pH = 13, and P_{CO_2} = 2.07 bar, sorted by reaction time and S:L ratio.

IV.I – Reaction time = 10 min

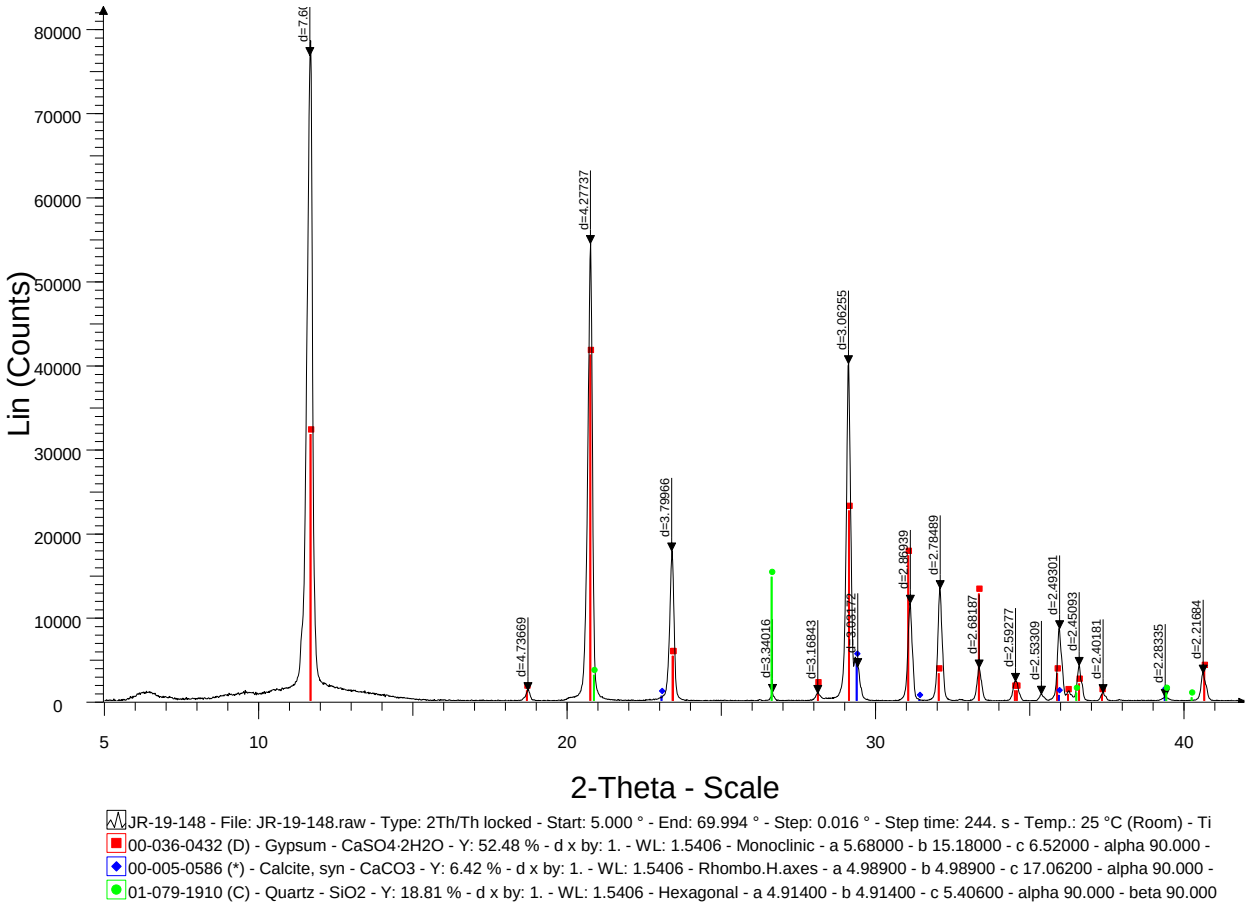


Figure IV.1 - S:L = 1:10

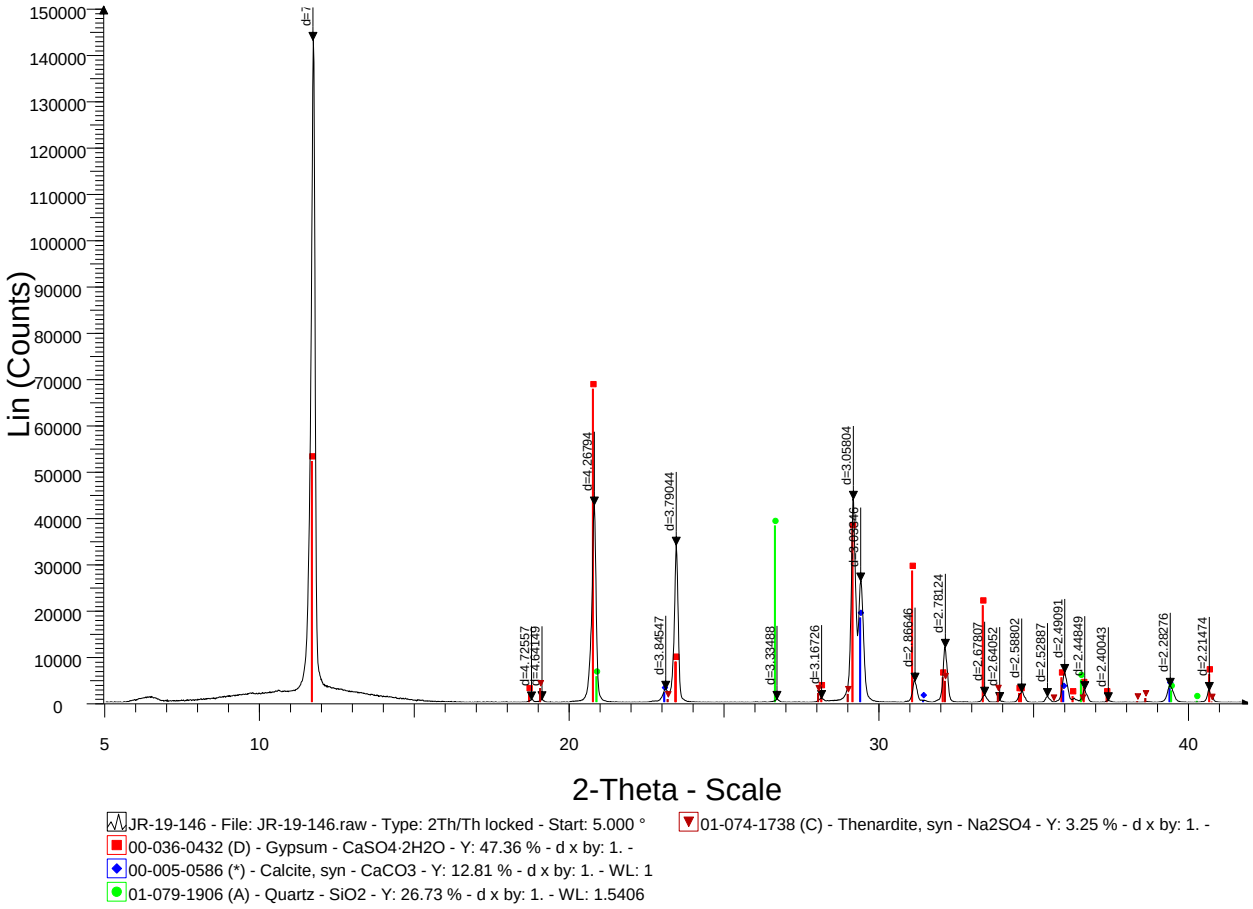


Figure 55 - S:L = 1:40

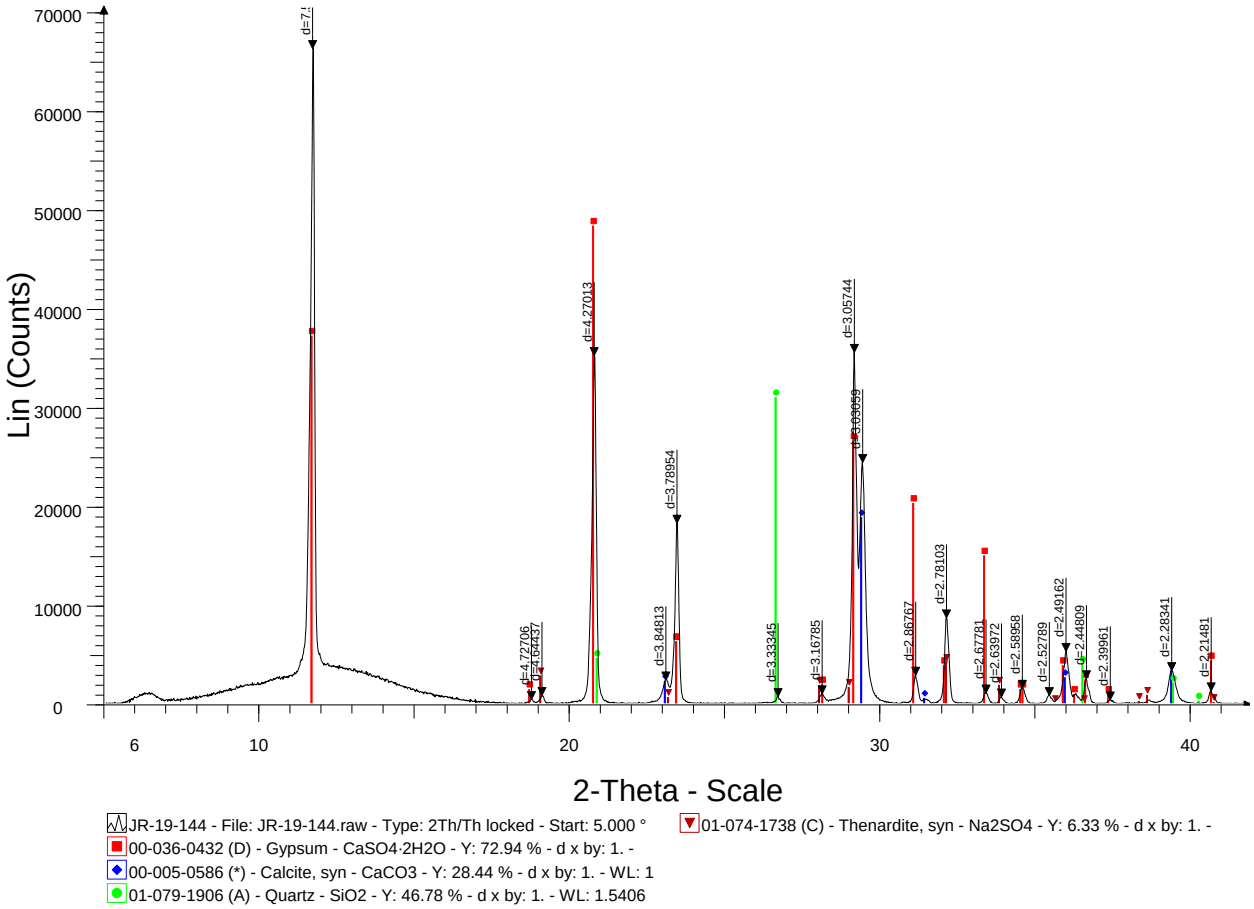


Figure 56 - S:L = 1:80

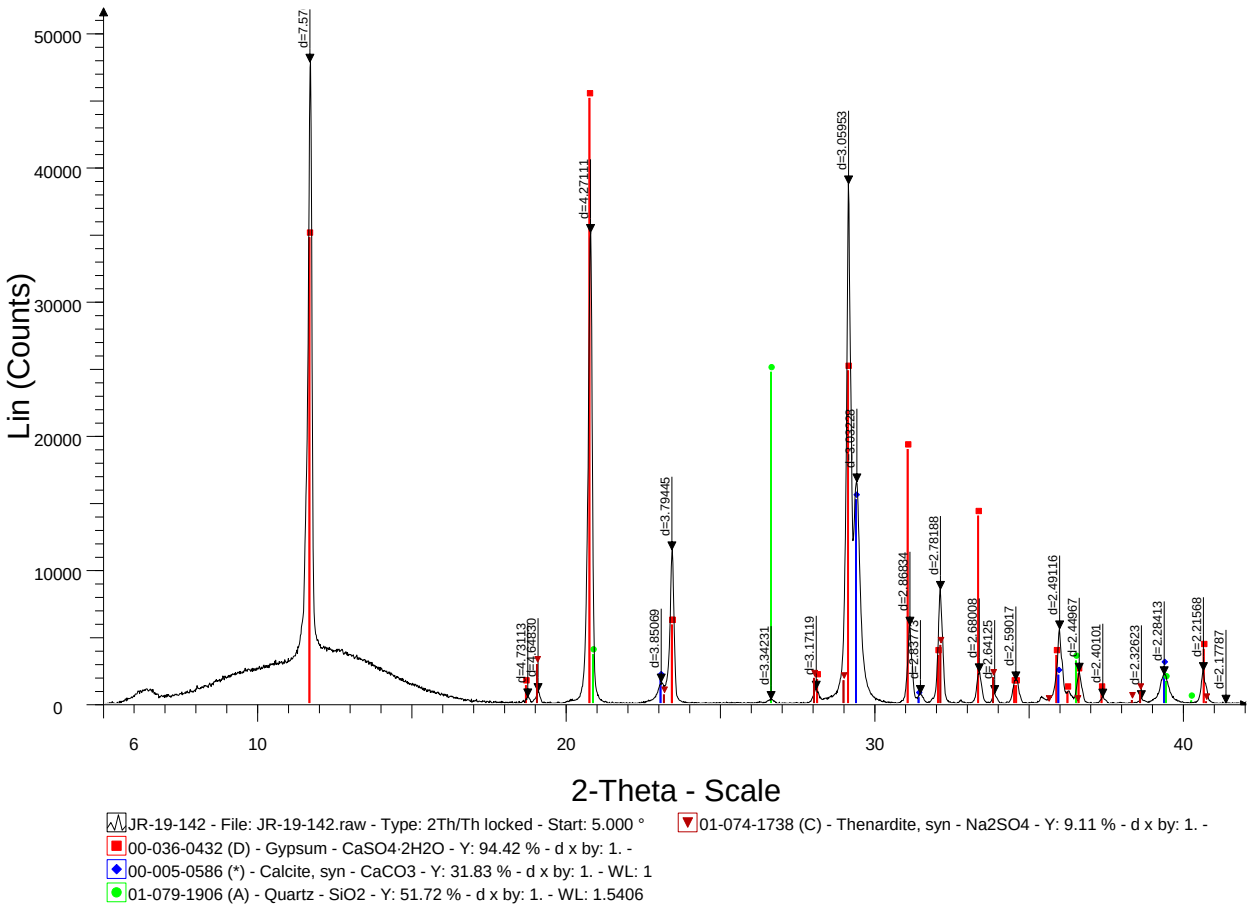


Figure 57 - S:L = 1:100

IV.II –Reaction time = 15 min

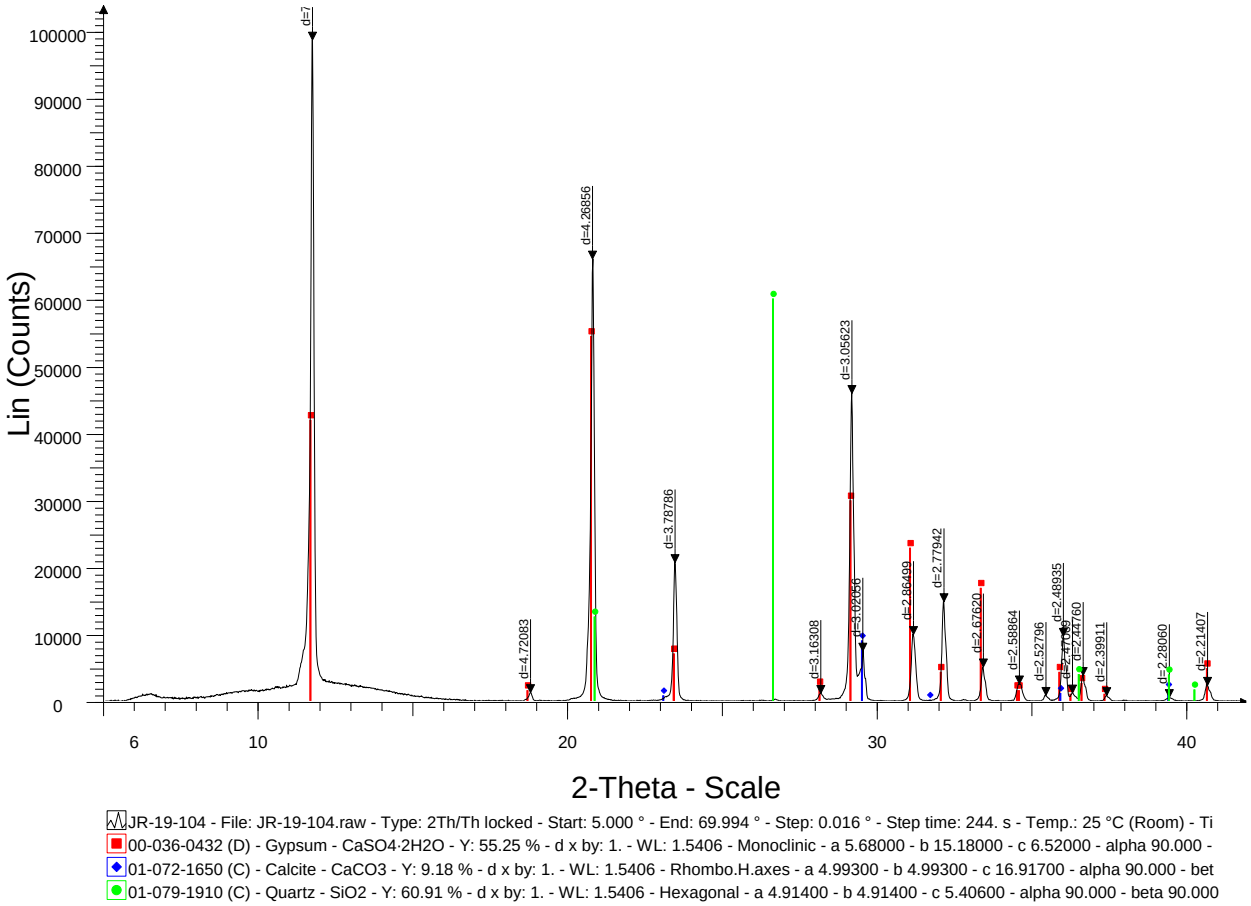


Figure 58 - S:L = 1:10

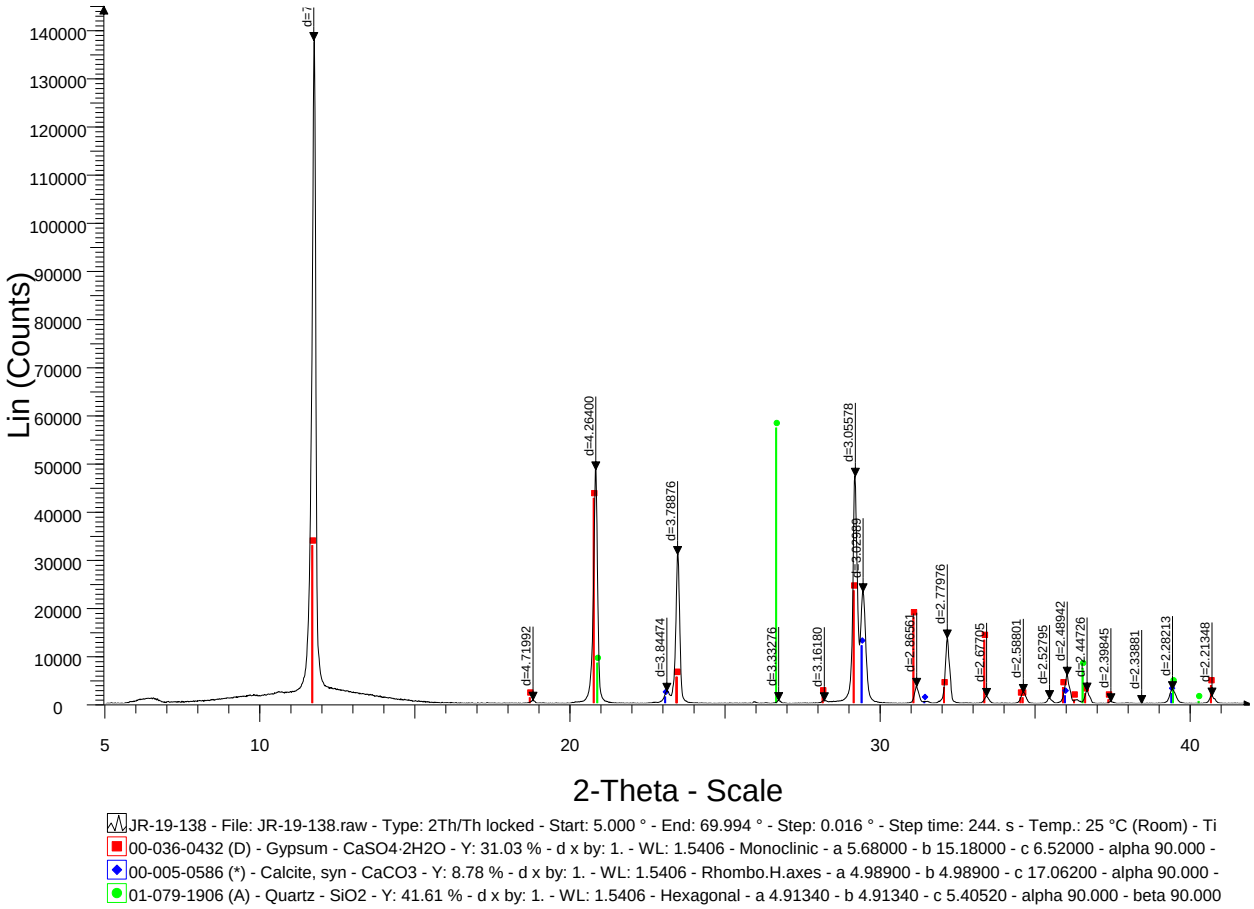


Figure 59 - S:L = 1:40

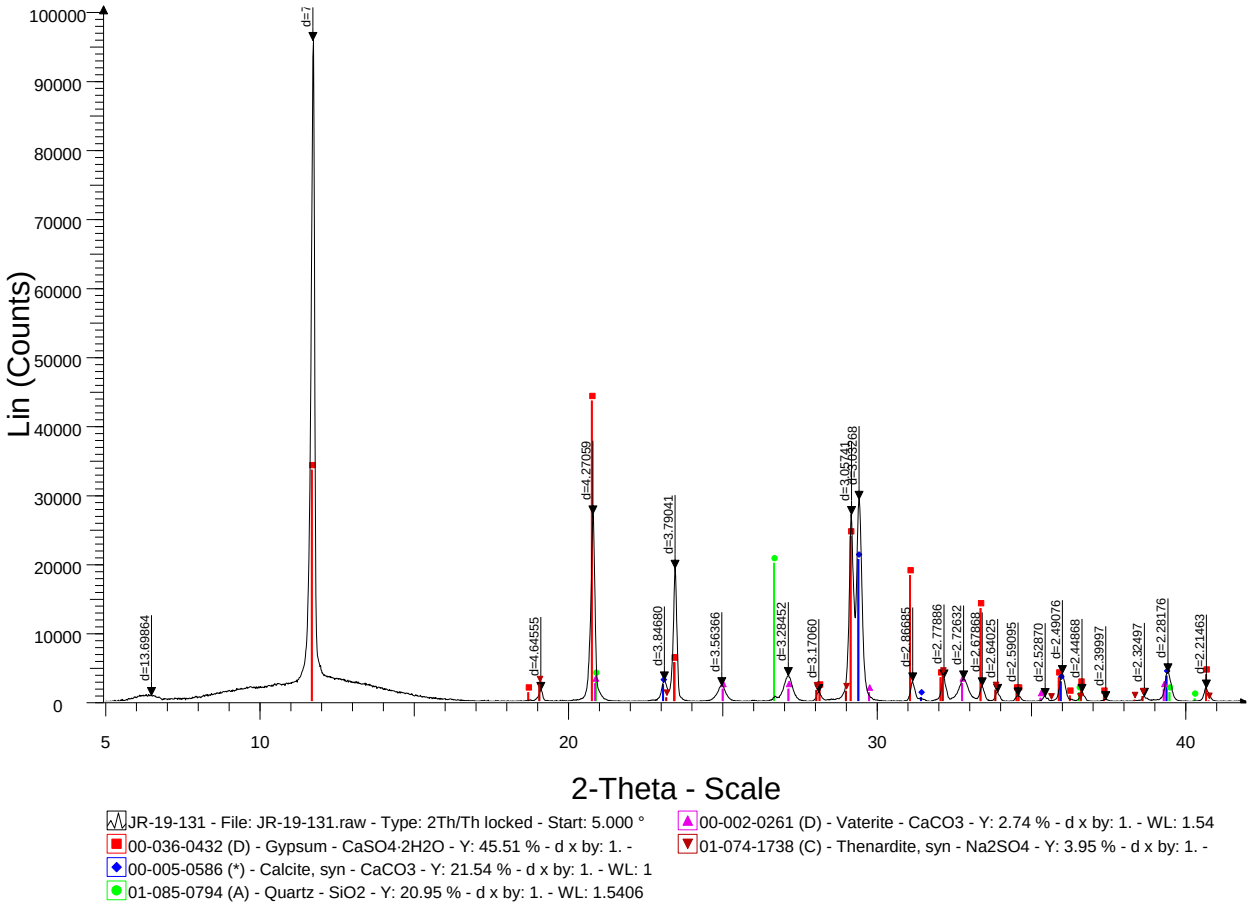


Figure 60 - S:L = 1:80

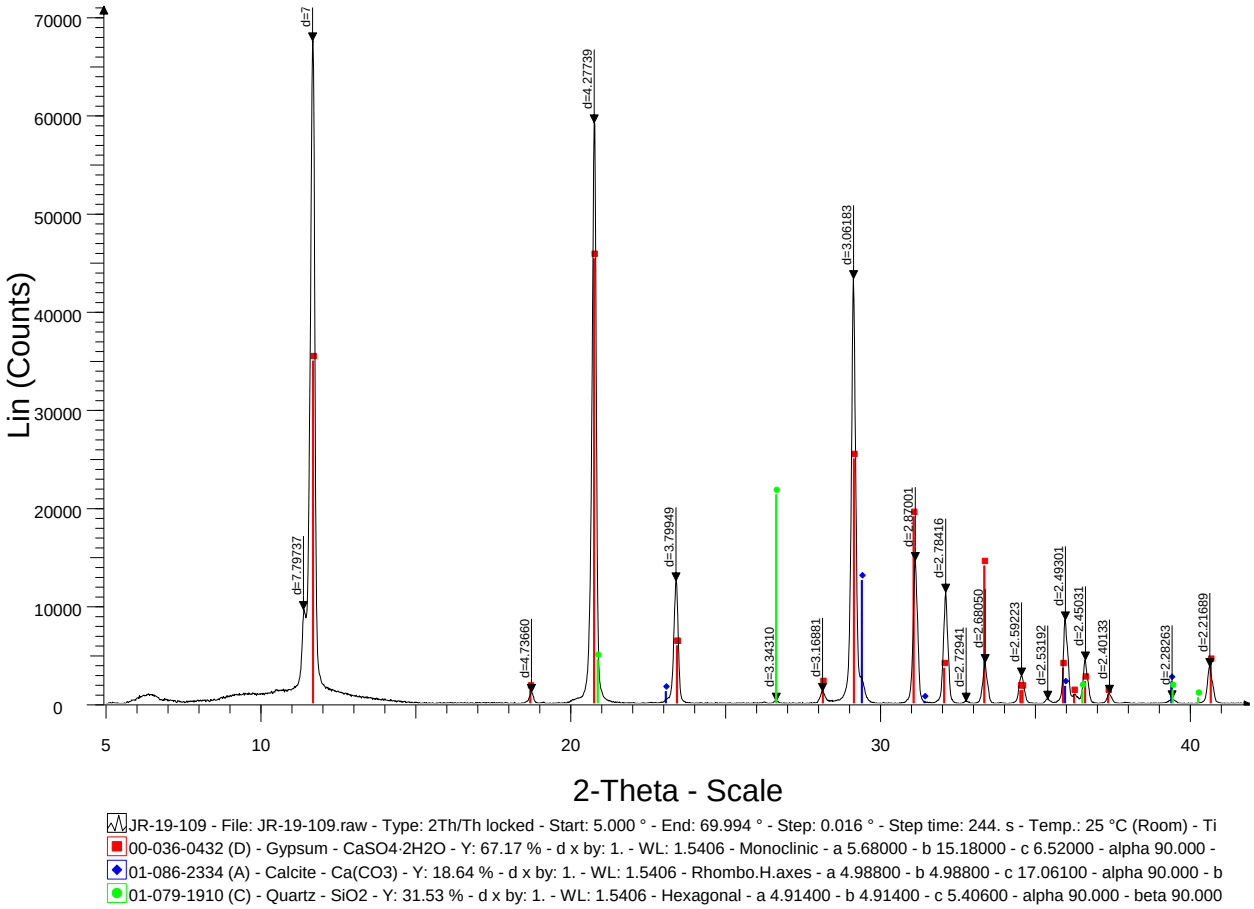


Figure 61 - S:L = 1:100

III.IV – Reaction time = 20 Min

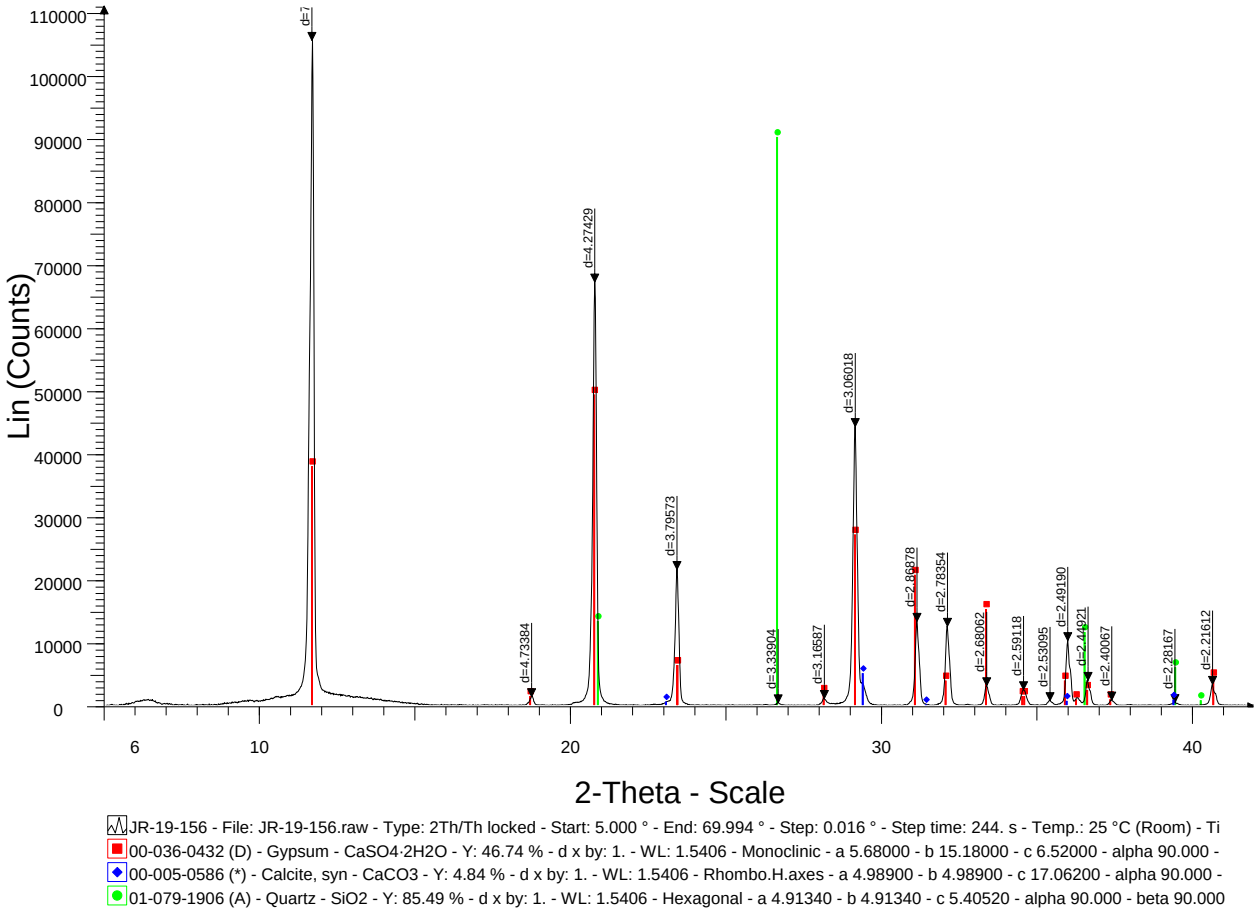


Figure 62 - S:L = 1:10

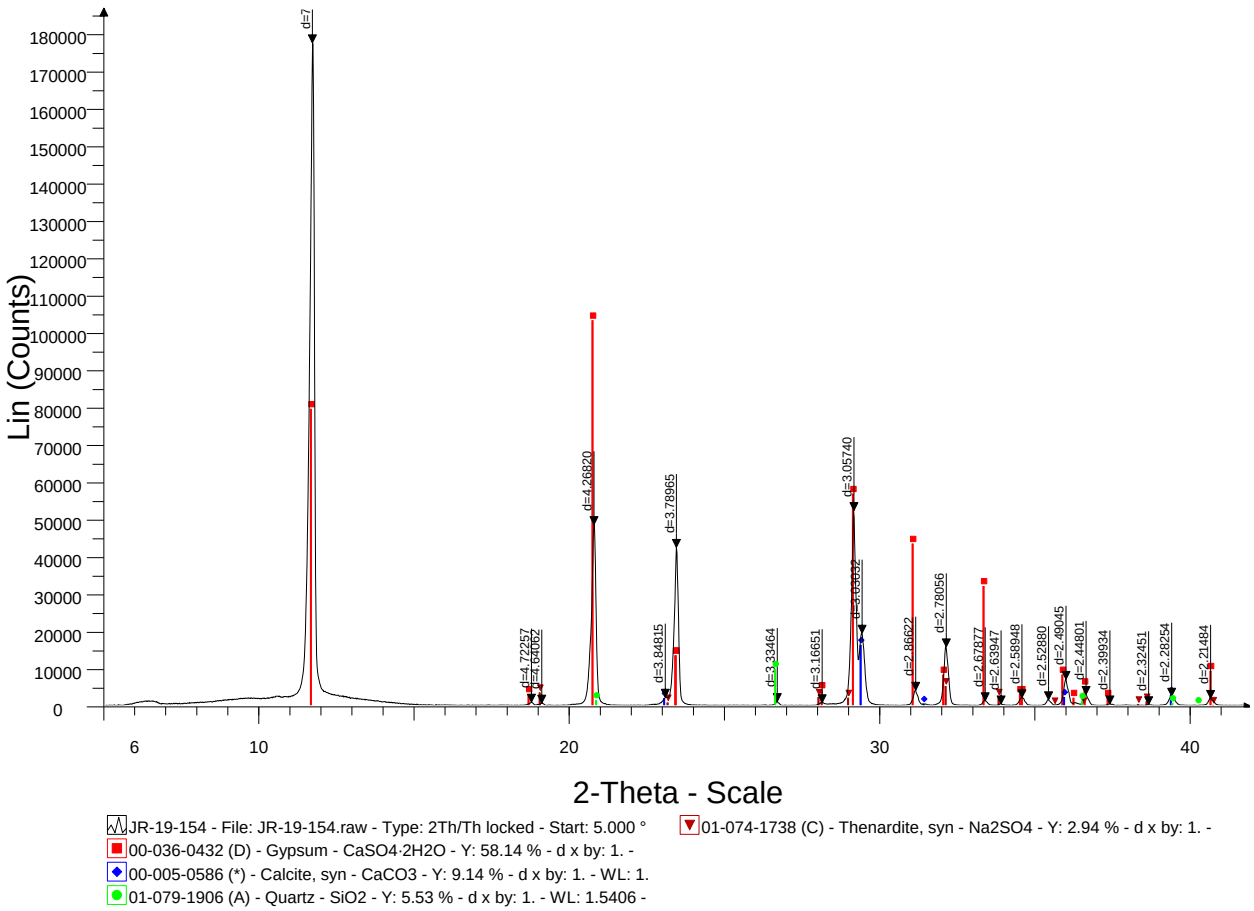


Figure 63 - S:L = 1:40

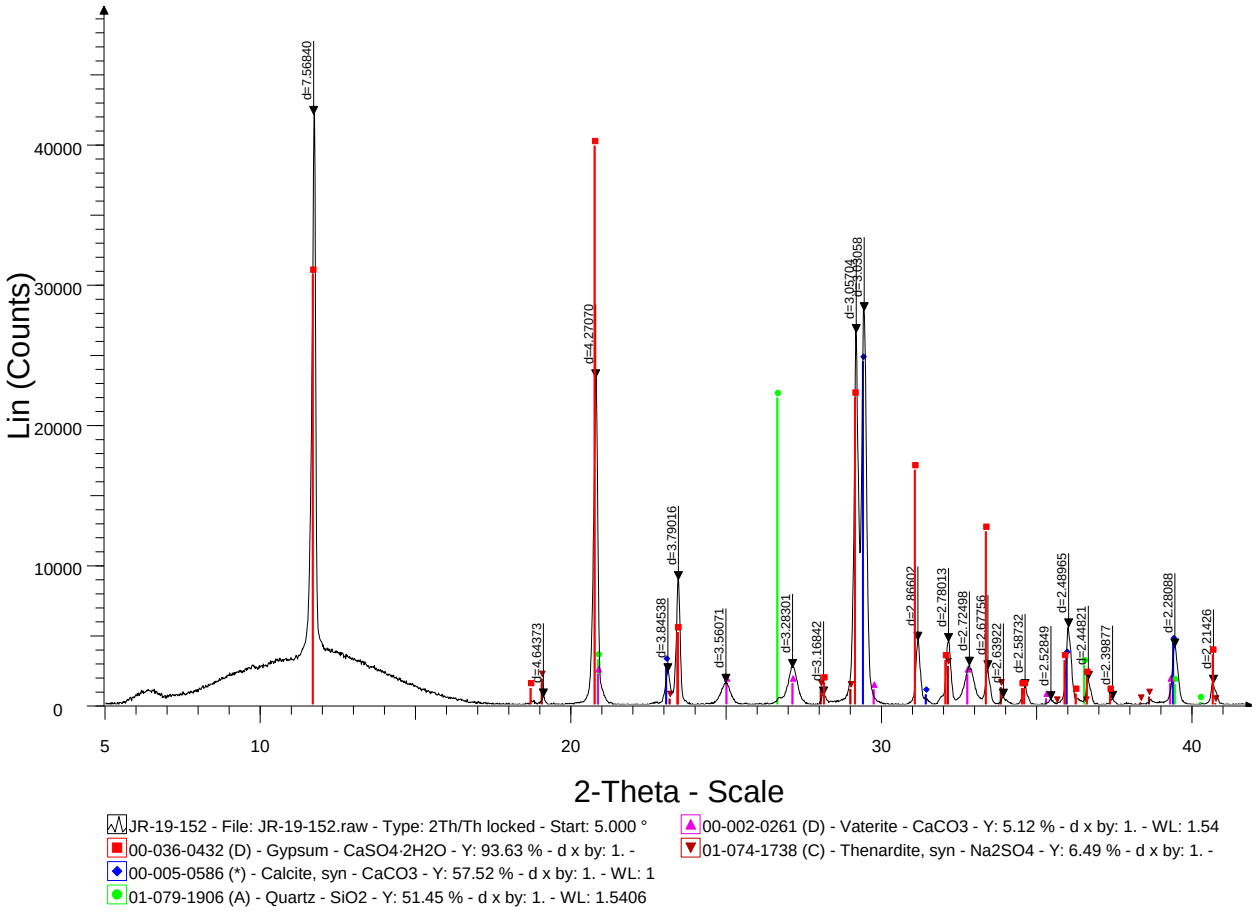


Figure 64 - S:L = 1:80

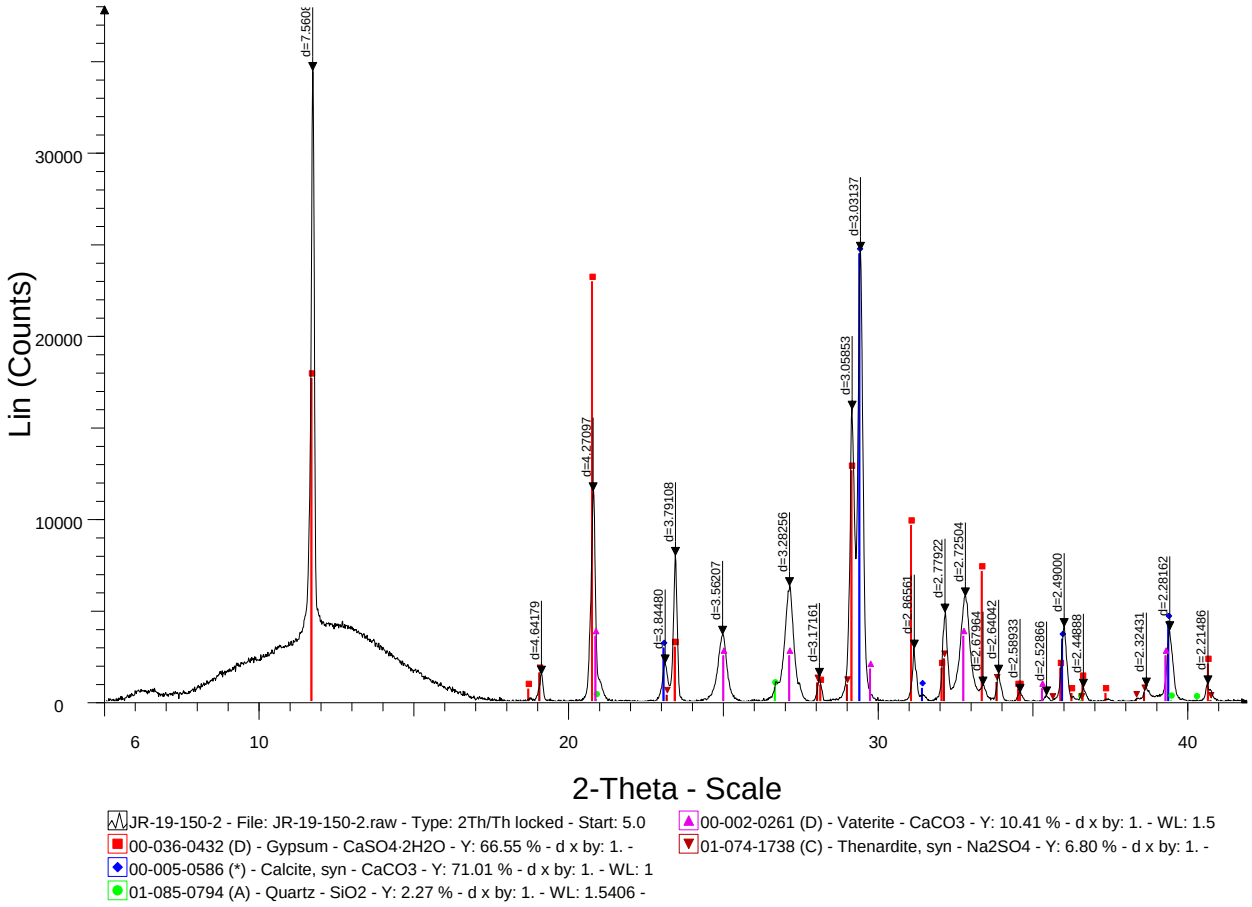


Figure 65 - S:L = 1:100

III.V – Reaction time = 120 min

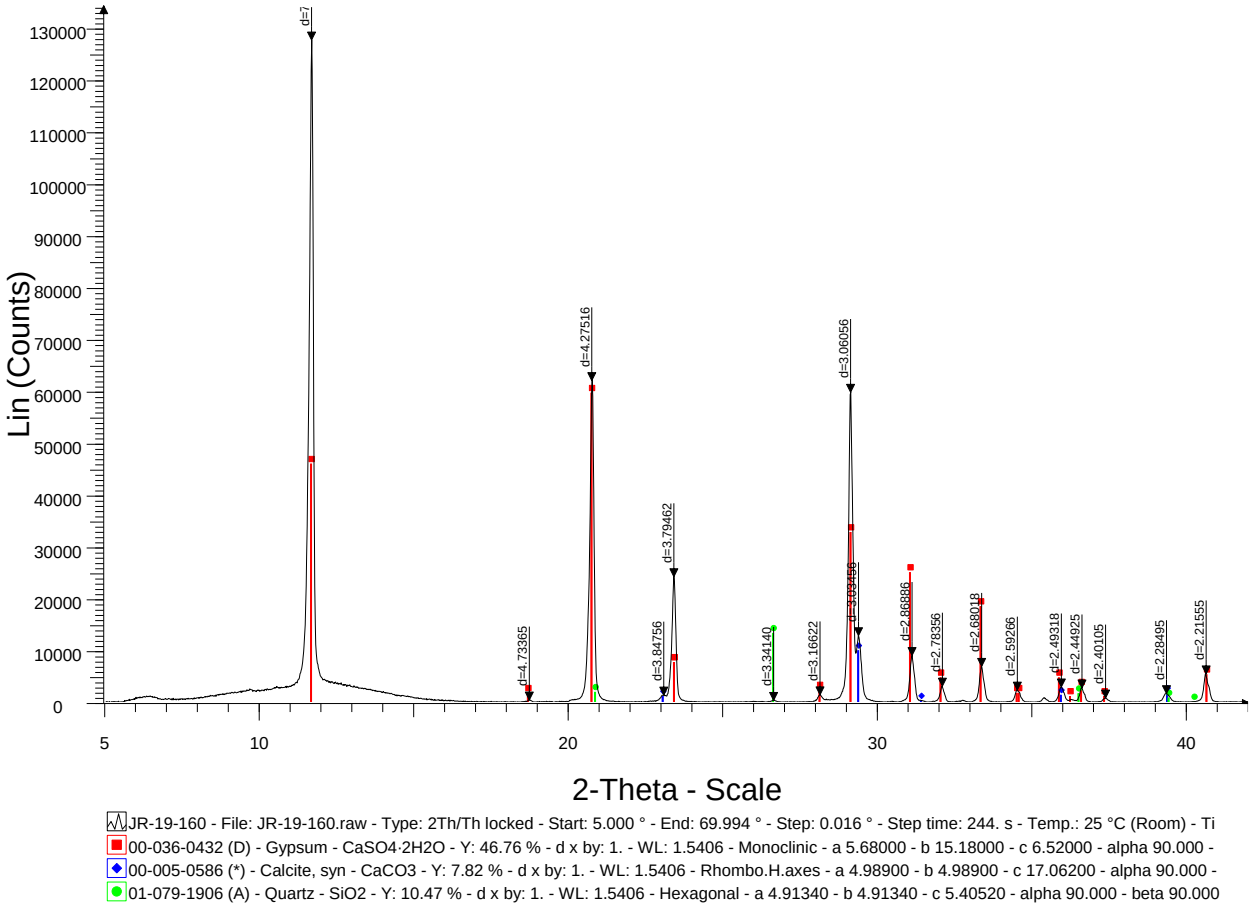


Figure 66 - S:L-1:40

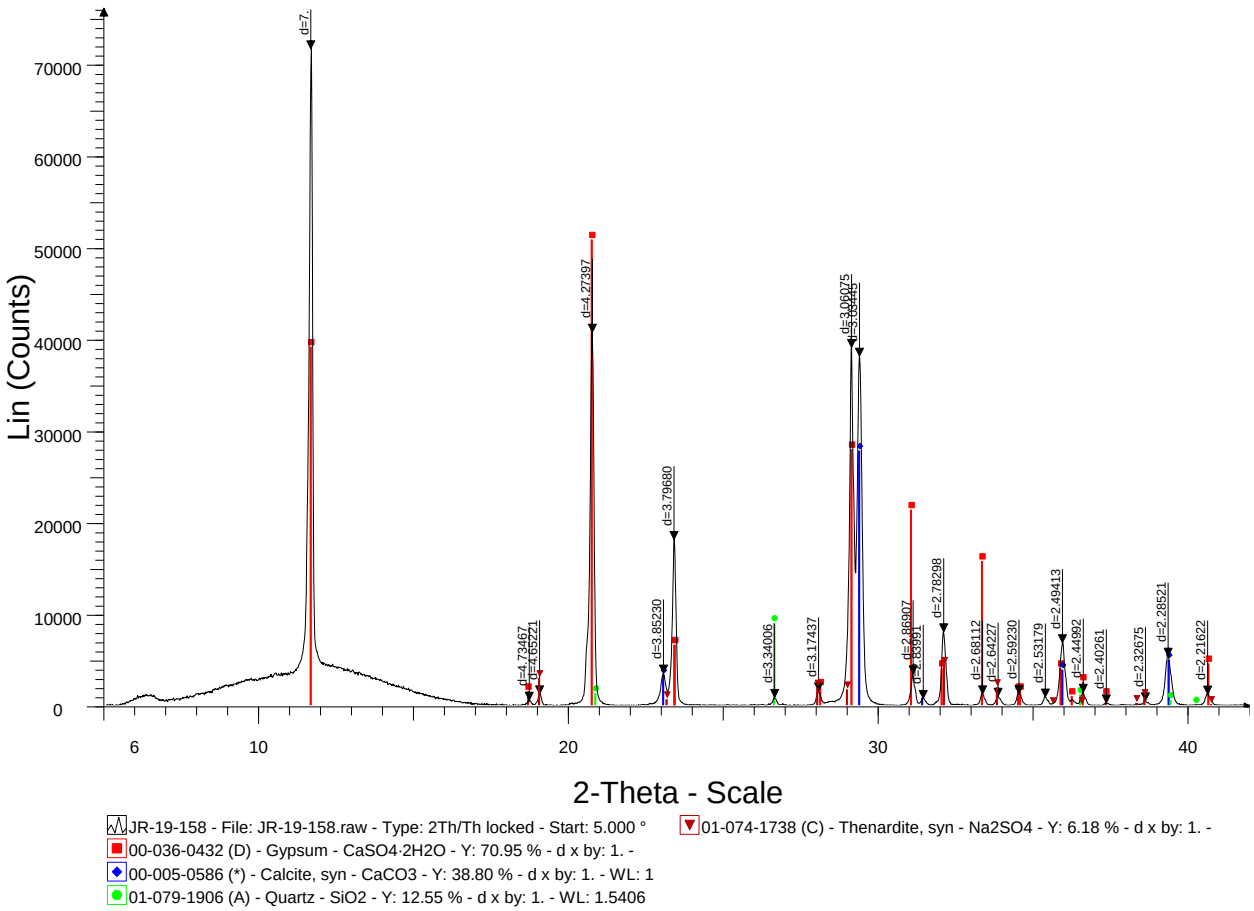


Figure 67 - S:L = 1:80

APPENDIX V: Wastewater concentrations of selected trace elements for all experiments.

Table 7: Wastewater trace element concentrations (initial pH = 13, S:L = 1:10 and 1:100).

Bar	Ratio	Final pH	Cr	Se	Tl
0.69	1:10	6.3	0.0048	0.2080	0.1371
2.07	1:10	6.16	0.0051	0.1521	0.1454
4.14	1:10	6.305	0.0076	0.2099	0.1787
17.24	1:10	6.365	0.0093	0.2096	0.1719
Bar	**Ratio**	**Final pH**	**Cr**	**Se**	**Tl**
0.69	1:100	6.23	0.0048	0.1273	0.1408
2.07	1:100	6.14	0.0051	0.1891	0.1835
4.14	1:100	6.485	0.0076	0.1779	0.1946
17.24	1:100	6.445	0.0093	0.1097	0.1718

Table 8: Wastewater trace element concentrations (initial pH = 13.5, S:L = 1:10 and 1:100).

Bar	Ratio	Final pH	Cr	Se	Tl
0.69	1:10	6.57	0.0062	0.3072	0.1326
2.07	1:10	6.74	0	0.4353	0.1618
4.14	1:10	6.745	0	0.5336	0.1928
17.24	1:10	6.75	0	0.8020	0.3337
Bar	**Ratio**	**Final pH**	**Cr**	**Se**	**Tl**
0.69	1:100	6.765	0	0.4680	0.1907
2.07	1:100	6.82	0	0.6479	0.3481
4.14	1:100	6.825	0	0.5081	0.2224
17.24	1:100	6.66	0	0.5251	0.2923

Table 9: Wastewater trace element concentrations (initial pH = 14, S:L = 1:10 and 1:100).

Bar	Ratio	Final pH	Cr	Se	Tl
0.69	1:10	6.955	0.0040	0.1424	0.0206
2.07	1:10	6.830	0.0026	0.1536	0.0213
4.14	1:10	7.015	0.0041	0.1294	0.0304
17.24	1:10	6.900	0.0029	0.1567	0.0349
Bar	**Ratio**	**Final pH**	**Cr**	**Se**	**Tl**
0.69	1:100	8.5	0.0060	0.2838	0.2194
2.07	1:100	7.37	0.0108	0.2692	0.2023
4.14	1:100	7.375	0.0045	0.1381	0.0881
17.24	1:100	7.345	0.0015	0.2647	0.2134

Table 10: Time series experiment wastewater trace element concentrations (initial pH = 13, P_{CO_2} = 2.07 bar, S:L = 1:100).

Time (Min)	Ratio	Final pH	Co	Se	Tl
10	1:100	12.485	0.0011	0	0.0023
15	1:100	8.2	0.0051	0.0202	0.0141
20	1:100	6.715	0.0123	0.0599	0.1051
360	1:100	6.14	0.0161	0.1891	0.1835

Table 11: Time series experiment wastewater trace element concentrations (initial pH = 13, P_{CO_2} = 2.07 bar, S:L = 1:80).

Time (Min)	Ratio	Final pH	Co	Se	Tl
10	1:80	12.425	0	0.0193	0.0111
15	1:80	7.305	0.0136	0.0632	0.1683
20	1:80	6.715	0.0132	0.0150	0.1039
120	1:80	6.09	0.0159	0.1372	0.1861

Table 12: Time series experiment wastewater trace element concentrations (initial pH = 13, P_{CO_2} = 2.07 bar, S:L = 1:40).

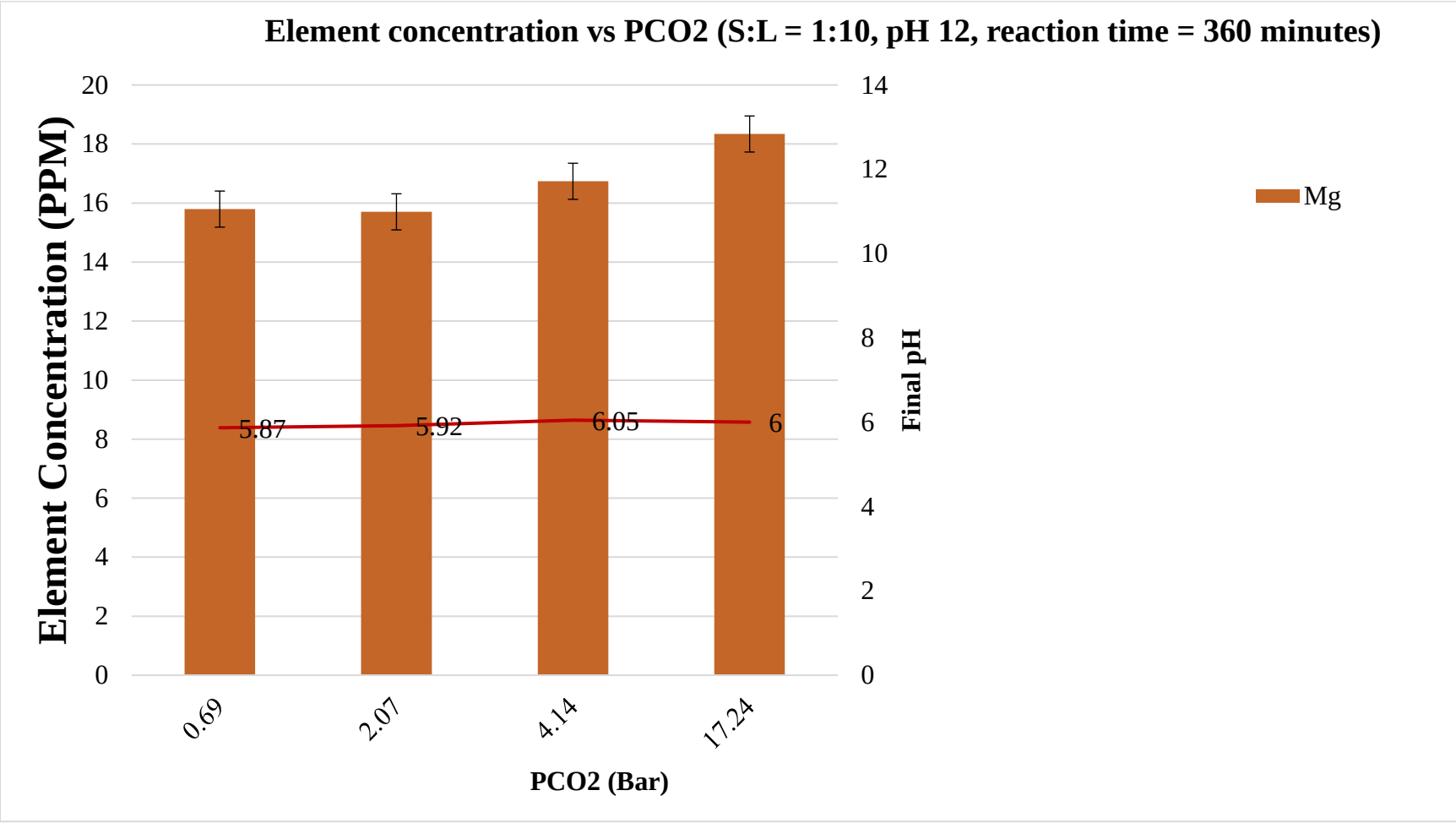
Time (Min)	Ratio	Final pH	Cr	Se	Tl
10	1:40	10.3	0.0045	0.1484	0.0892
15	1:40	7.385	0.0049	0.1703	0.1019
20	1:40	6.645	0.0055	0.1634	0.0931
120	1:40	6.12	0.0070	0.1736	0.1107

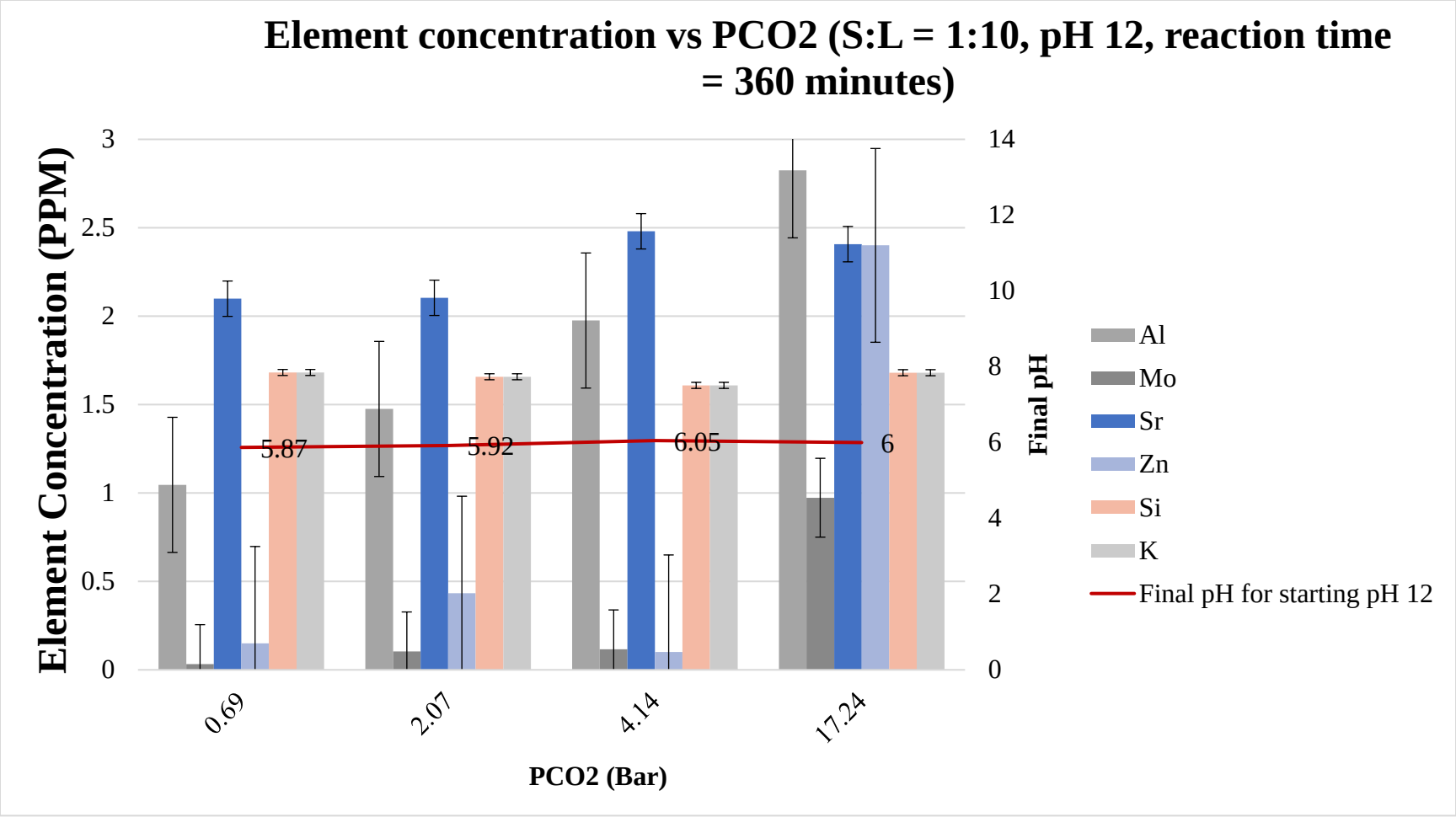
Table 13: Time series experiment wastewater trace element concentrations (initial pH = 13, P_{CO_2} = 2.07 bar, S:L = 1:10).

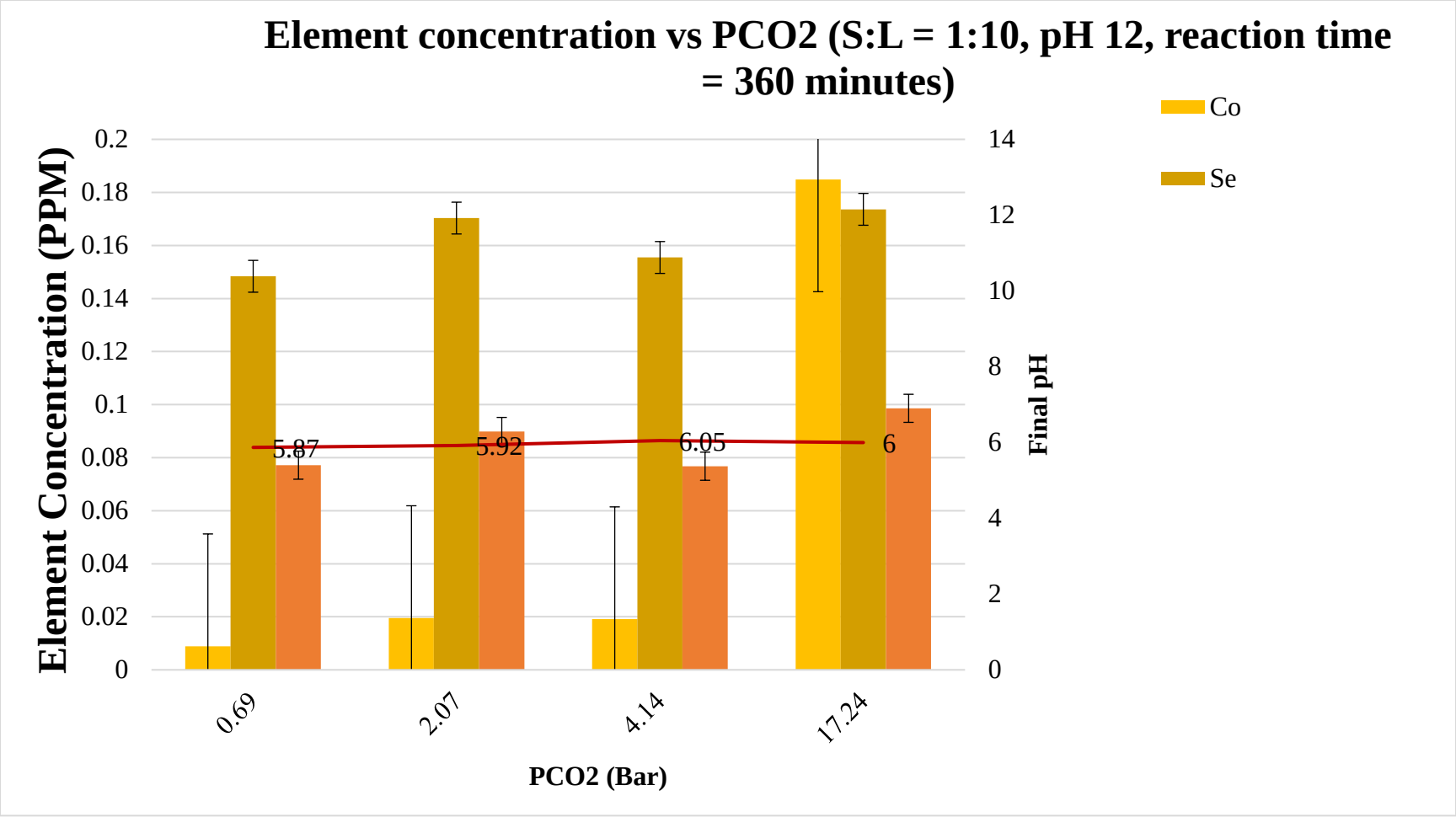
Time (Min)	Ratio	Final pH	Cr	Se	Tl
10	1:10	6.43	0.0068	0.1529	0.1519
15	1:10	6.285	0.0052	0.1486	0.1262
20	1:10	6.195	0.0068	0.0967	0.1235
120	1:10	6.16	0.0066	0.1521	0.1454

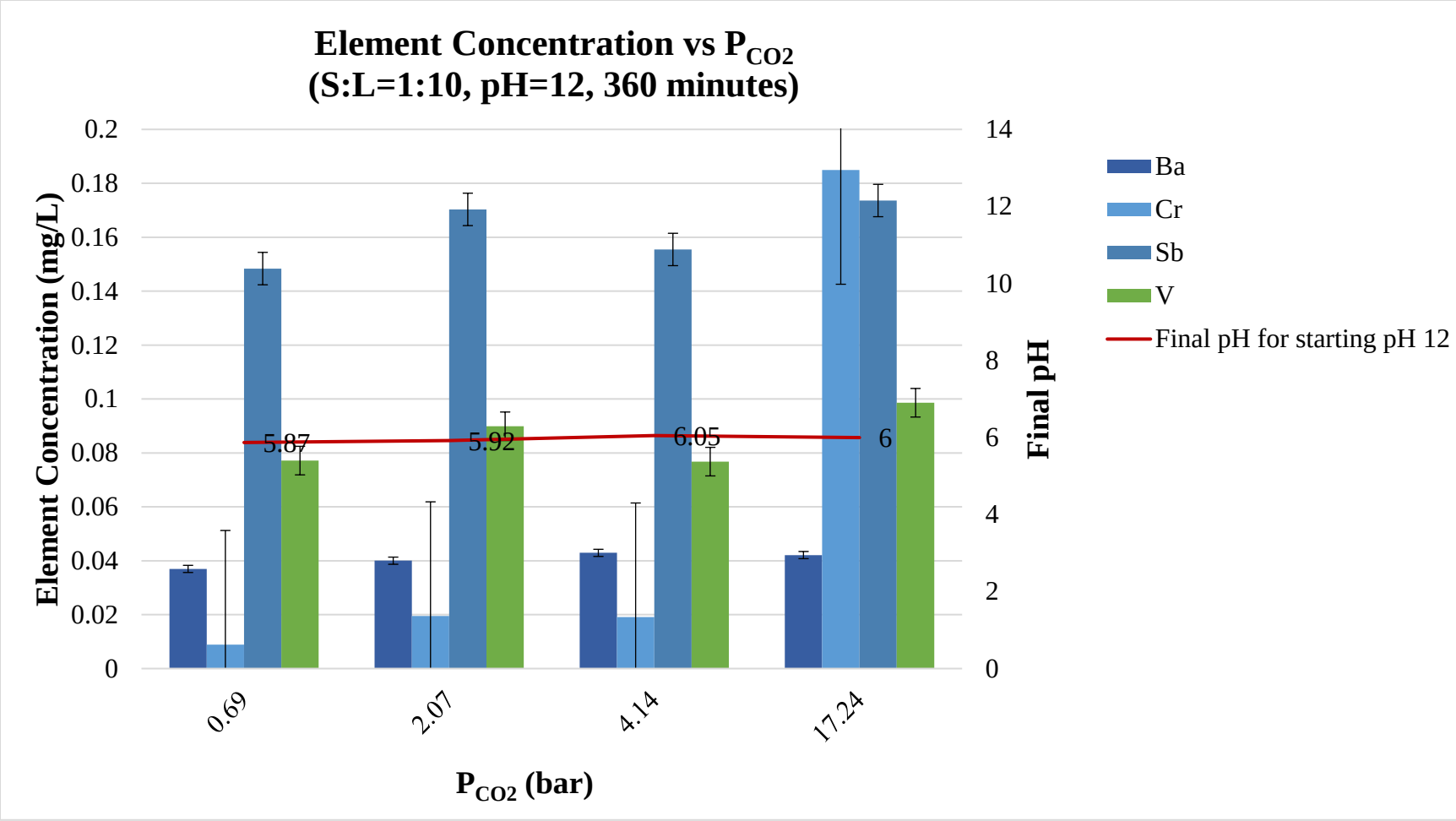
APPENDIX VI: Wastewater Element Concentrations and pH vs P_{CO_2} Plots.

VI.I – pH Series Experiments (pH = 12, S:L = 1:10, reaction time = 360 min). Error bars represent the standard deviation calculated from experimental duplicates.

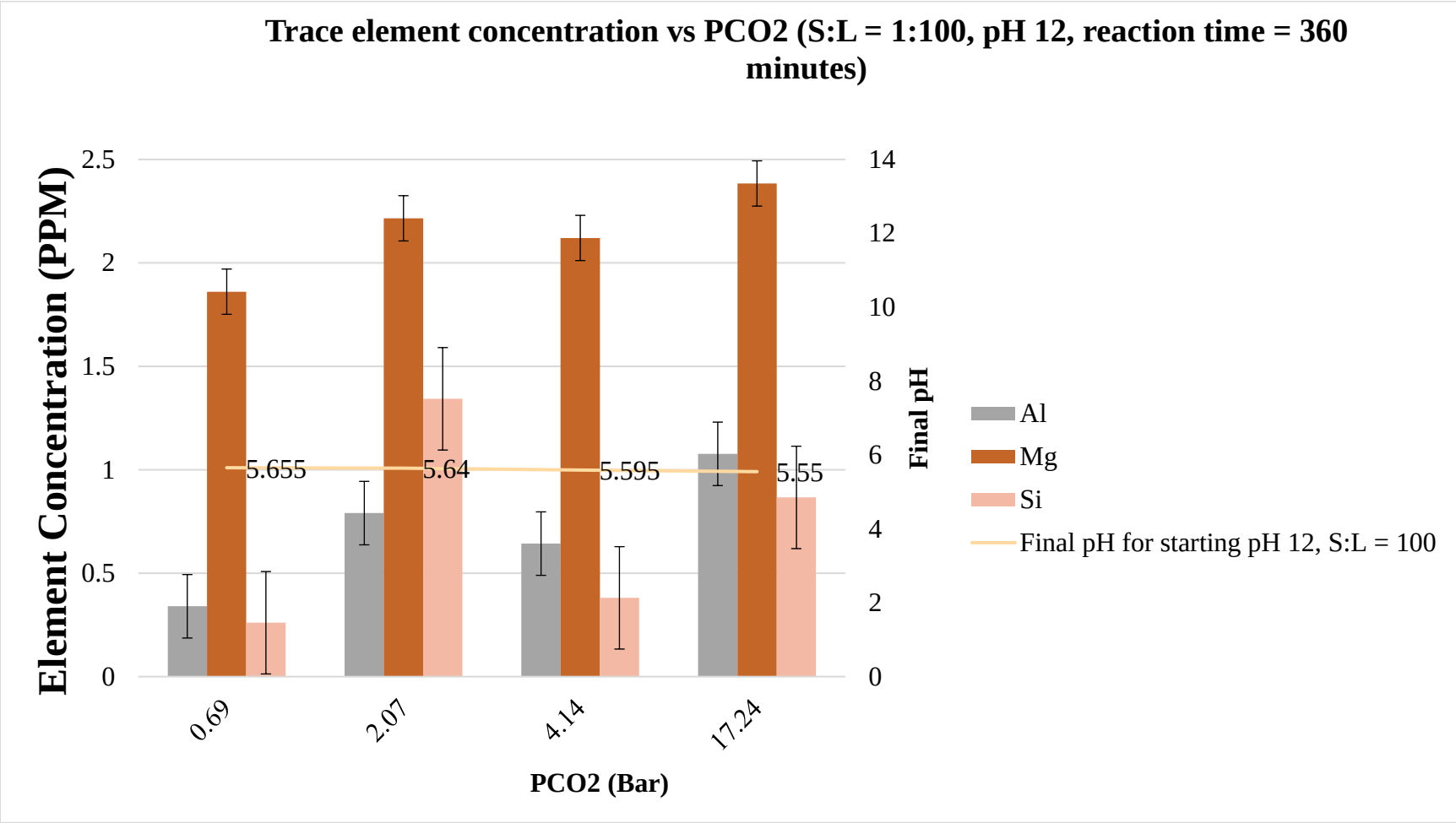


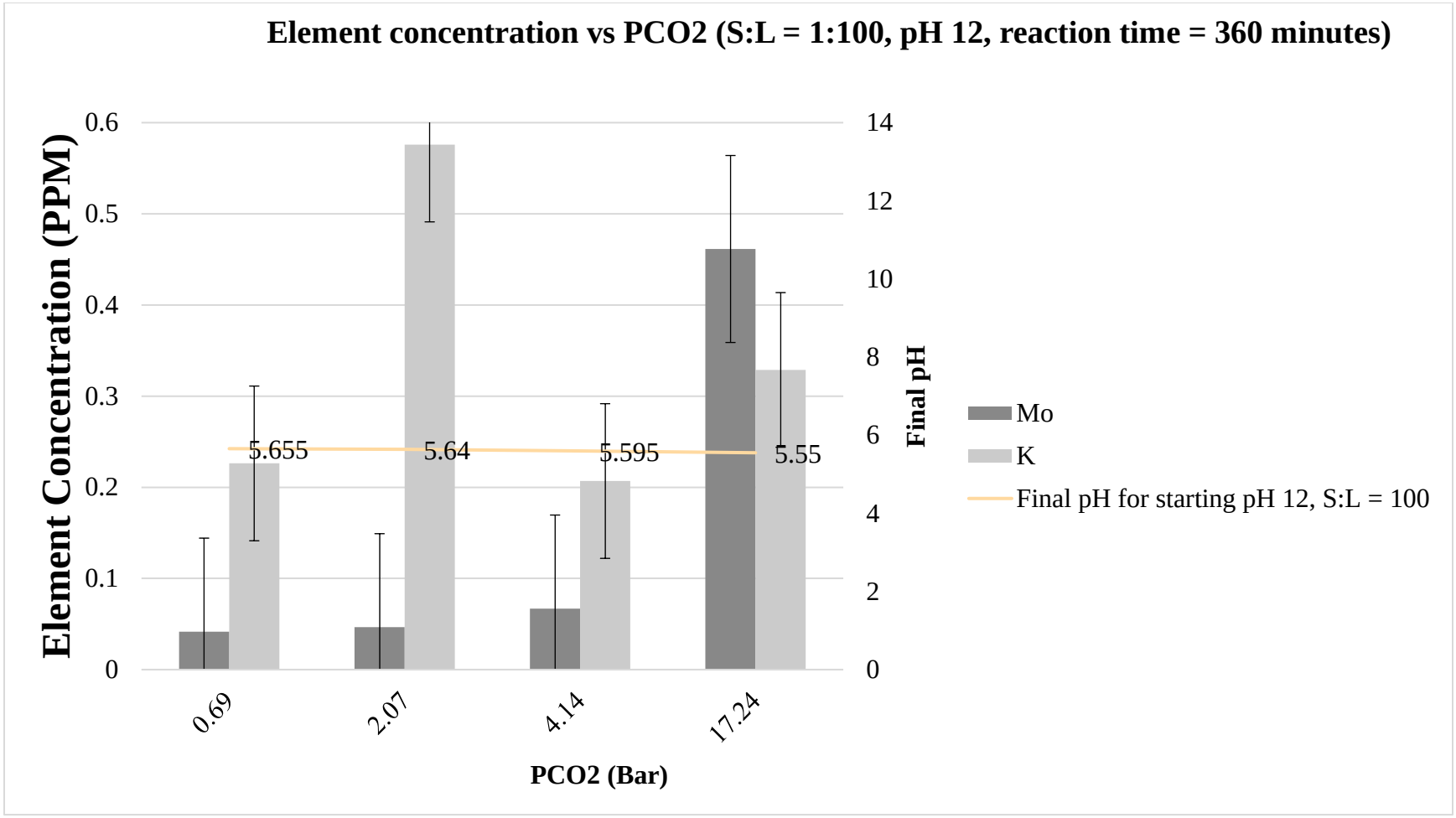

Element concentration vs PCO2 (S:L = 1:10, pH 12, reaction time = 360 minutes)
Element Concentration (PPM)
Final pH
PCO2 (Bar)
0.69
2.07
4.14
17.24
5.87
5.92
6.05
6
Al
Mo
Sr
Zn
Si
K
Final pH for starting pH 12

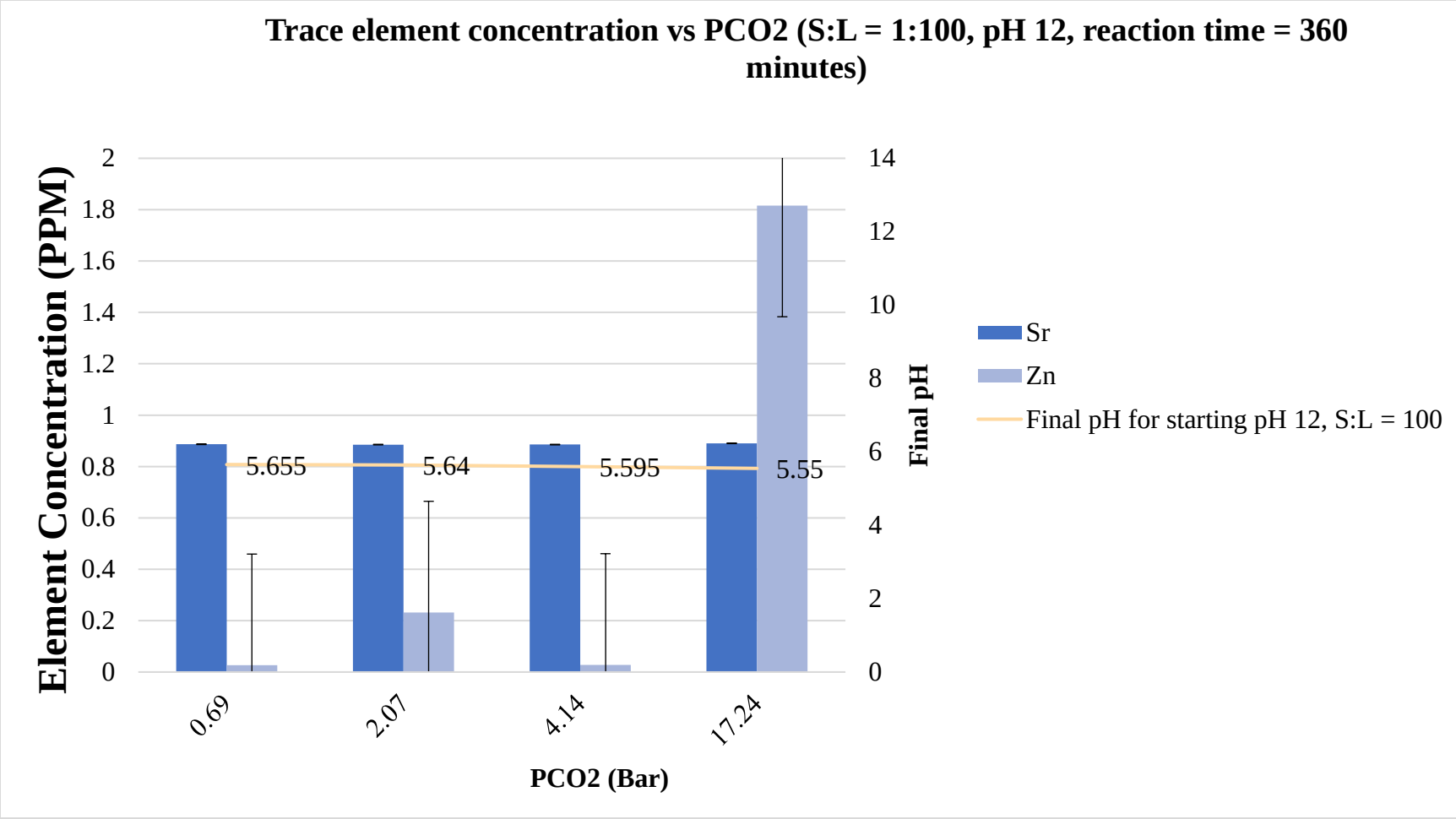

Element concentration vs PCO2 (S:L = 1:10, pH 12, reaction time = 360 minutes)
Element Concentration (PPM)
Final pH
PCO2 (Bar)
Co
Se
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
14
12
10
8
6
4
2
0
5.87
5.92
6.05
6
0.69
2.07
4.14
17.24

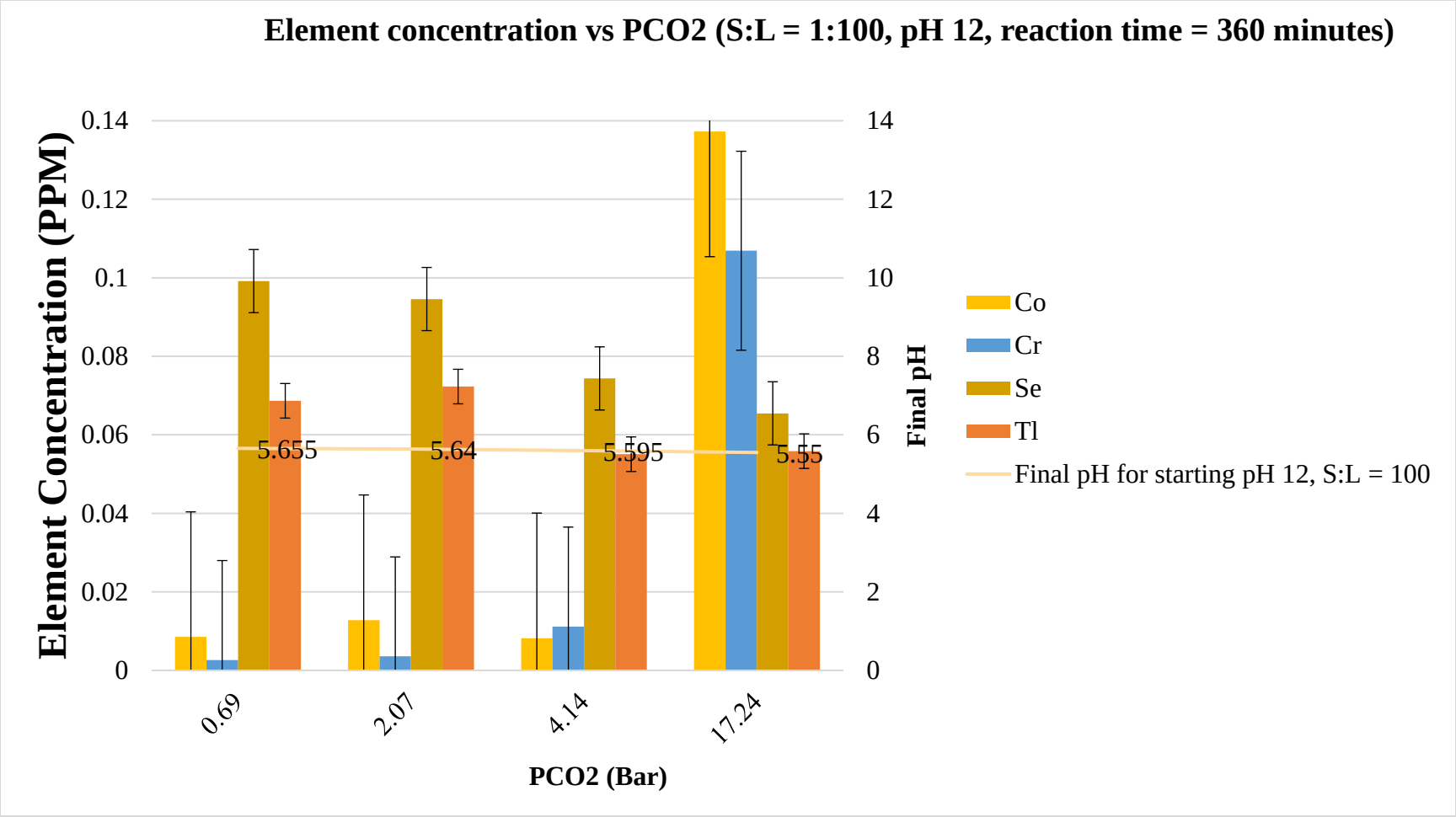

Element Concentration vs P_{CO2}
(S:L=1:10, pH=12, 360 minutes)
Element Concentration (mg/L)
Final pH
P_{CO2} (bar)
0.69
2.07
4.14
17.24
5.87
5.92
6.05
6
Ba
Cr
Sb
V
Final pH for starting pH 12

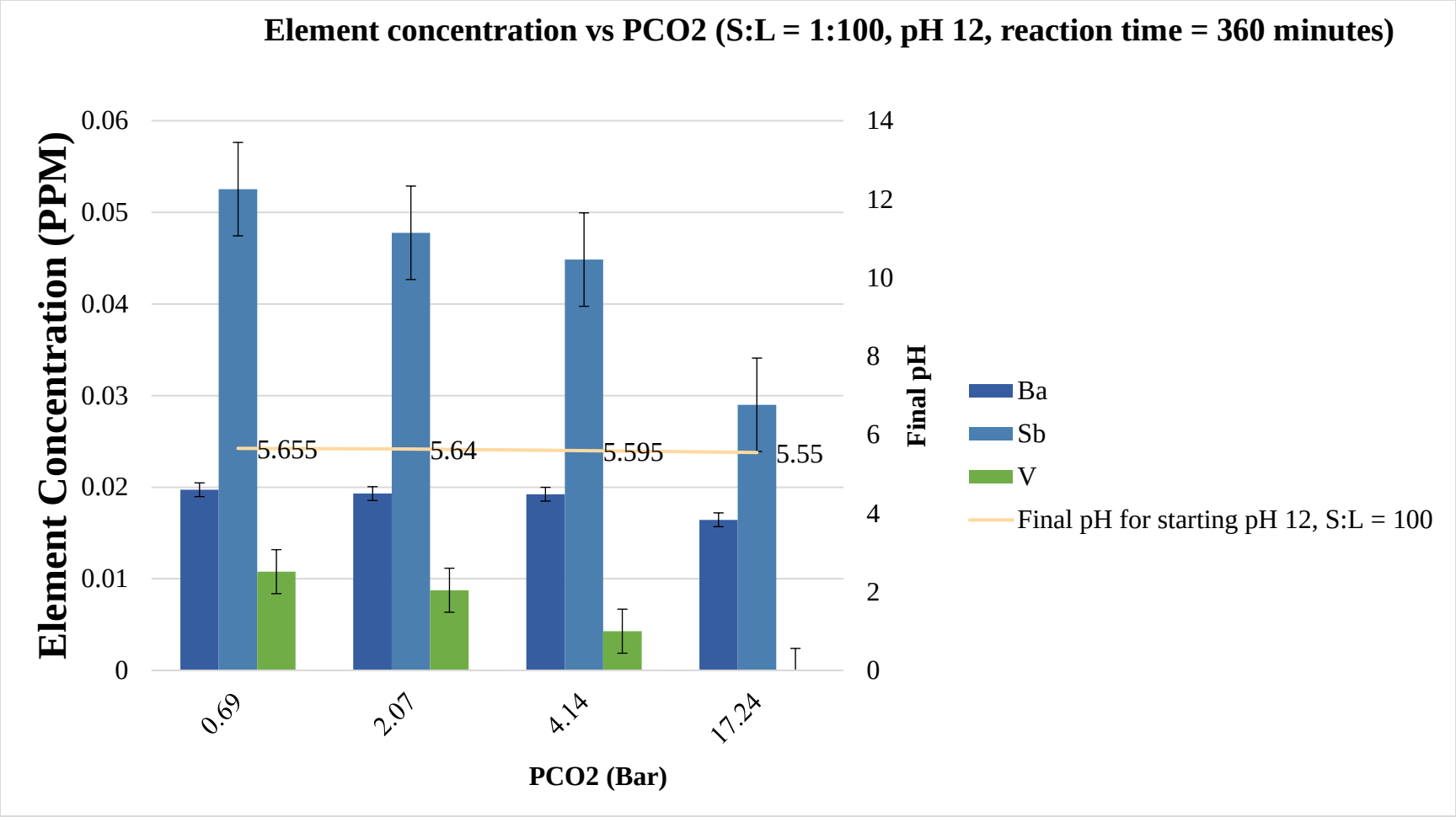
VI.II – pH Series Experiments (pH = 12, S:L = 1:100, reaction time = 360 min). Error bars represent the standard deviation calculated from experimental duplicates.



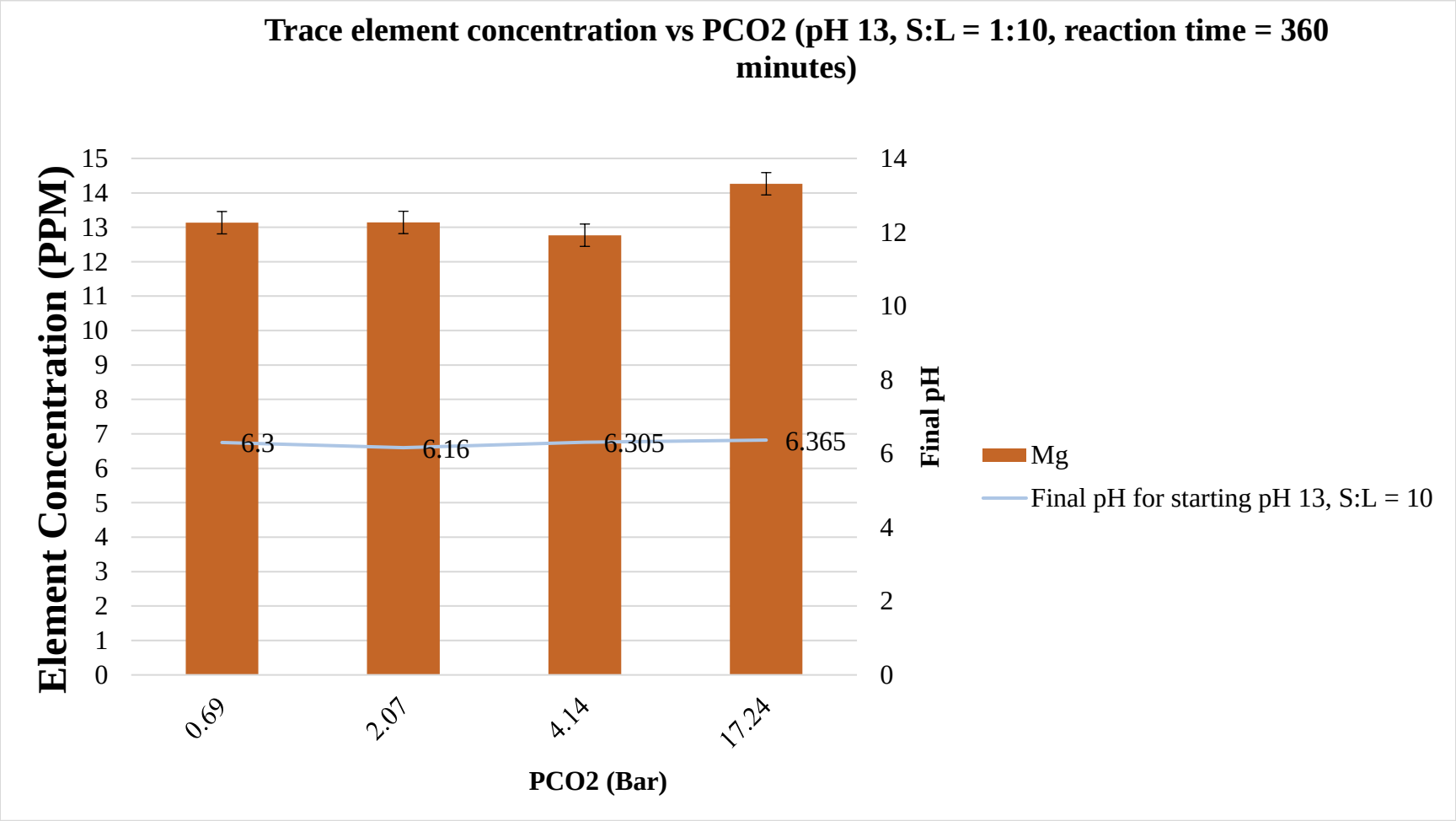

Element concentration vs PCO2 (S:L = 1:100, pH 12, reaction time = 360 minutes)
Element Concentration (PPM)
0.6
0.5
0.4
0.3
0.2
0.1
0
14
12
10
8
6
4
2
0
Final pH
5.655
5.64
5.595
5.55
0.69
2.07
4.14
17.24
PCO2 (Bar)
Mo
K
Final pH for starting pH 12, S:L = 100

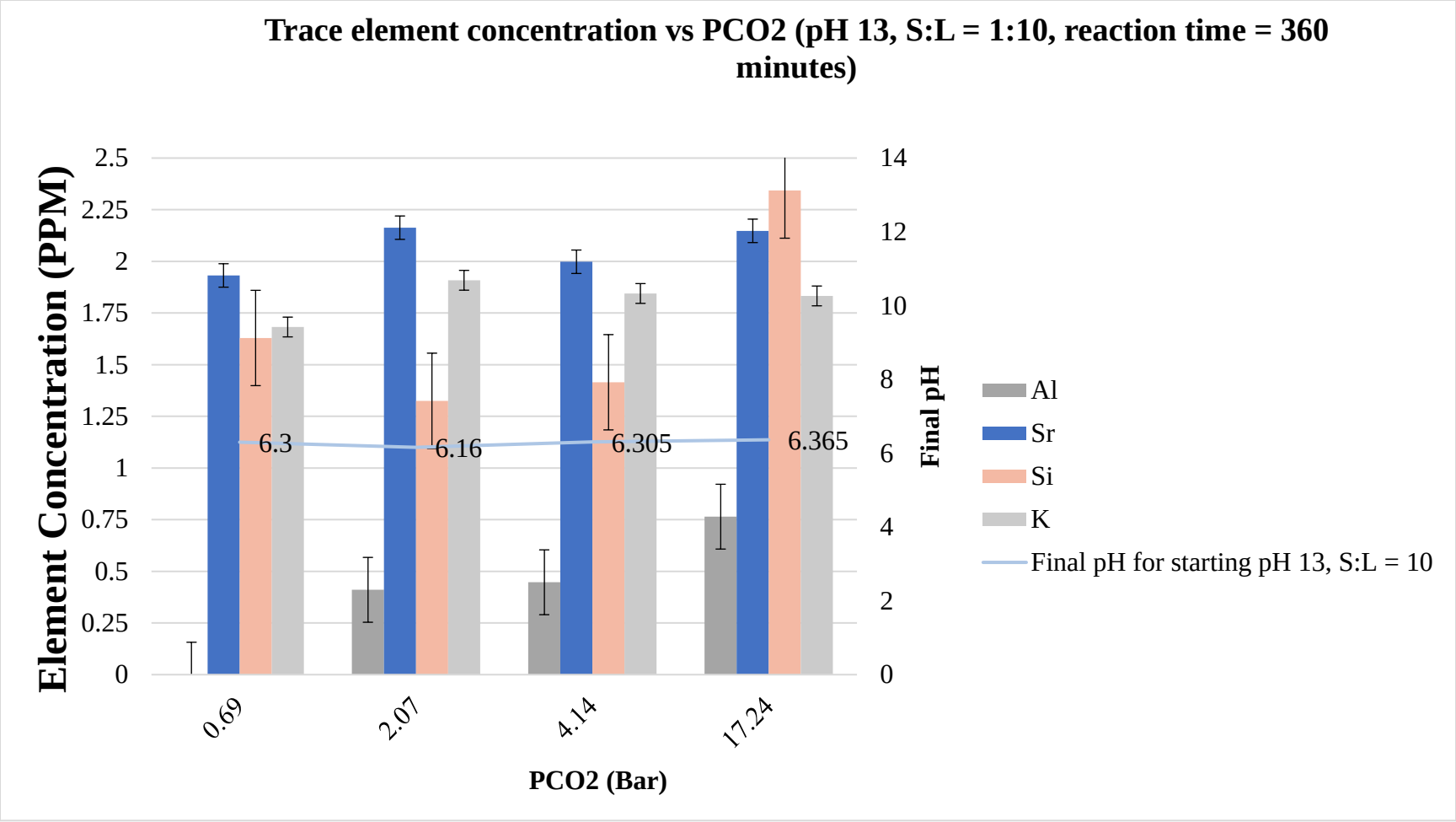

Trace element concentration vs PCO2 (S:L = 1:100, pH 12, reaction time = 360 minutes)
Element Concentration (PPM)
Final pH
PCO2 (Bar)
0.69
2.07
4.14
17.24
5.655
5.64
5.595
5.55
Sr
Zn
Final pH for starting pH 12, S:L = 100

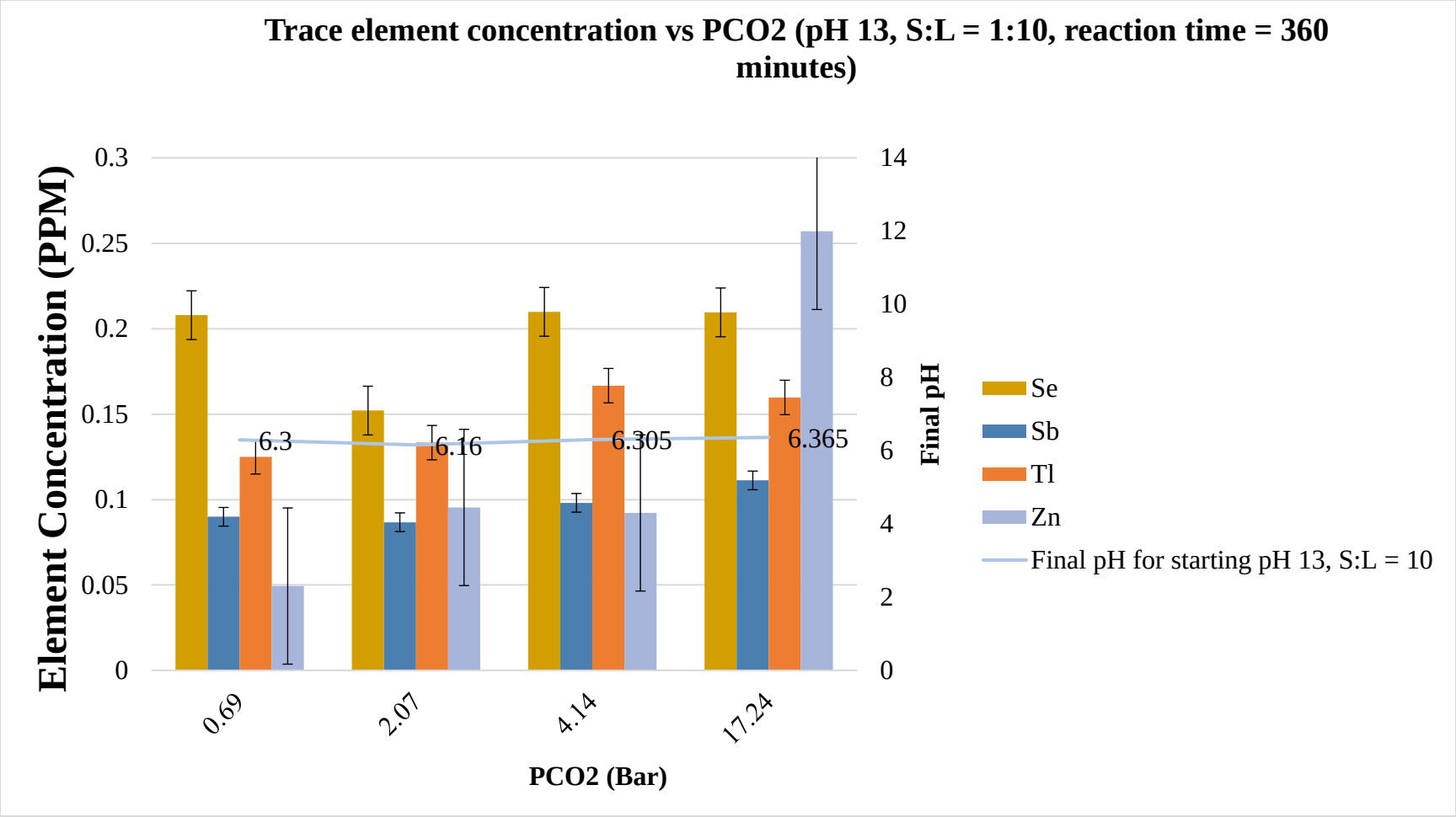

Element concentration vs PCO2 (S:L = 1:100, pH 12, reaction time = 360 minutes)
Element Concentration (PPM)
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
14
12
10
8
6
4
2
0
Final pH
5.655
5.64
5.595
5.55
0.69
2.07
4.14
17.24
PCO2 (Bar)
Co
Cr
Se
Tl
Final pH for starting pH 12, S:L = 100

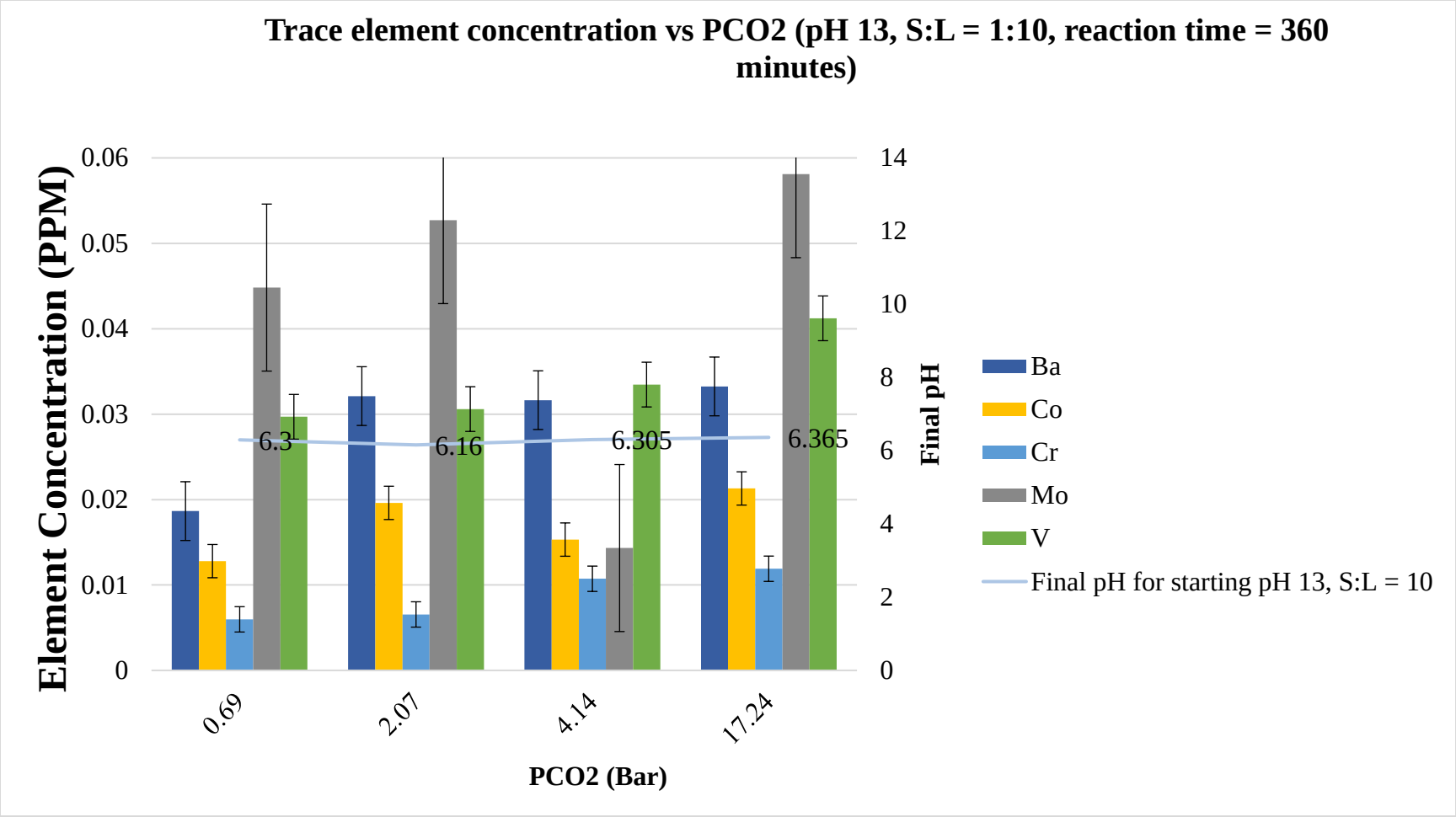

Element concentration vs PCO2 (S:L = 1:100, pH 12, reaction time = 360 minutes)
Element Concentration (PPM)
0.06
0.05
0.04
0.03
0.02
0.01
0
14
12
10
8
6
4
2
0
Final pH
5.655
5.64
5.595
5.55
0.69
2.07
4.14
17.24
PCO2 (Bar)
Ba
Sb
V
Final pH for starting pH 12, S:L = 100

VI.III – pH Series Experiments (pH = 13, S:L = 1:10, reaction time = 360 min). Error bars represent the standard deviation calculated from experimental duplicates.

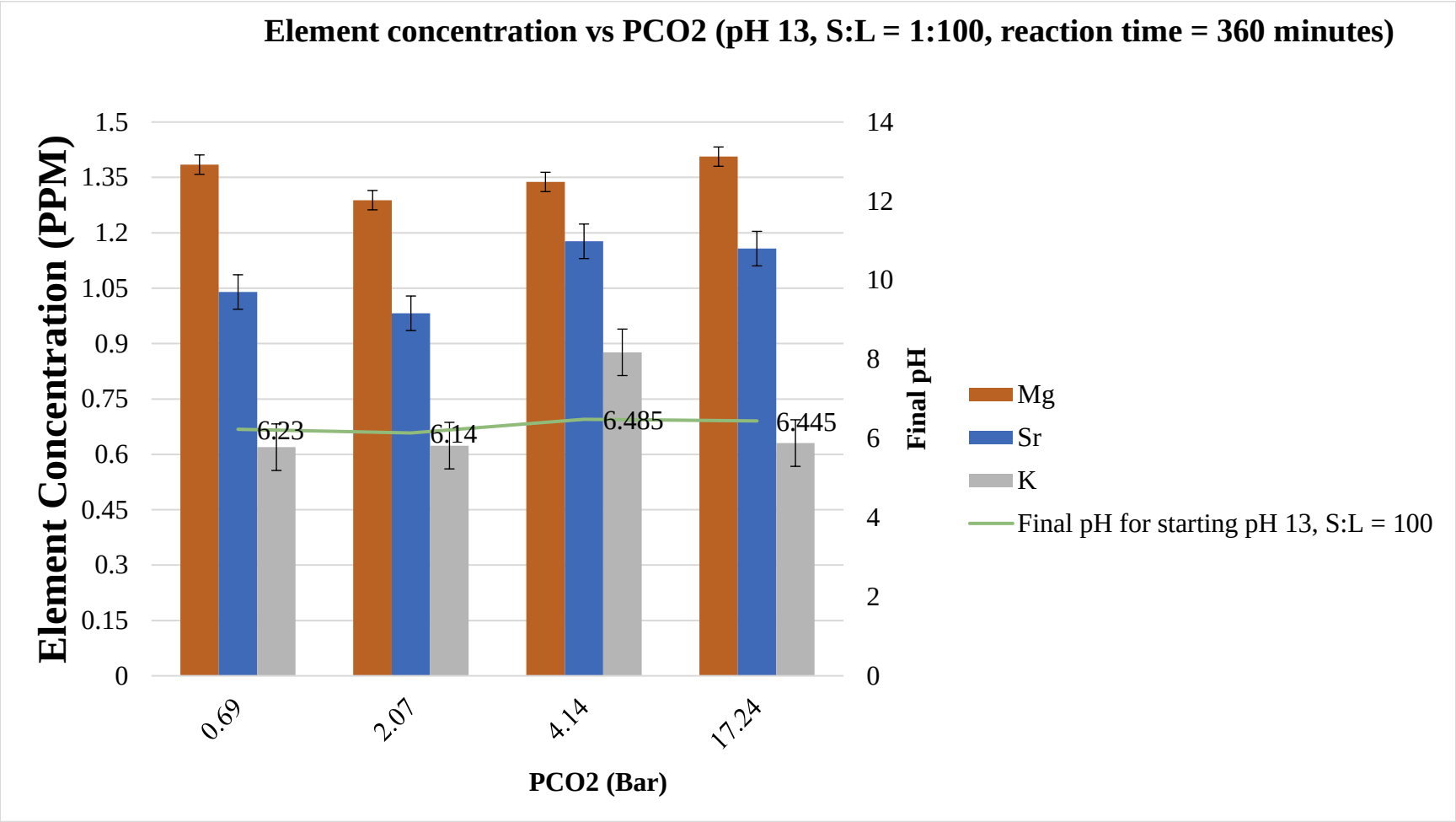


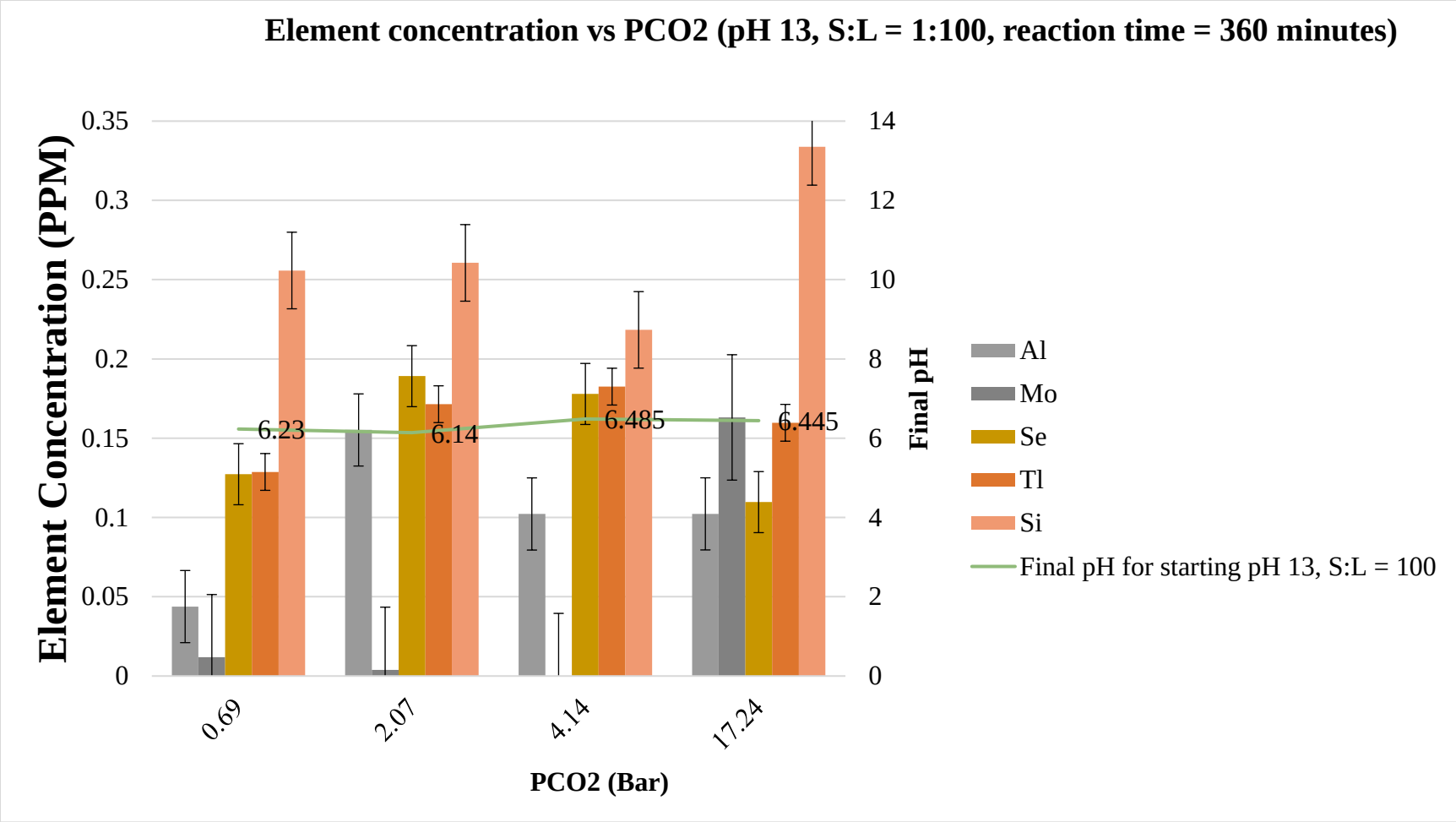

Trace element concentration vs PCO2 (pH 13, S:L = 1:10, reaction time = 360 minutes)
Element Concentration (PPM)
2.5
2.25
2
1.75
1.5
1.25
1
0.75
0.5
0.25
0
14
12
10
8
6
4
2
0
Final pH
6.3
6.16
6.305
6.365
0.69
2.07
4.14
17.24
PCO2 (Bar)
Al
Sr
Si
K
Final pH for starting pH 13, S:L = 10

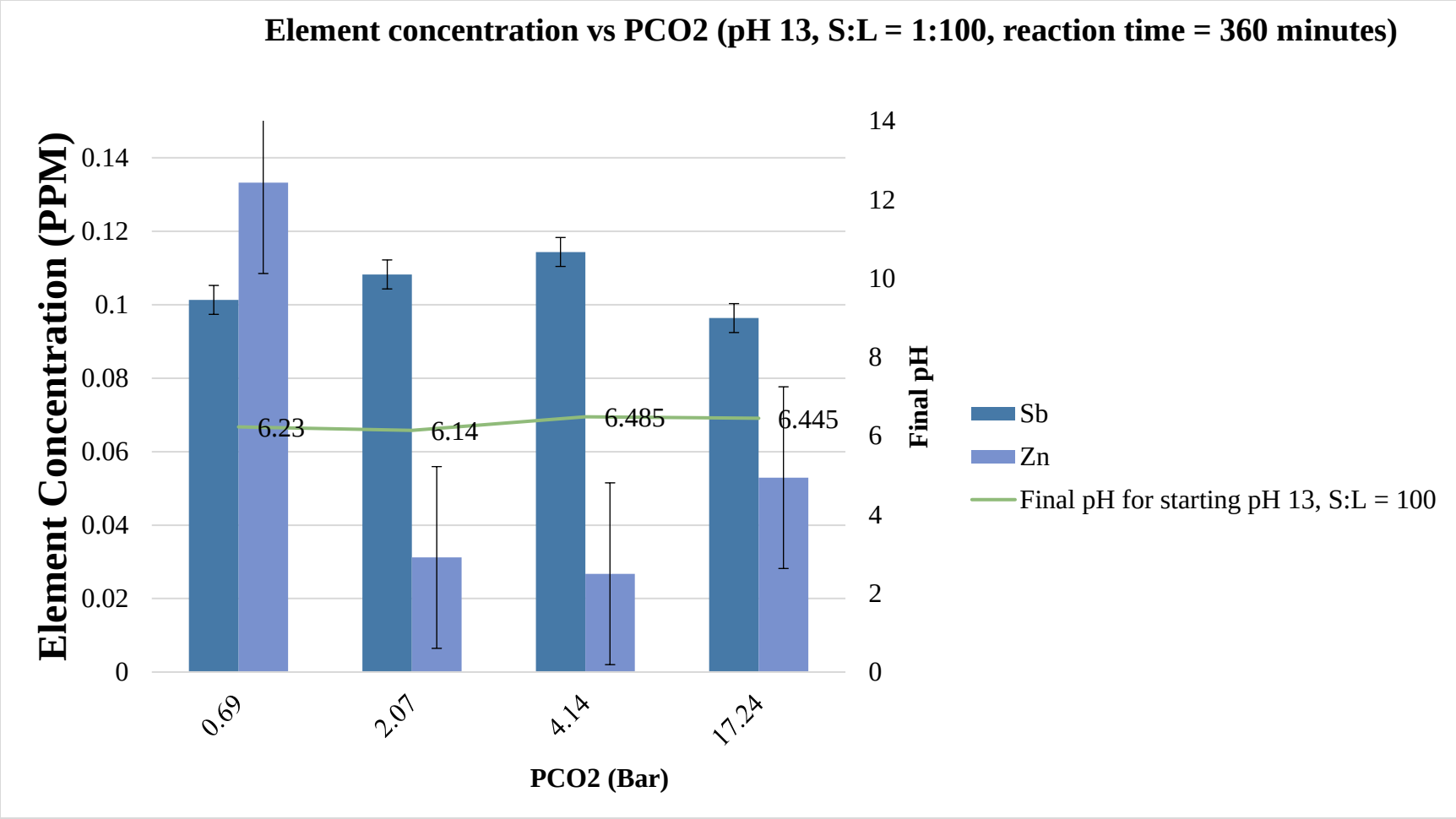

Trace element concentration vs PCO2 (pH 13, S:L = 1:10, reaction time = 360 minutes)
Element Concentration (PPM)
0.3
0.25
0.2
0.15
0.1
0.05
0
14
12
10
8
6
4
2
0
Final pH
6.3
6.16
6.305
6.365
0.69
2.07
4.14
17.24
PCO2 (Bar)
Se
Sb
Tl
Zn
Final pH for starting pH 13, S:L = 10

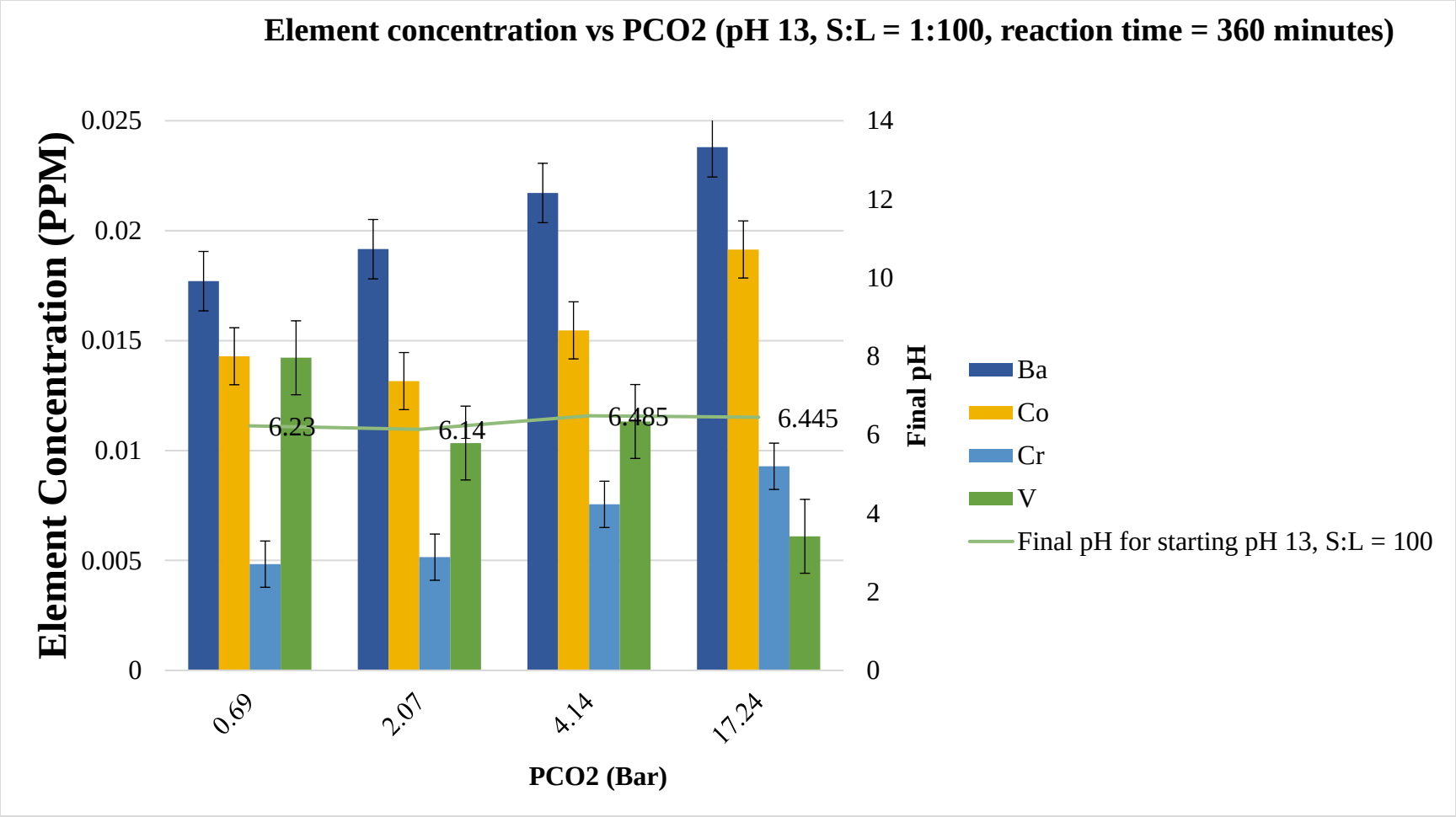

Trace element concentration vs PCO2 (pH 13, S:L = 1:10, reaction time = 360 minutes)
Element Concentration (PPM)
0.06
0.05
0.04
0.03
0.02
0.01
0
14
12
10
8
6
4
2
0
Final pH
6.3
6.16
6.305
6.365
0.69
2.07
4.14
17.24
PCO2 (Bar)
Ba
Co
Cr
Mo
V
Final pH for starting pH 13, S:L = 10

VI.VI – pH Series Experiments (pH = 13, S:L = 1:100, reaction time = 360 min). Error bars represent the standard deviation calculated from experimental duplicates.

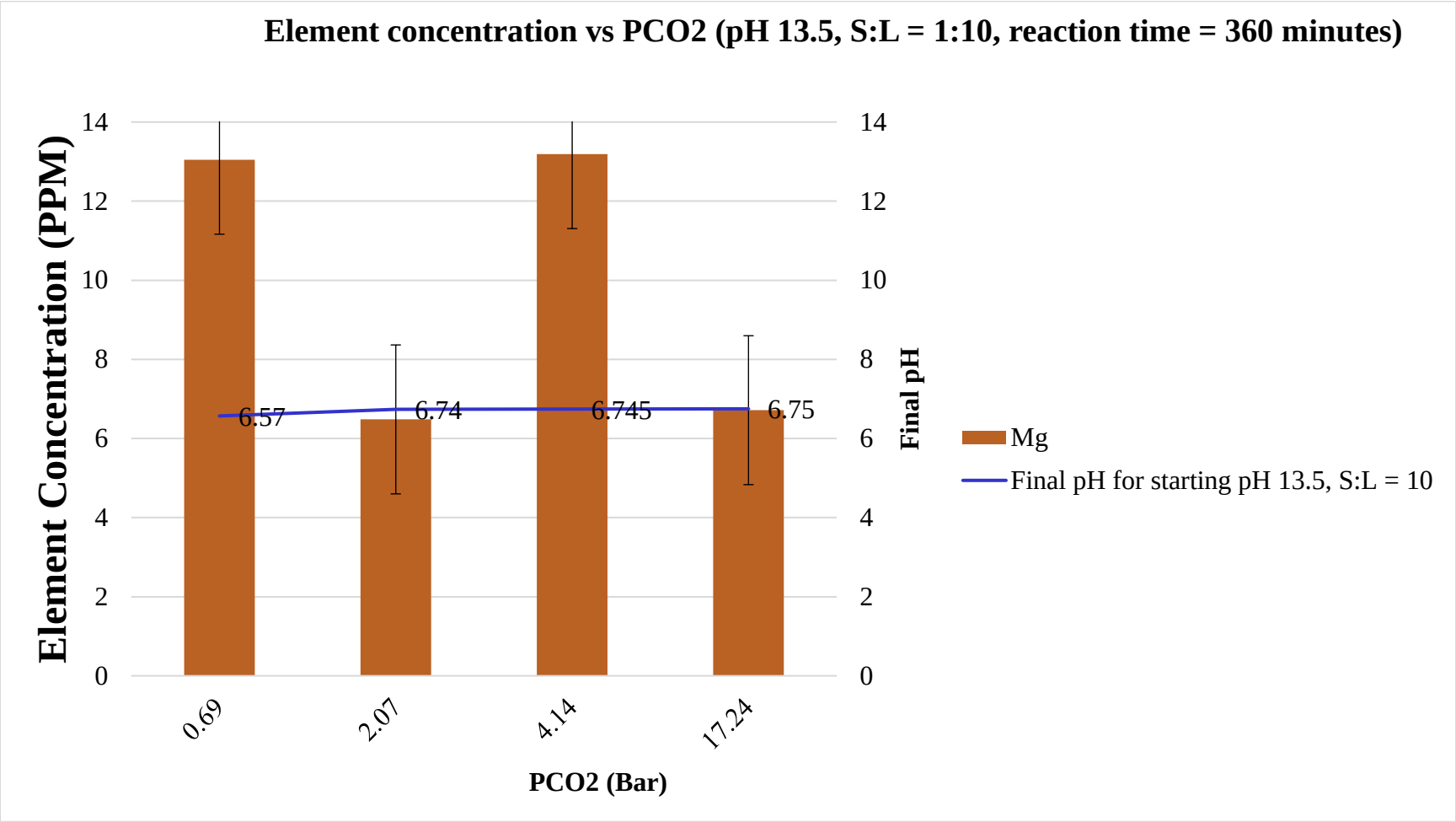


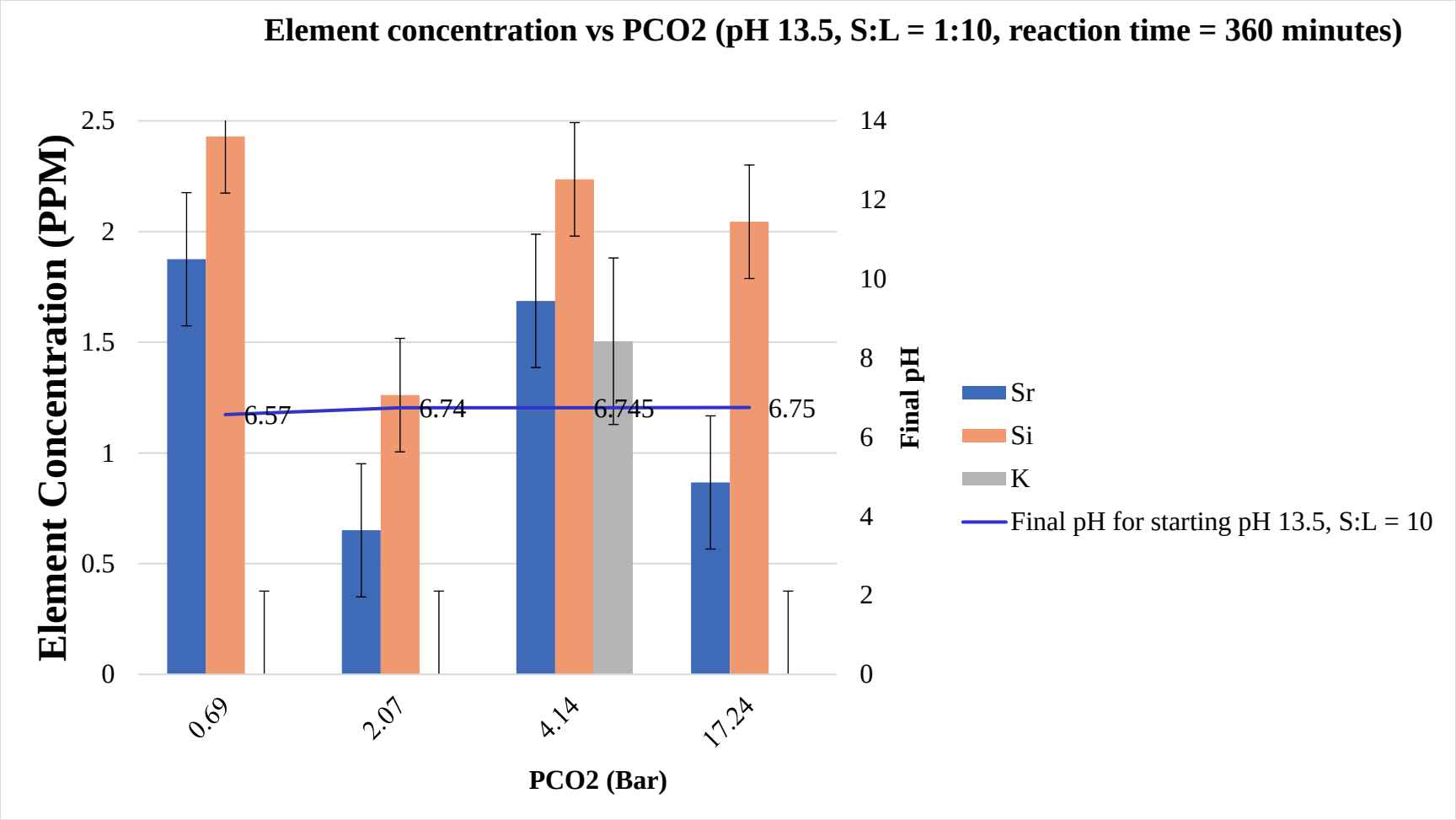

Element concentration vs PCO2 (pH 13, S:L = 1:100, reaction time = 360 minutes)
Element Concentration (PPM)
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
14
12
10
8
6
4
2
0
Final pH
6.23
6.14
6.485
6.445
0.69
2.07
4.14
17.24
PCO2 (Bar)
Al
Mo
Se
Tl
Si
Final pH for starting pH 13, S:L = 100

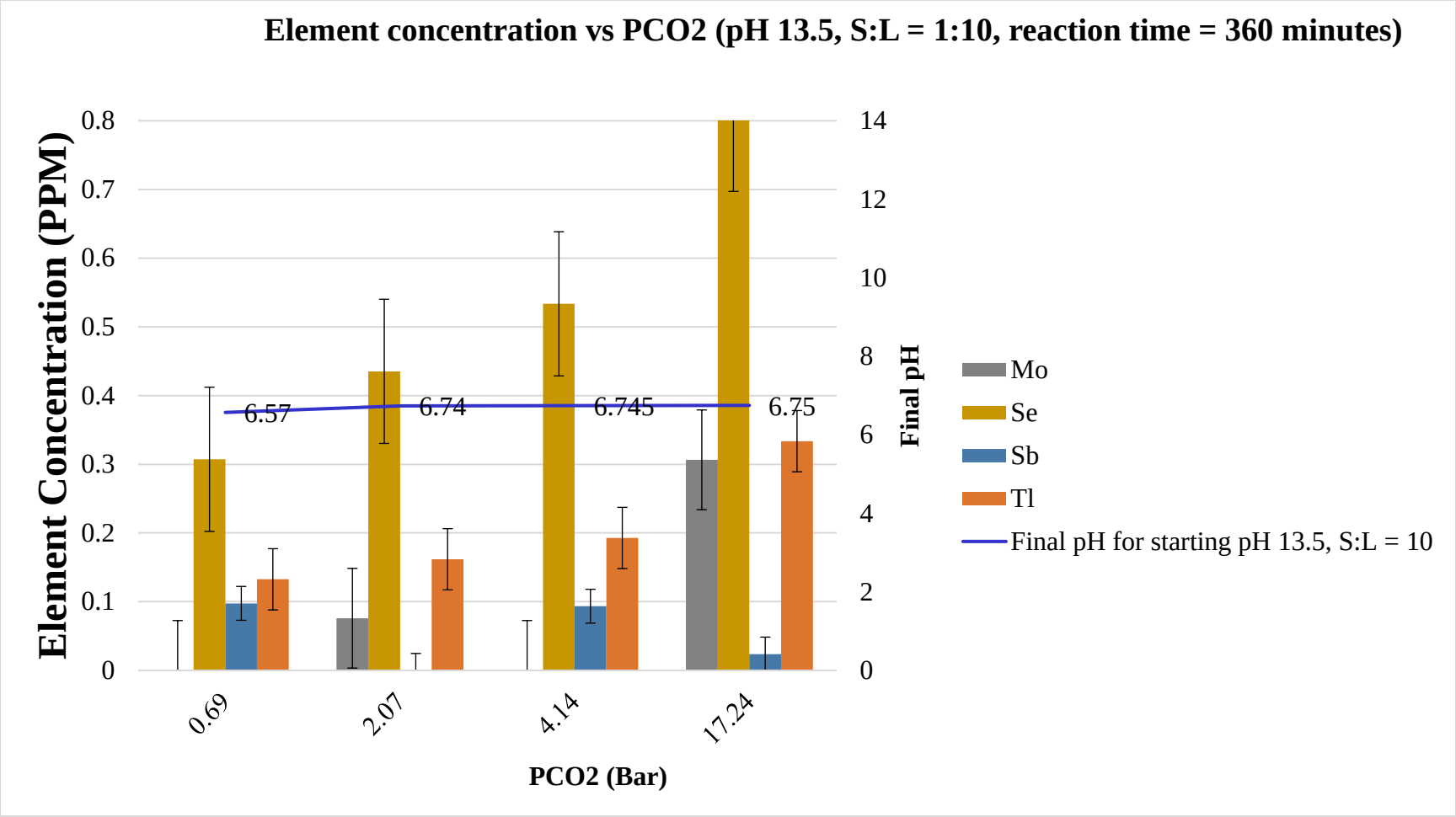

Element concentration vs PCO2 (pH 13, S:L = 1:100, reaction time = 360 minutes)
Element Concentration (PPM)
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
14
12
10
8
6
4
2
0
Final pH
6.23
6.14
6.485
6.445
0.69
2.07
4.14
17.24
PCO2 (Bar)
Sb
Zn
Final pH for starting pH 13, S:L = 100

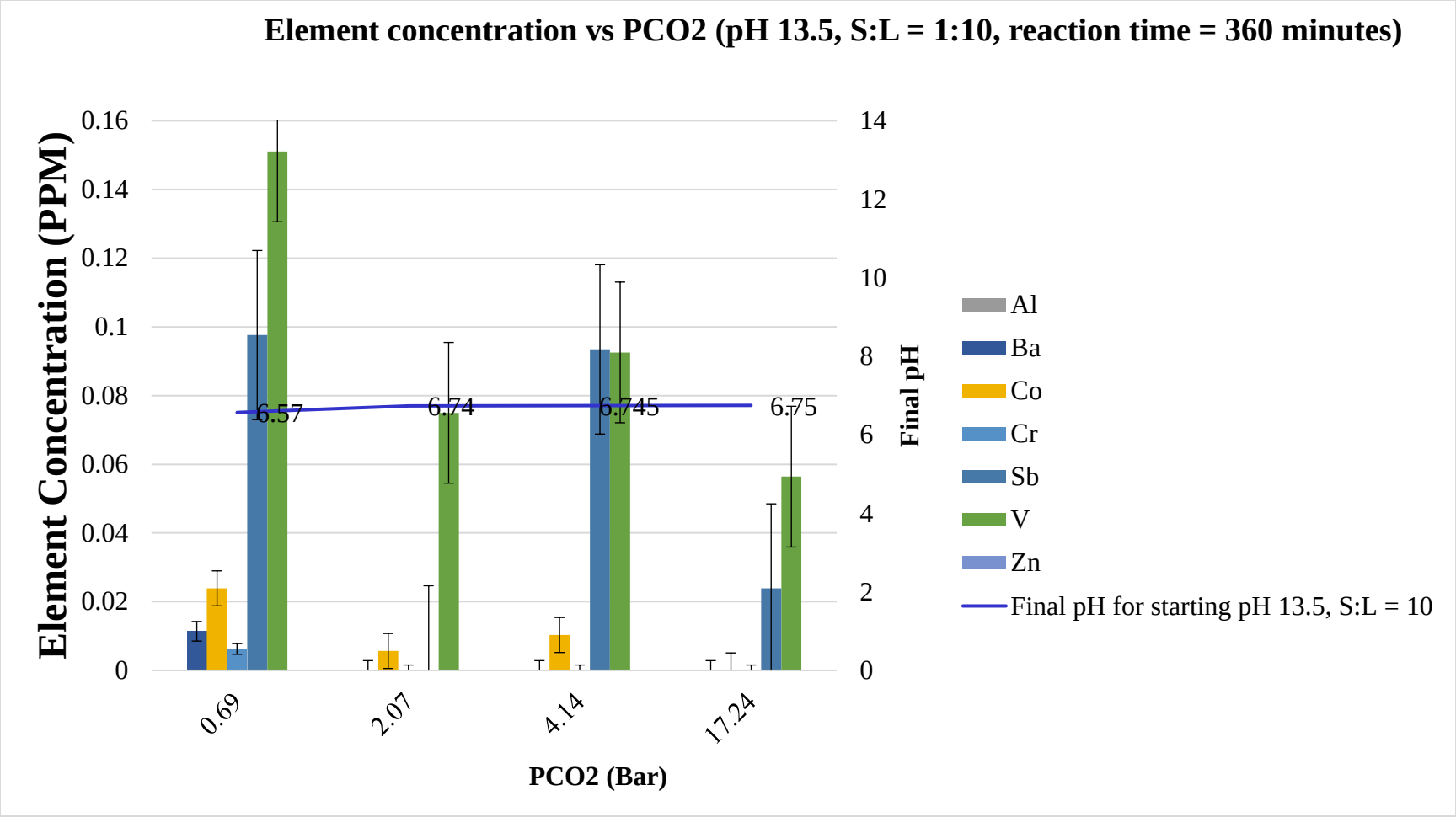

Element concentration vs PCO2 (pH 13, S:L = 1:100, reaction time = 360 minutes)
Element Concentration (PPM)
0.025
0.02
0.015
0.01
0.005
0
14
12
10
8
6
4
2
0
Final pH
6.23
6.14
6.485
6.445
0.69
2.07
4.14
17.24
PCO2 (Bar)
Ba
Co
Cr
V
Final pH for starting pH 13, S:L = 100

VI.V – pH Series Experiments (pH = 13.5, S:L = 1:10, reaction time = 360 min). Error bars represent the standard deviation calculated from experimental duplicates.

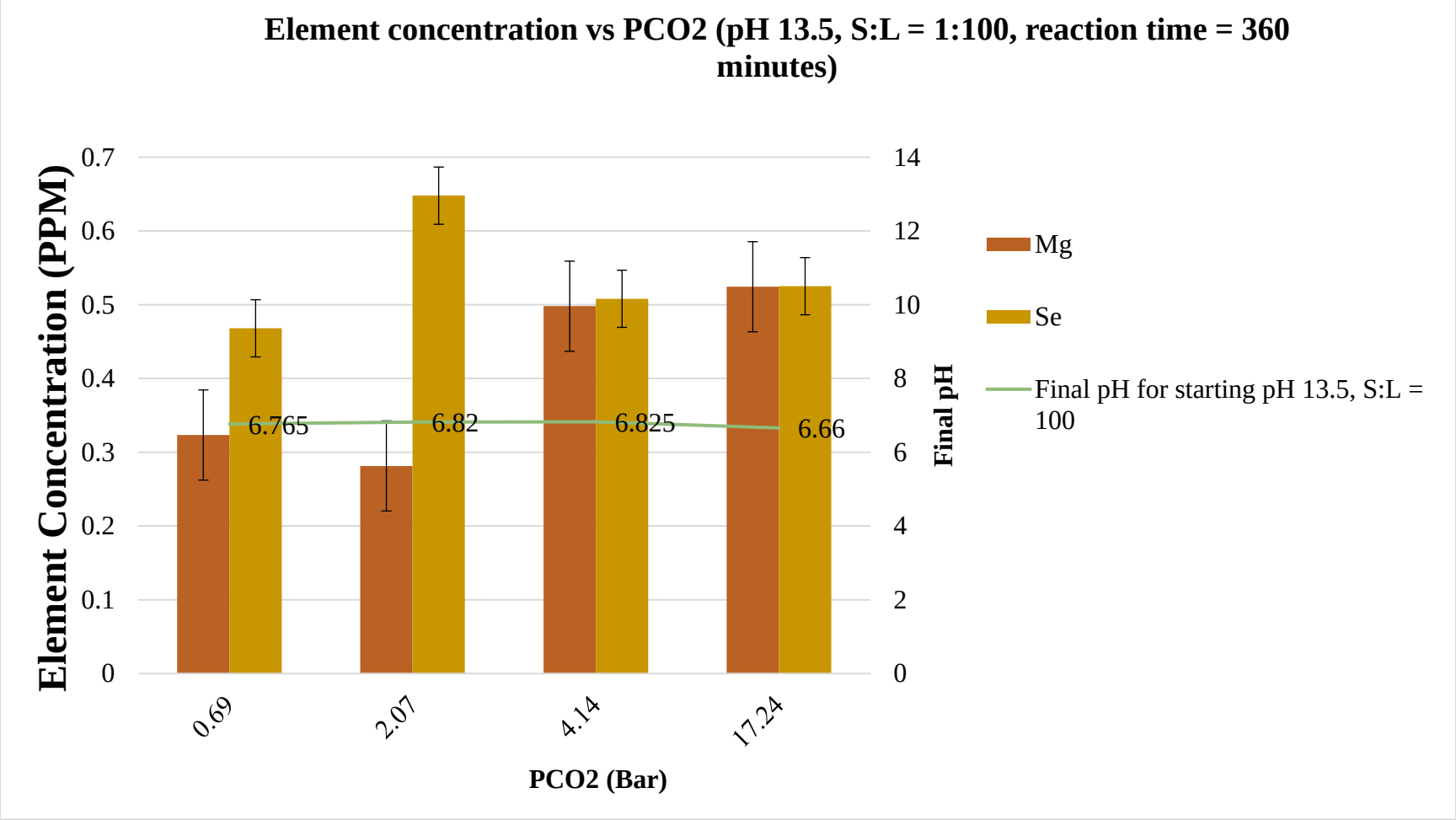


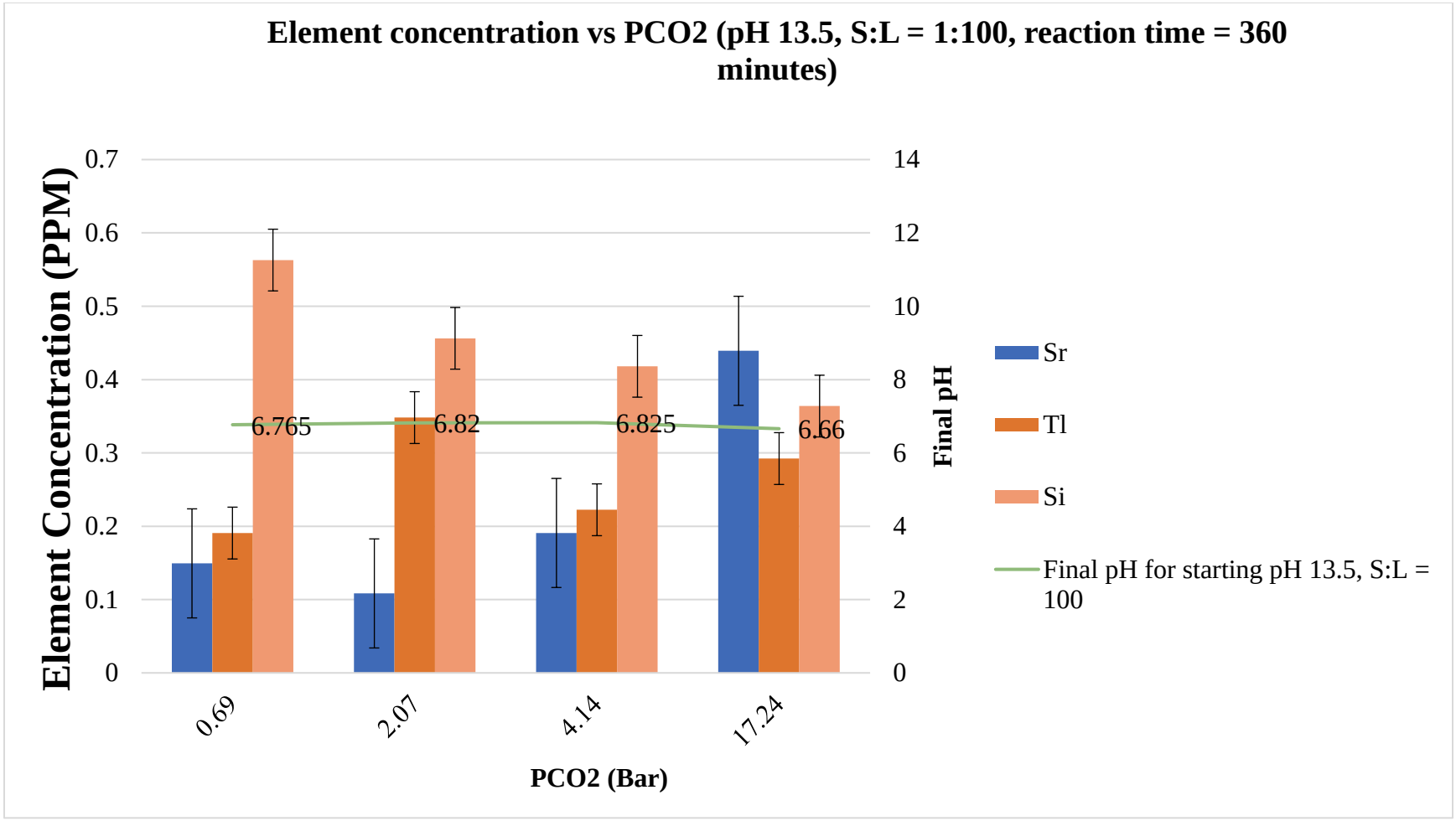

Element concentration vs PCO2 (pH 13.5, S:L = 1:10, reaction time = 360 minutes)
Element Concentration (PPM)
Final pH
PCO2 (Bar)
0.69
2.07
4.14
17.24
6.57
6.74
6.745
6.75
Sr
Si
K
Final pH for starting pH 13.5, S:L = 10

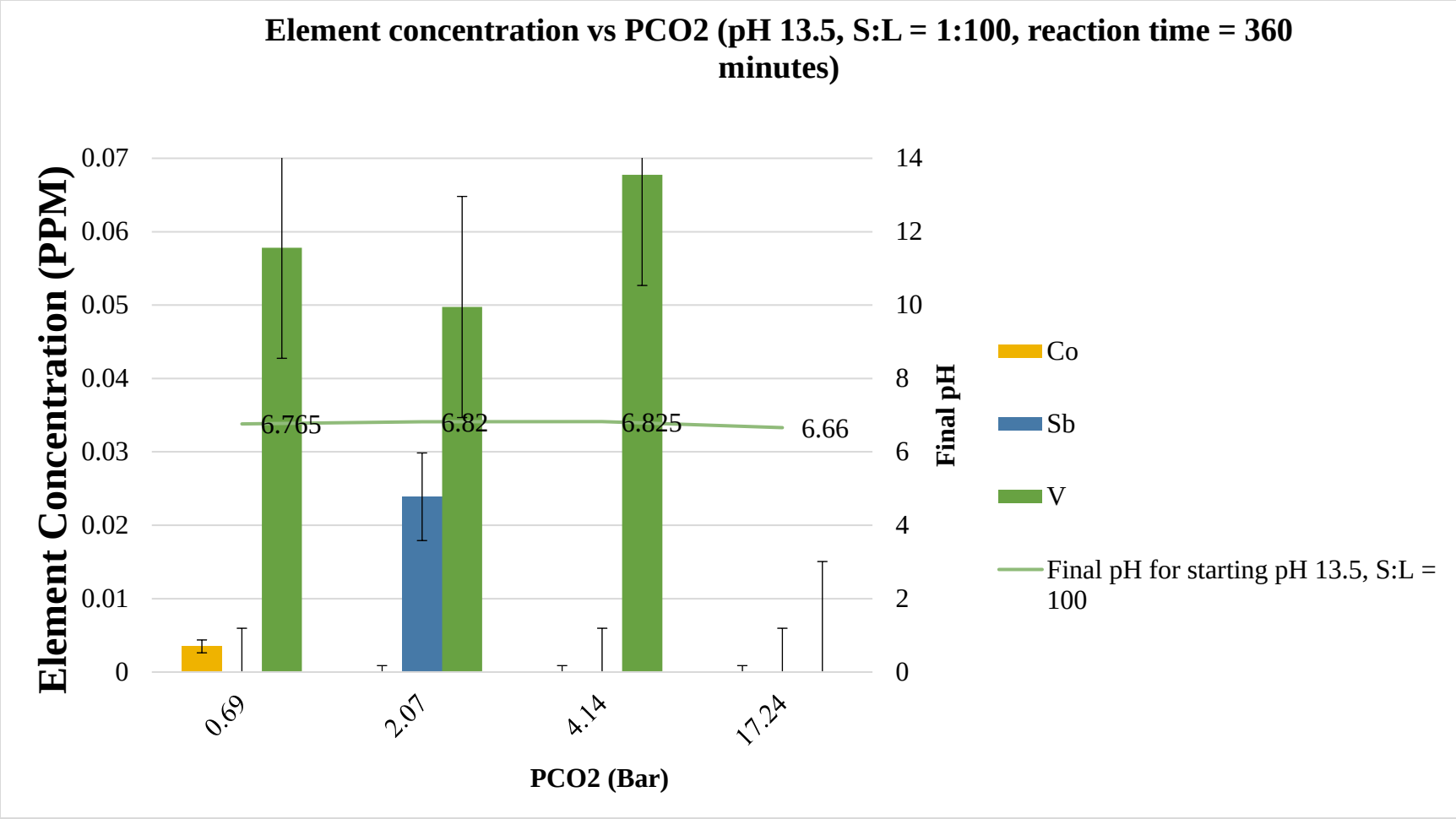

Element concentration vs PCO2 (pH 13.5, S:L = 1:10, reaction time = 360 minutes)
Element Concentration (PPM)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
14
12
10
8
6
4
2
0
Final pH
6.57
6.74
6.745
6.75
0.69
2.07
4.14
17.24
PCO2 (Bar)
Mo
Se
Sb
Tl
Final pH for starting pH 13.5, S:L = 10


Element concentration vs PCO2 (pH 13.5, S:L = 1:10, reaction time = 360 minutes)
Element Concentration (PPM)
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
14
12
10
8
6
4
2
0
Final pH
6.57
6.74
6.745
6.75
0.69
2.07
4.14
17.24
PCO2 (Bar)
Al
Ba
Co
Cr
Sb
V
Zn
Final pH for starting pH 13.5, S:L = 10

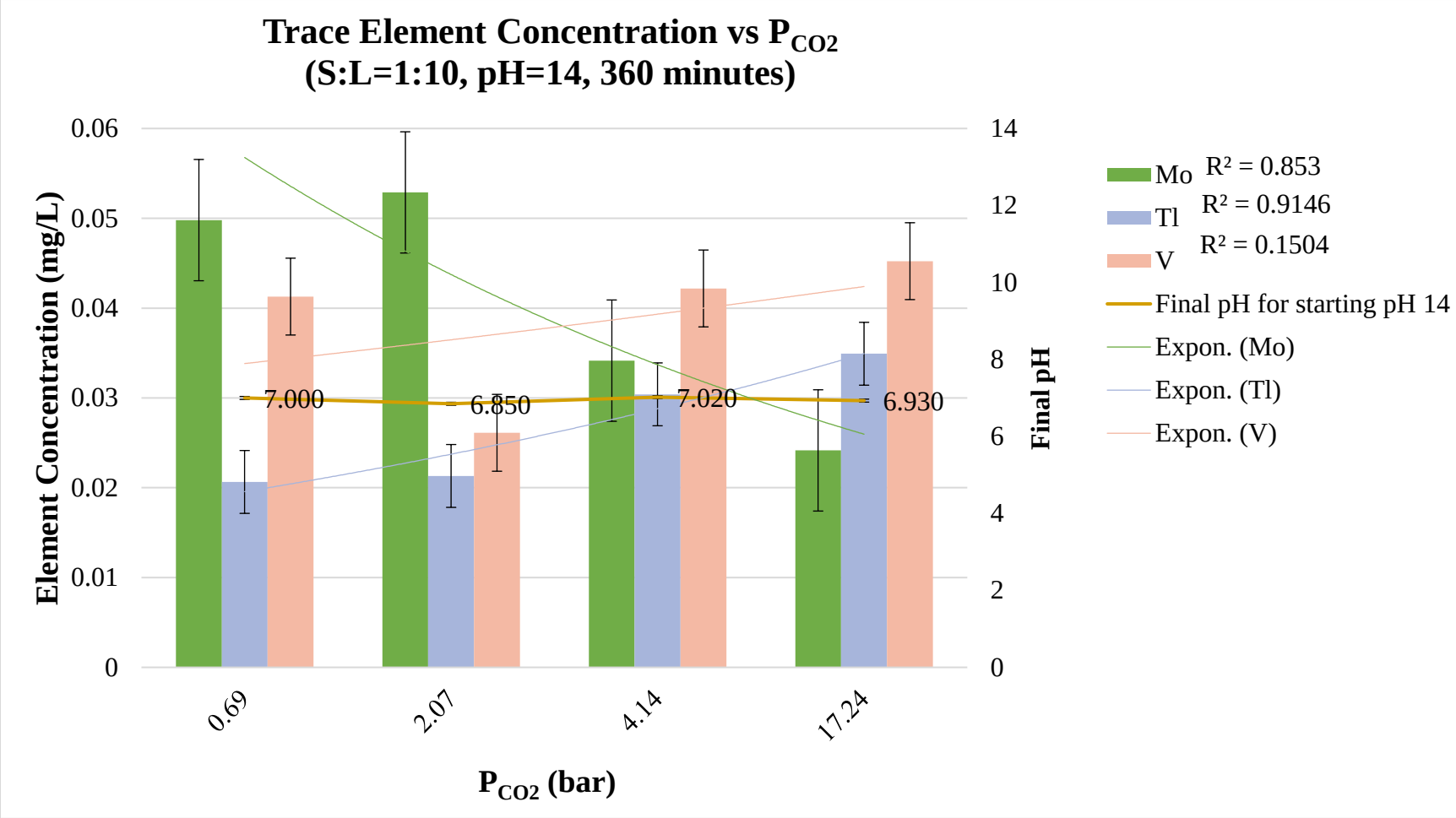
VI.VI – pH Series Experiments (pH = 13.5, S:L = 1:100, reaction time = 360 min). Error bars represent the standard deviation calculated from experimental duplicates.

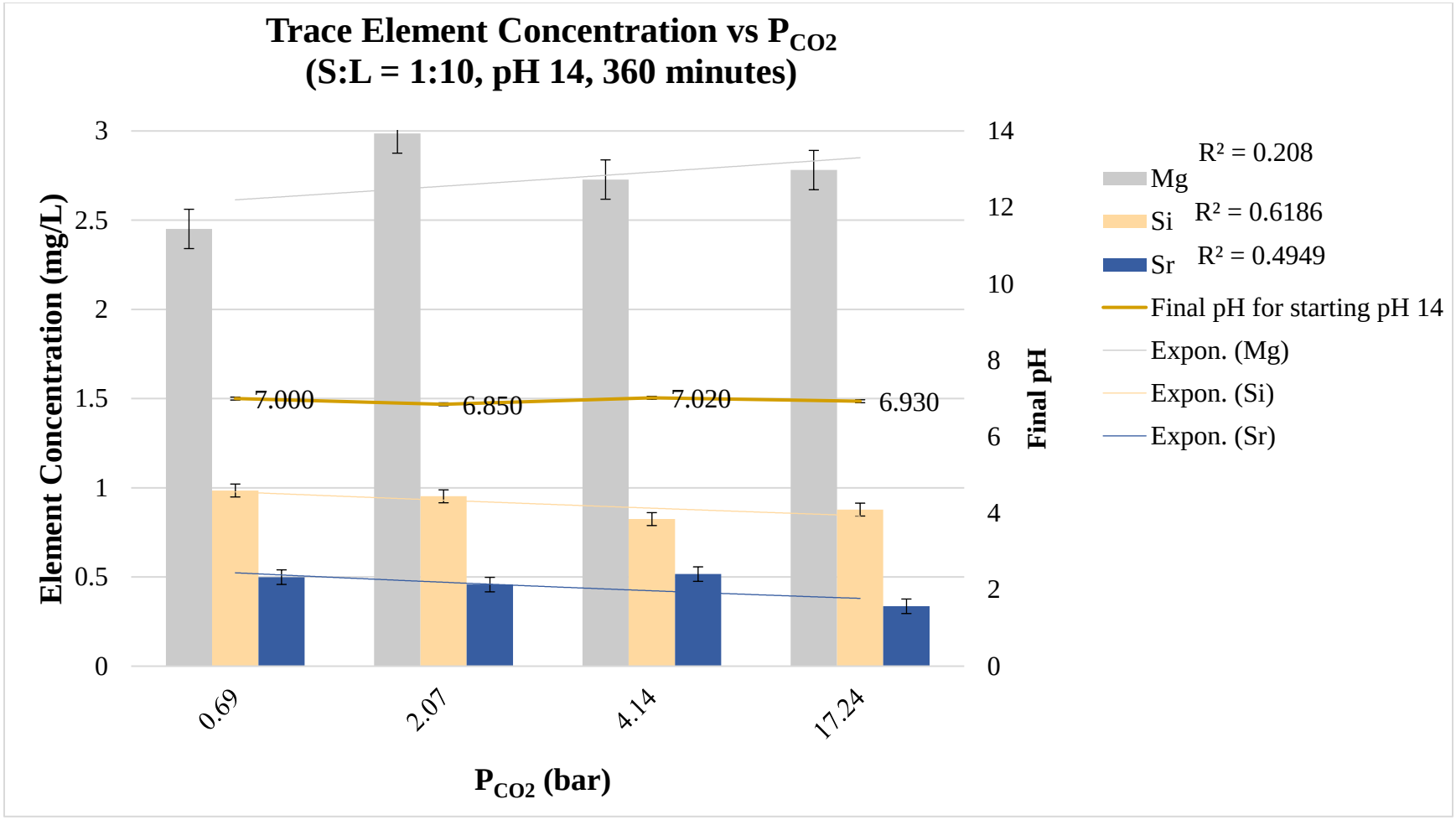


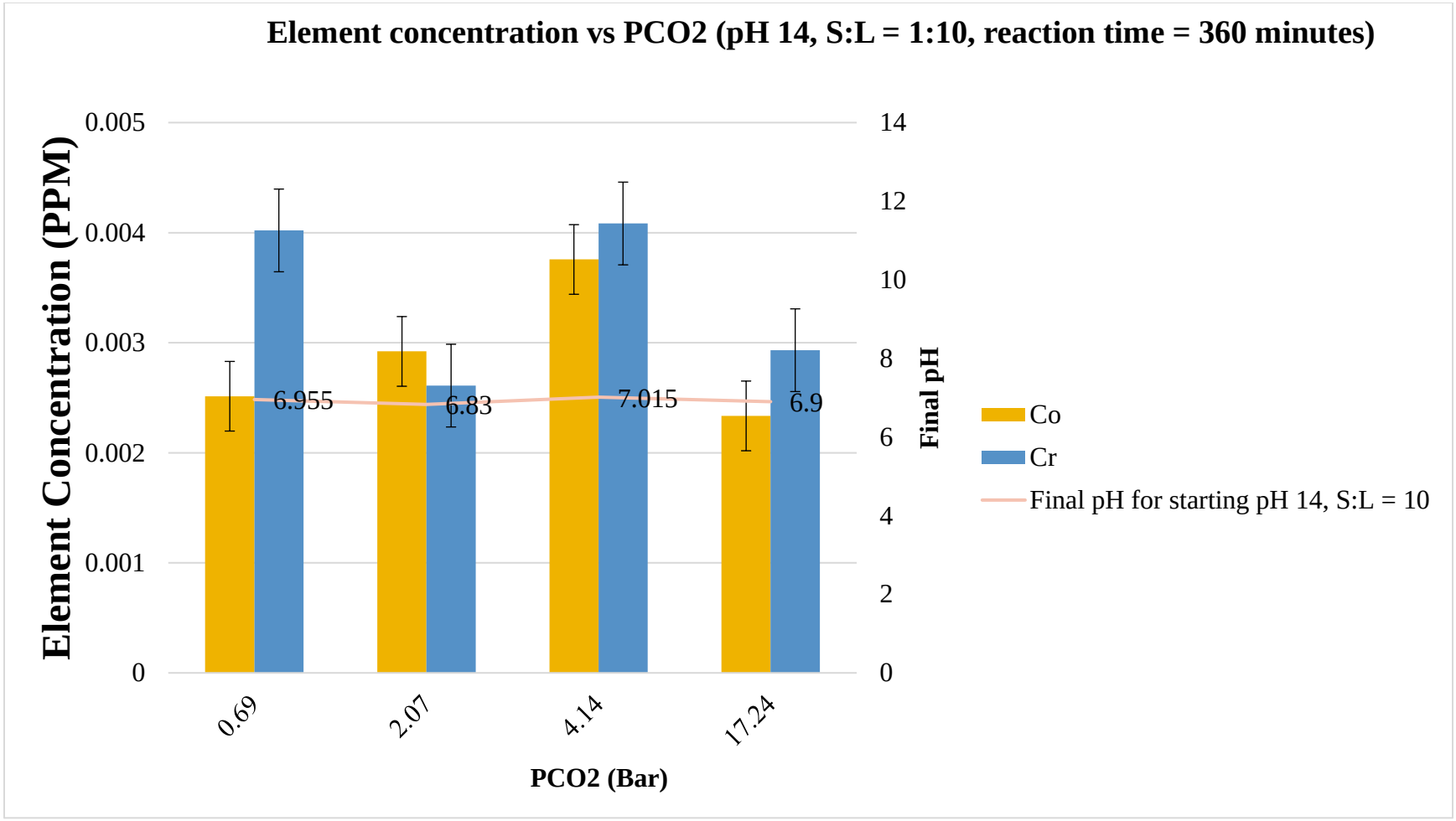

Element concentration vs PCO2 (pH 13.5, S:L = 1:100, reaction time = 360 minutes)
Element Concentration (PPM)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
14
12
10
8
6
4
2
0
Final pH
6.765
6.82
6.825
6.66
0.69
2.07
4.14
17.24
PCO2 (Bar)
Sr
Tl
Si
Final pH for starting pH 13.5, S:L = 100


Element concentration vs PCO2 (pH 13.5, S:L = 1:100, reaction time = 360 minutes)
Element Concentration (PPM)
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
14
12
10
8
6
4
2
0
Final pH
6.765
6.82
6.825
6.66
0.69
2.07
4.14
17.24
PCO2 (Bar)
Co
Sb
V
Final pH for starting pH 13.5, S:L = 100

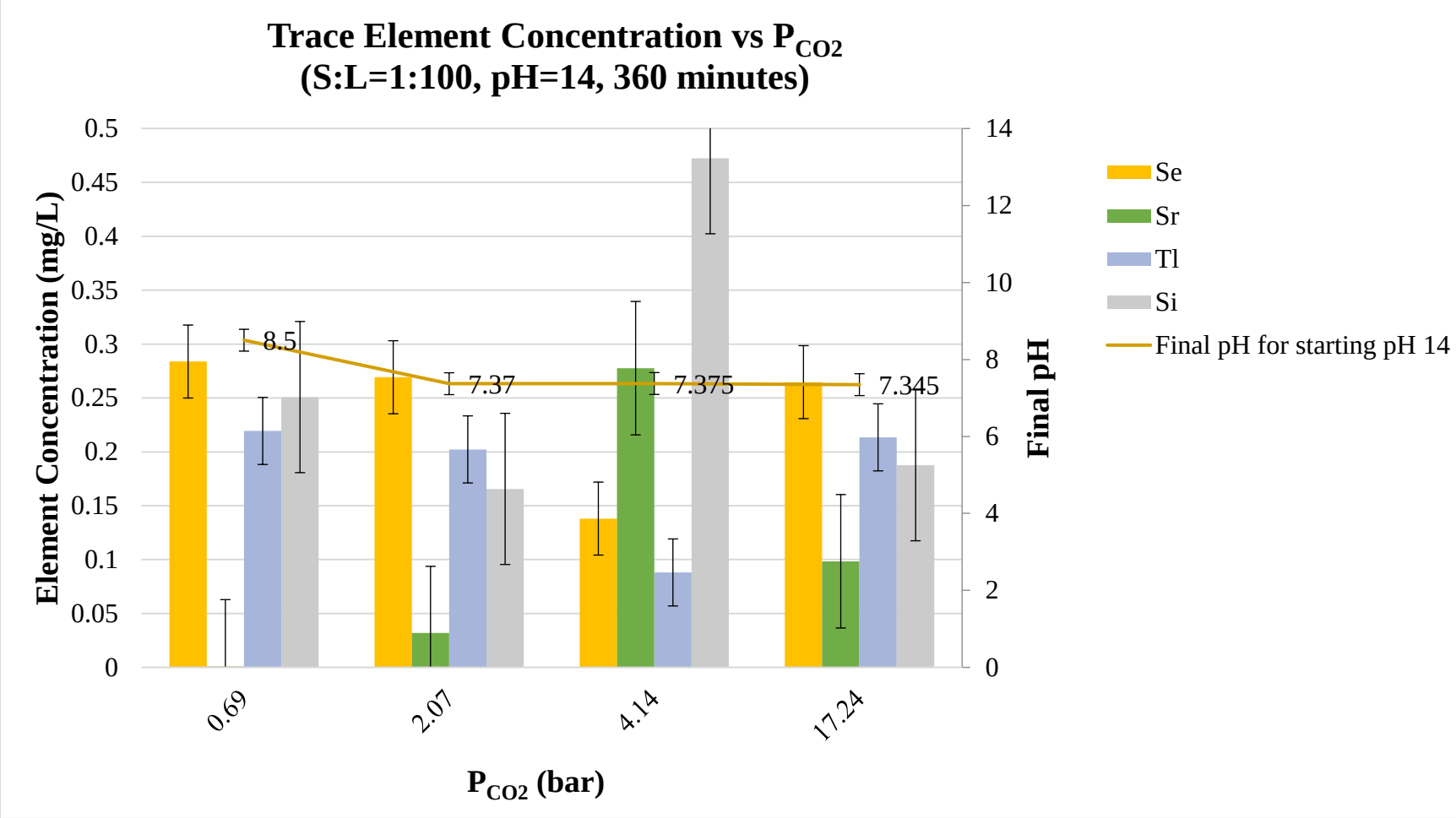
VI.VII – pH Series Experiments (pH = 14, S:L = 1:10, reaction time = 360 min). Error bars represent the standard deviation calculated from experimental duplicates.

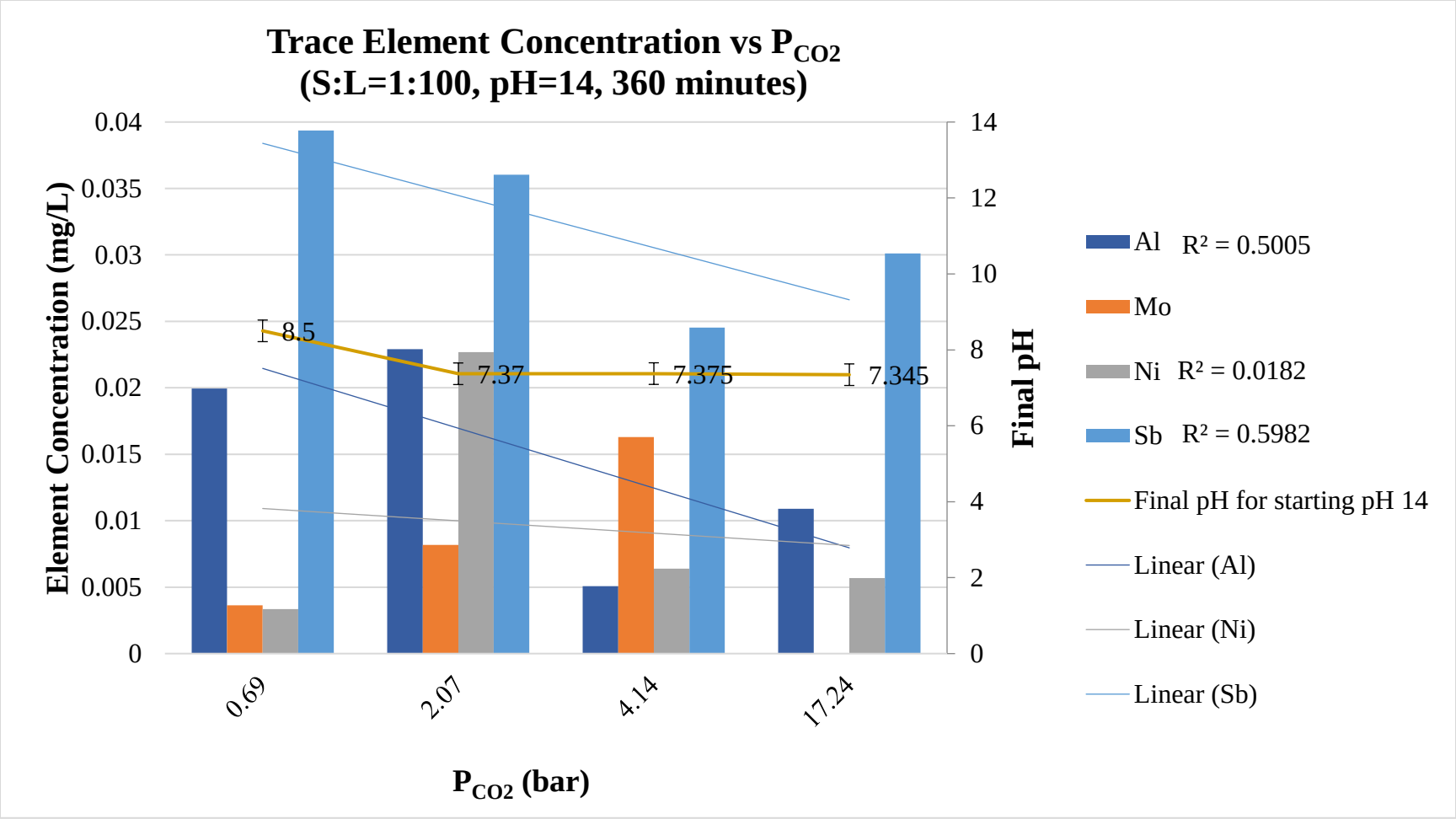



Trace Element Concentration vs P_{CO2}
(S:L = 1:10, pH 14, 360 minutes)
Element Concentration (mg/L)
Final pH
P_{CO2} (bar)
0.69
2.07
4.14
17.24
7.000
6.850
7.020
6.930
Mg
Si
Sr
R² = 0.208
R² = 0.6186
R² = 0.4949
Final pH for starting pH 14
Expon. (Mg)
Expon. (Si)
Expon. (Sr)


Element concentration vs PCO2 (pH 14, S:L = 1:10, reaction time = 360 minutes)
Element Concentration (PPM)
0.005
0.004
0.003
0.002
0.001
0
14
12
10
8
6
4
2
0
Final pH
6.955
6.83
7.015
6.9
0.69
2.07
4.14
17.24
PCO2 (Bar)
Co
Cr
Final pH for starting pH 14, S:L = 10

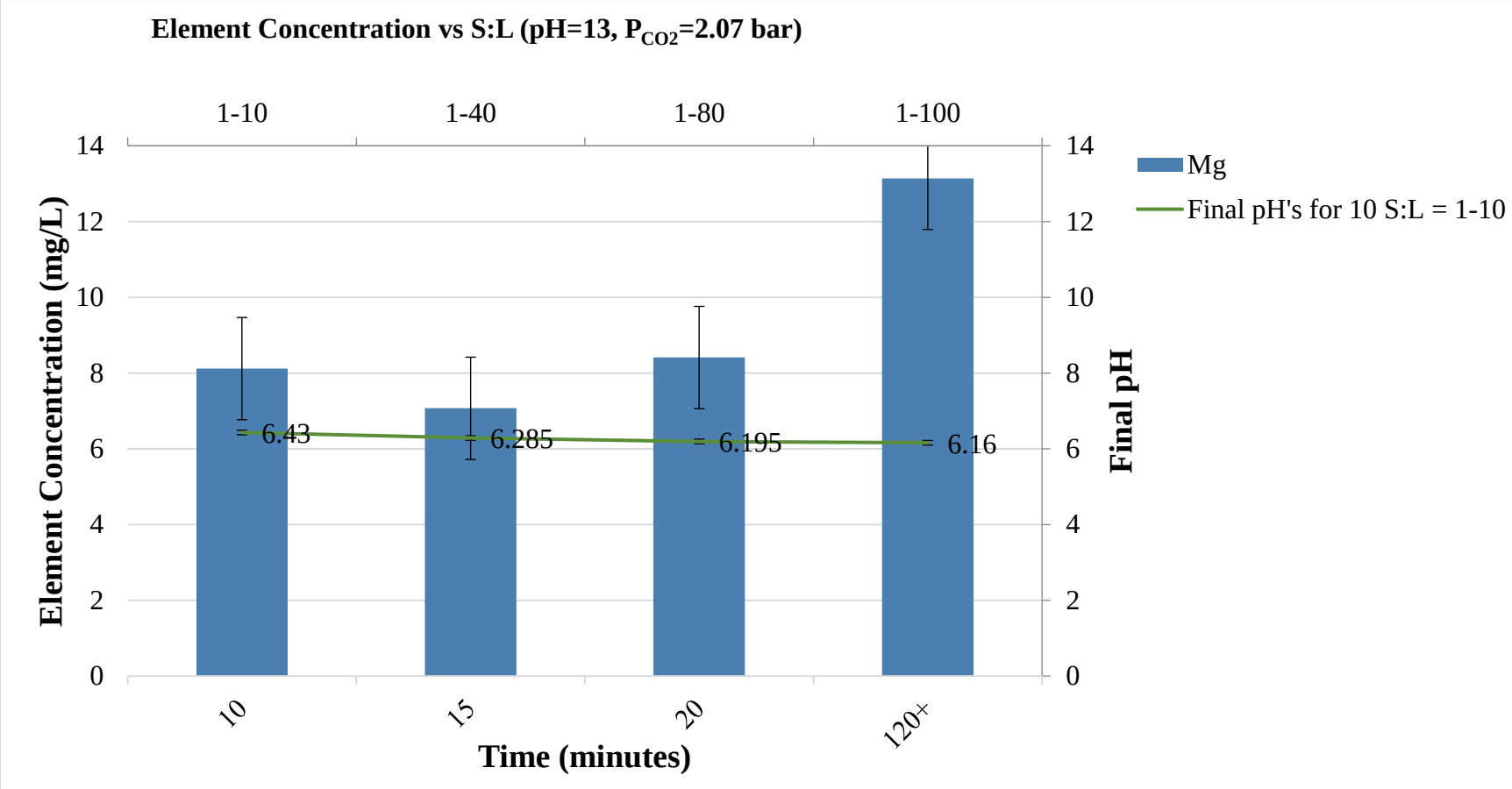
VI.VIII – pH Series Experiments (pH = 14, S:L = 1:100, reaction time = 360 min). Error bars represent the standard deviation calculated from experimental duplicates.

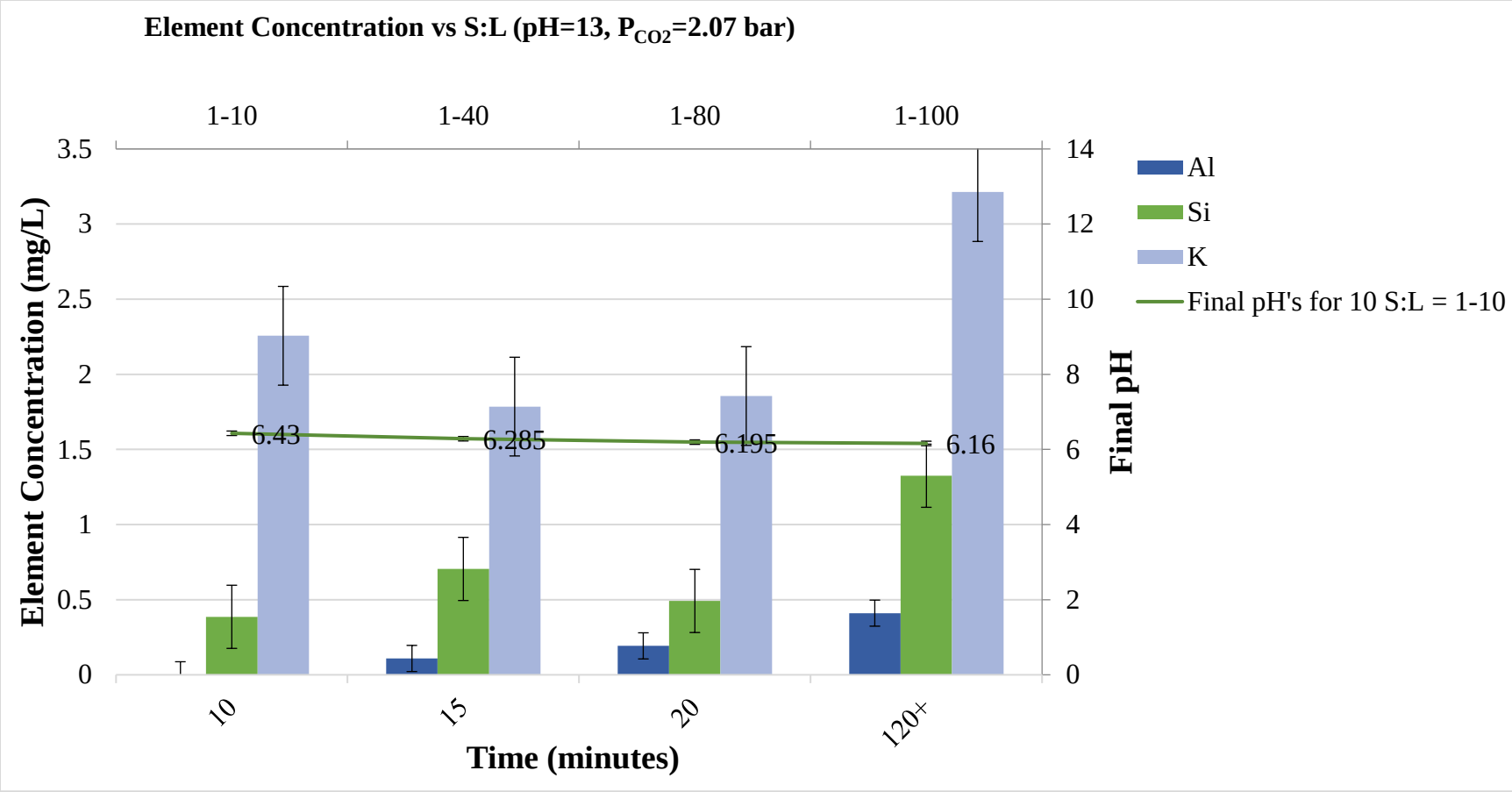


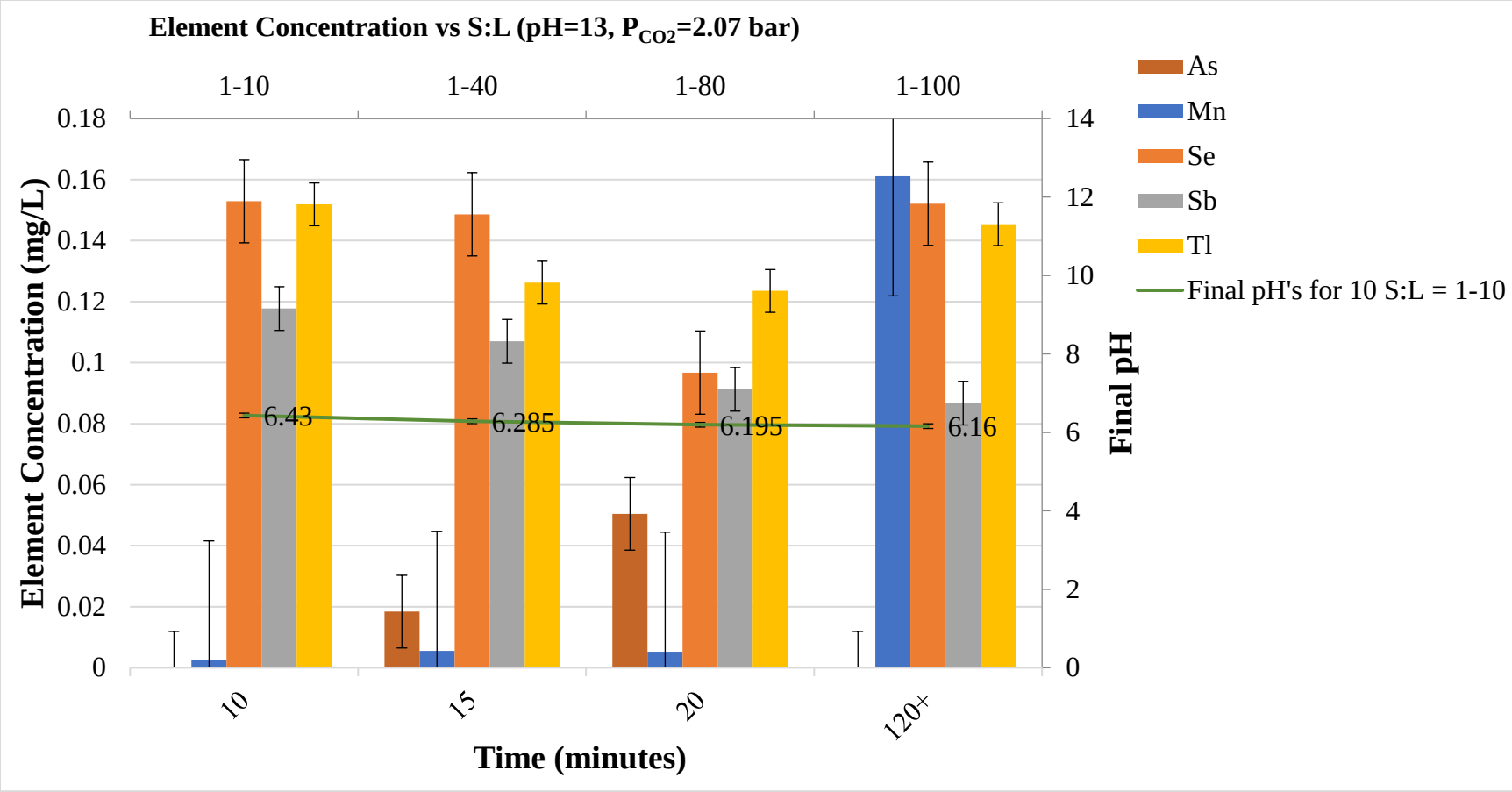

Trace Element Concentration vs P_{CO2}
(S:L=1:100, pH=14, 360 minutes)
Element Concentration (mg/L)
Final pH
P_{CO2} (bar)
0.69
2.07
4.14
17.24
8.5
7.37
7.375
7.345
Al R² = 0.5005
Mo
Ni R² = 0.0182
Sb R² = 0.5982
Final pH for starting pH 14
Linear (Al)
Linear (Ni)
Linear (Sb)

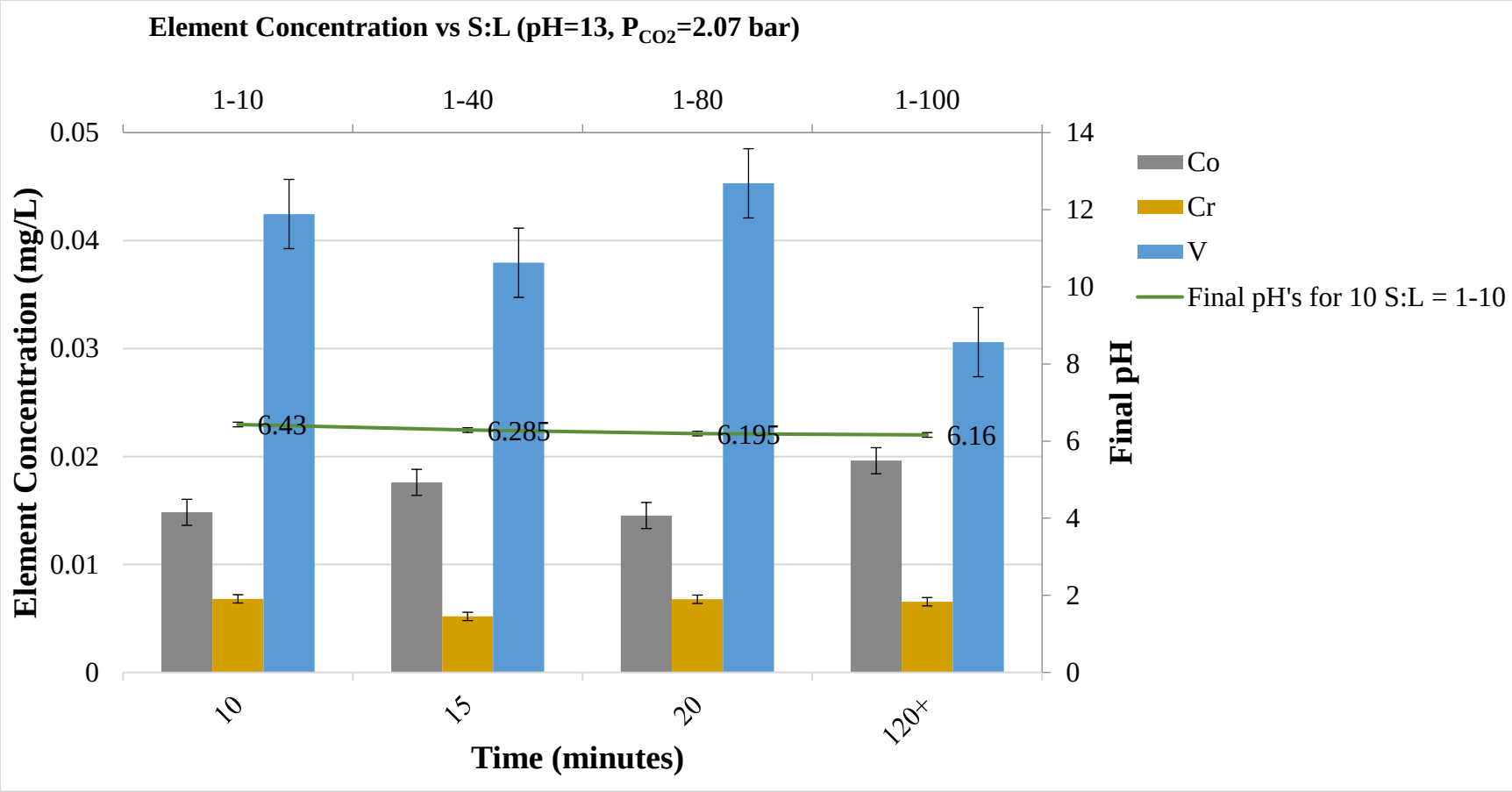
APPENDIX VII: Wastewater Element Concentrations and pH vs Time Plots

VII.I – Times Series Experiments (pH = 13, P_{CO_2} = 2.07). Error bars represent the standard deviation calculated from experimental duplicates.

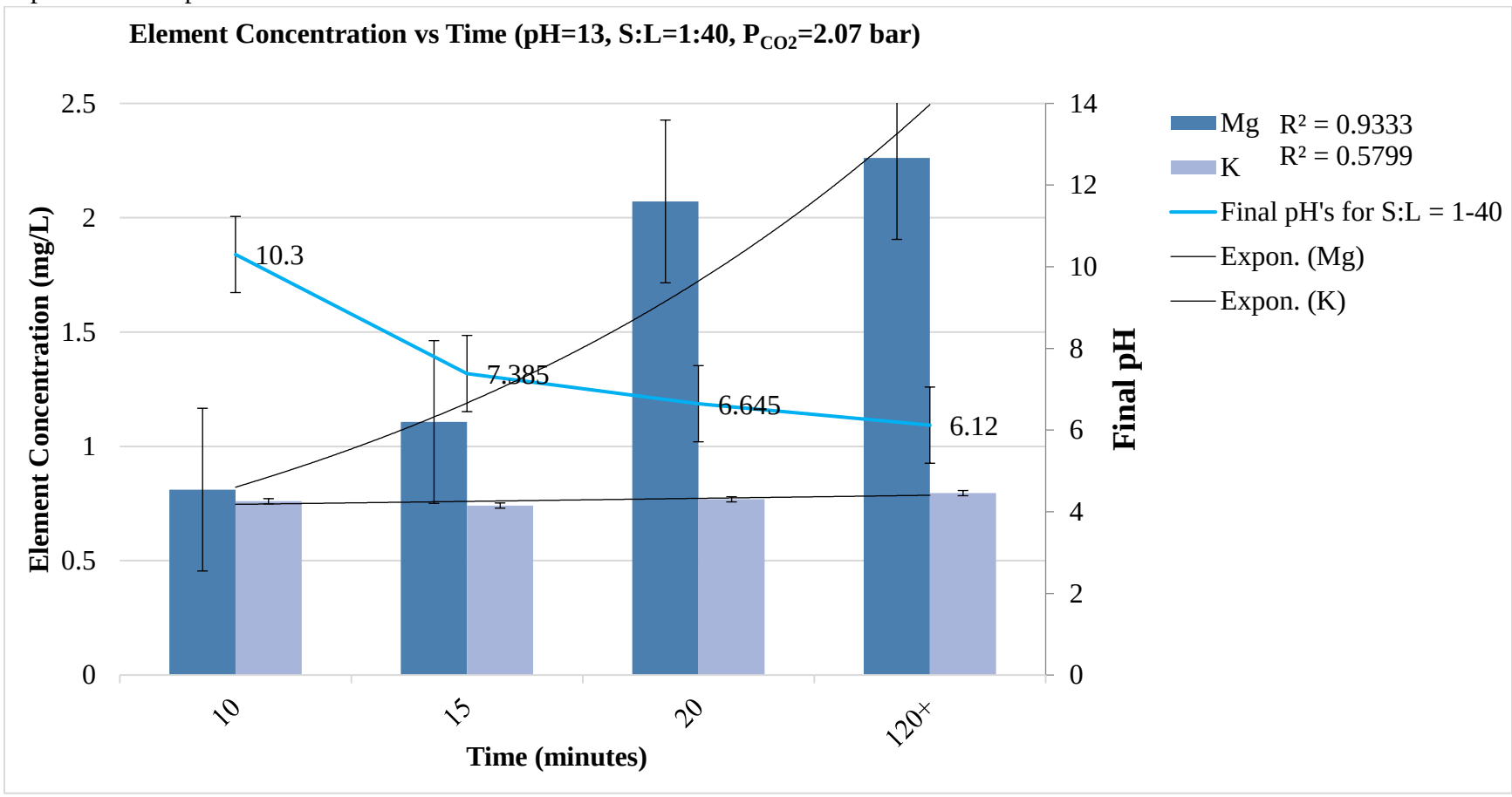


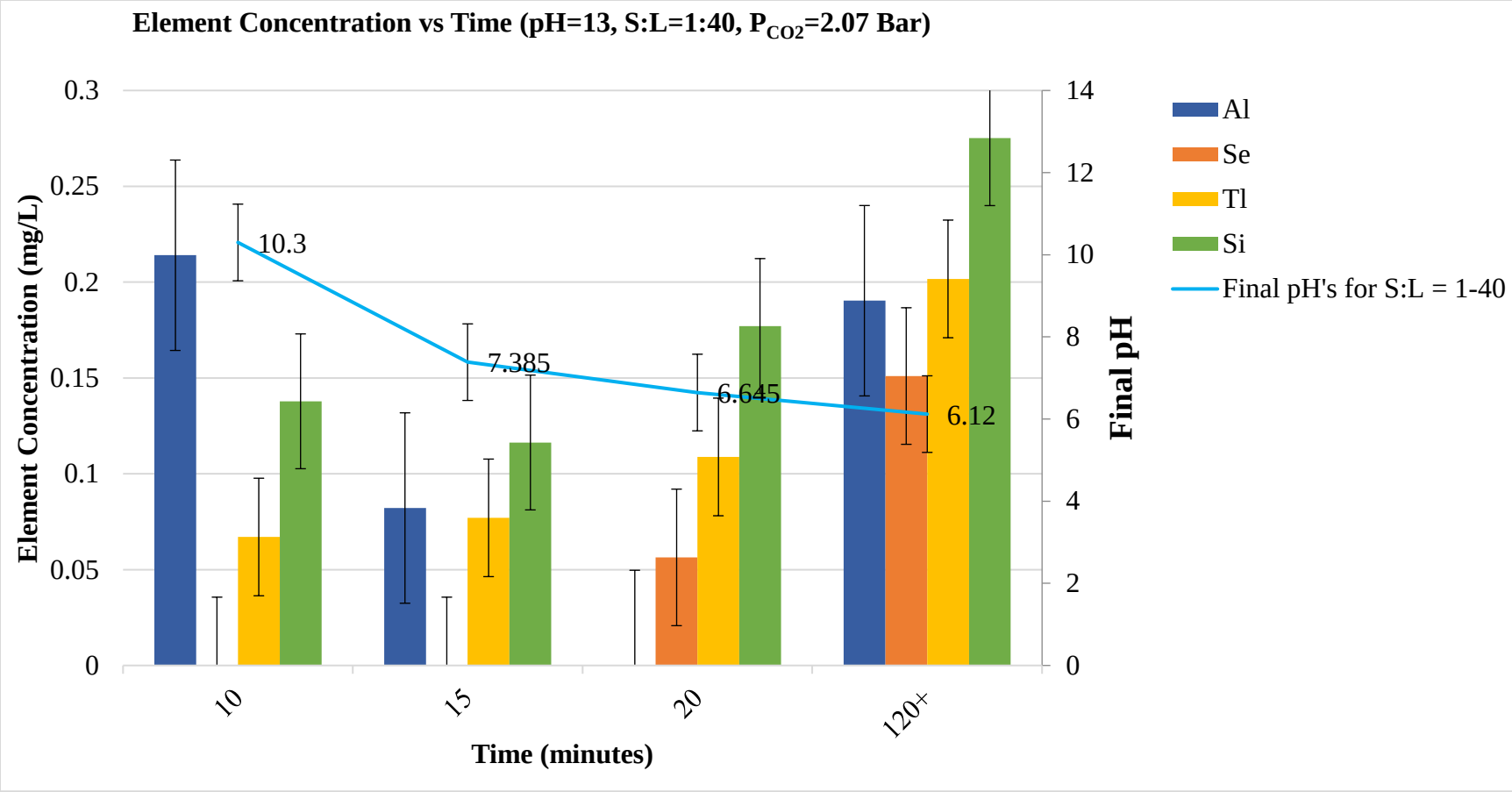

Element Concentration vs S:L (pH=13, P_{CO2}=2.07 bar)
1-10
1-40
1-80
1-100
3.5
3
2.5
2
1.5
1
0.5
0
14
12
10
8
6
4
2
0
Element Concentration (mg/L)
Final pH
Al
Si
K
Final pH's for 10 S:L = 1-10
6.43
6.285
6.195
6.16
10
15
20
120+
Time (minutes)

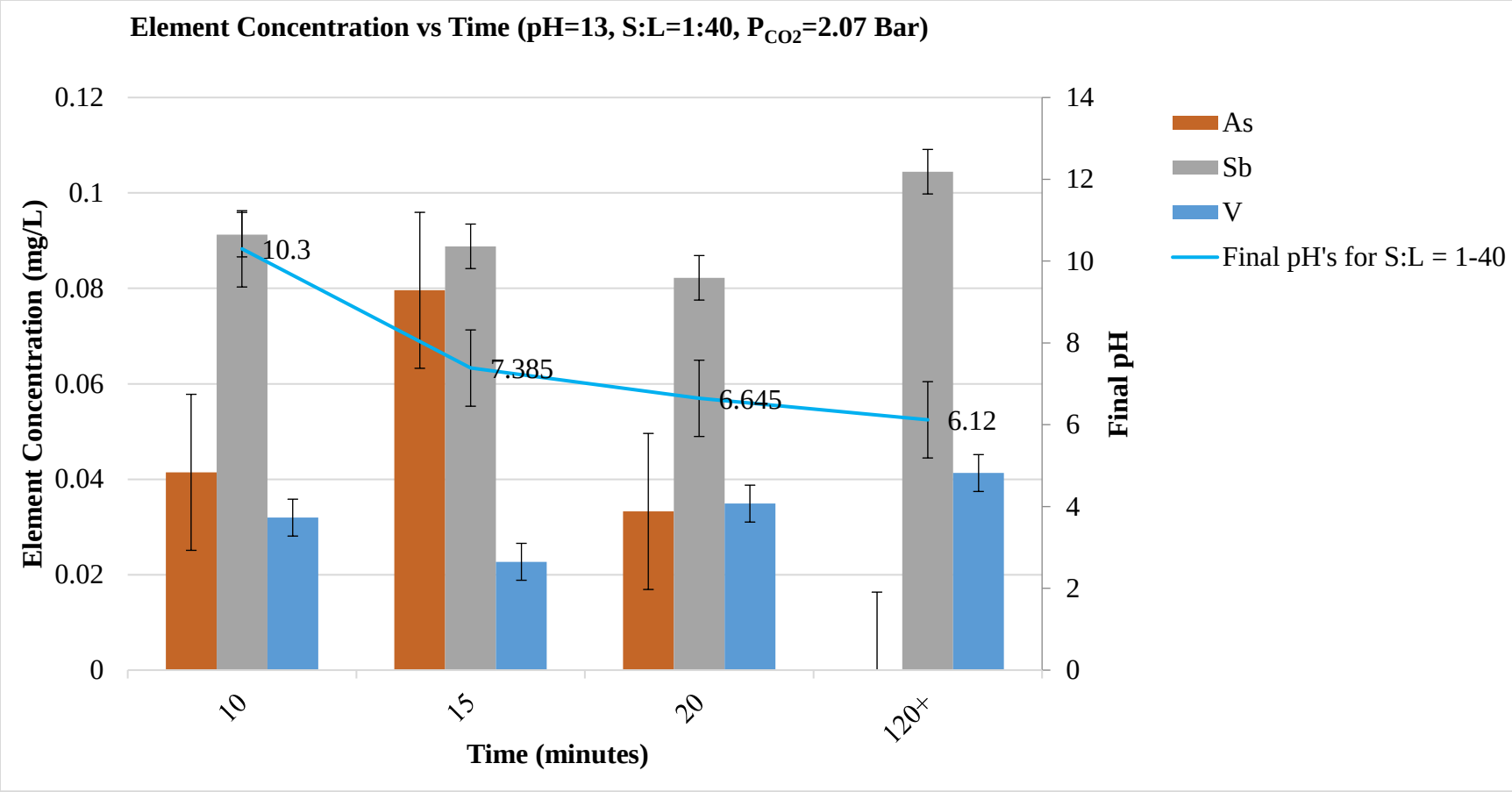

Element Concentration vs S:L (pH=13, P_{CO2}=2.07 bar)
1-10
1-40
1-80
1-100
As
Mn
Se
Sb
Tl
Final pH's for 10 S:L = 1-10
Element Concentration (mg/L)
Final pH
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
14
12
10
8
6
4
2
0
= 6.43
= 6.285
= 6.195
= 6.16
10
15
20
120+
Time (minutes)

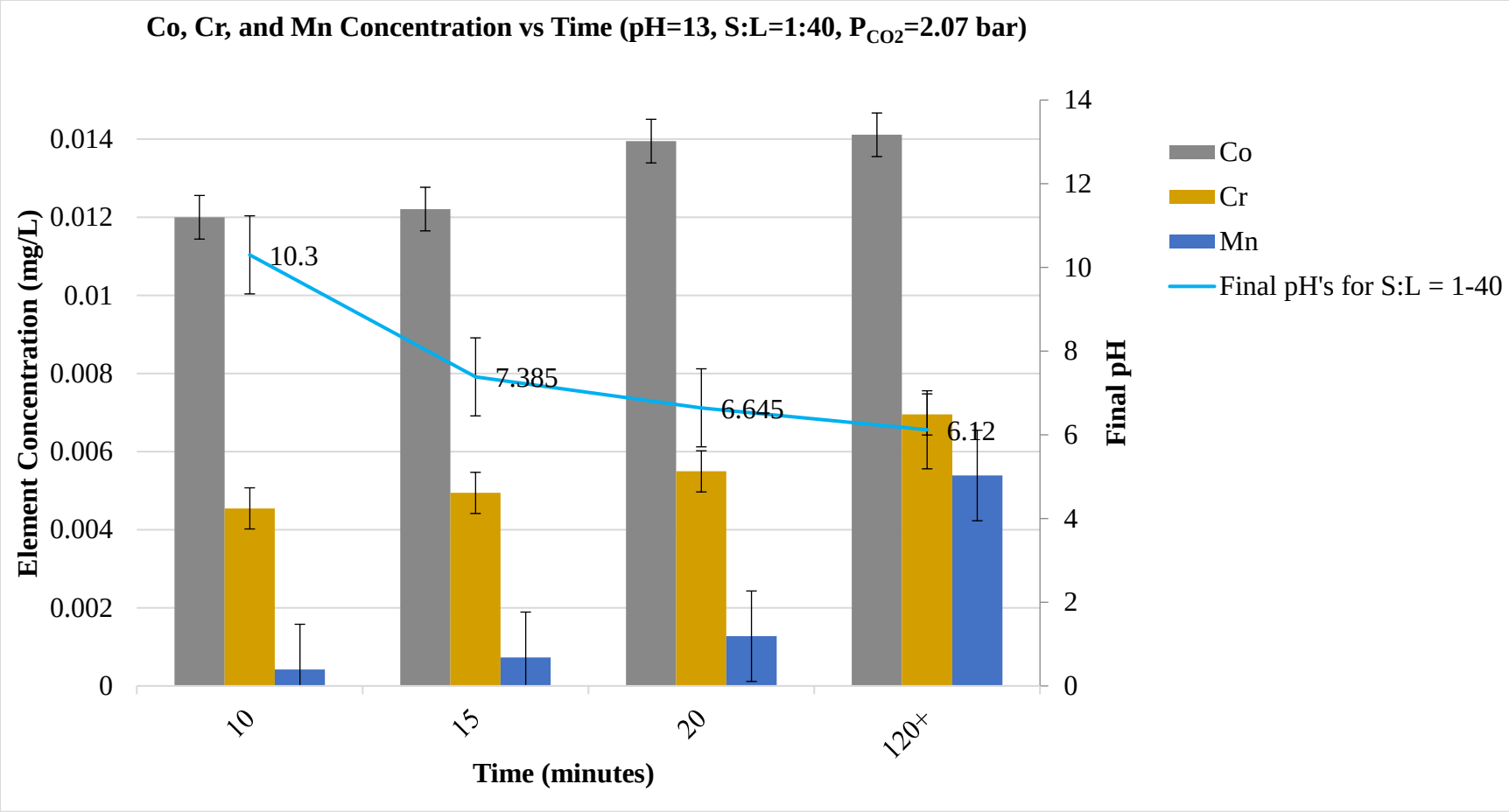

Element Concentration vs S:L (pH=13, P_{CO2}=2.07 bar)
1-10
1-40
1-80
1-100
0.05
0.04
0.03
0.02
0.01
0
Element Concentration (mg/L)
14
12
10
8
6
4
2
0
Final pH
6.43
6.285
6.195
6.16
Co
Cr
V
Final pH's for 10 S:L = 1-10
10
15
20
120+
Time (minutes)

VII.II – Times Series Experiments (pH = 13, S:L = 1:40, P_{CO_2} = 2.07). Error bars represent the standard deviation calculated from experimental duplicates.

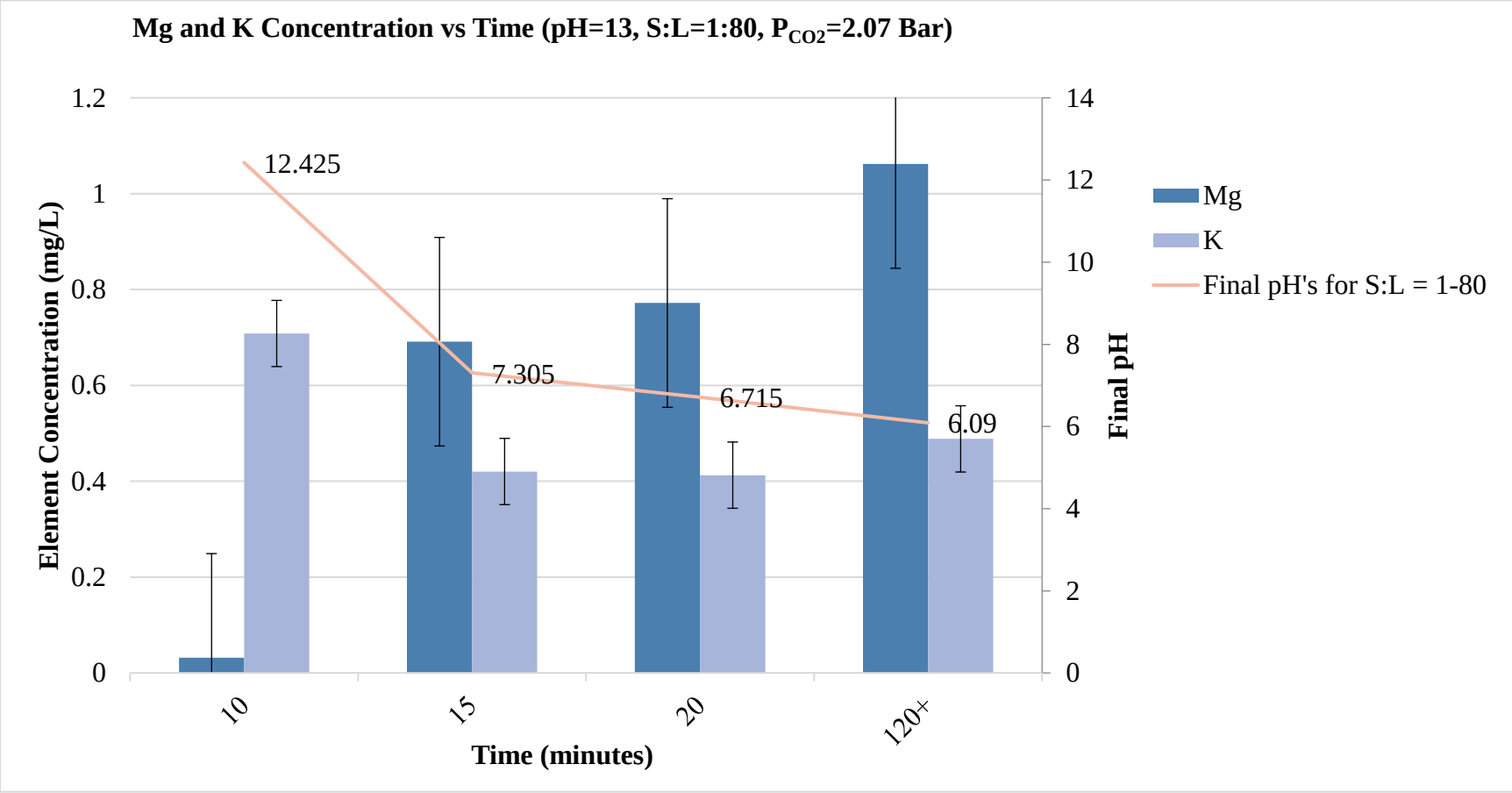


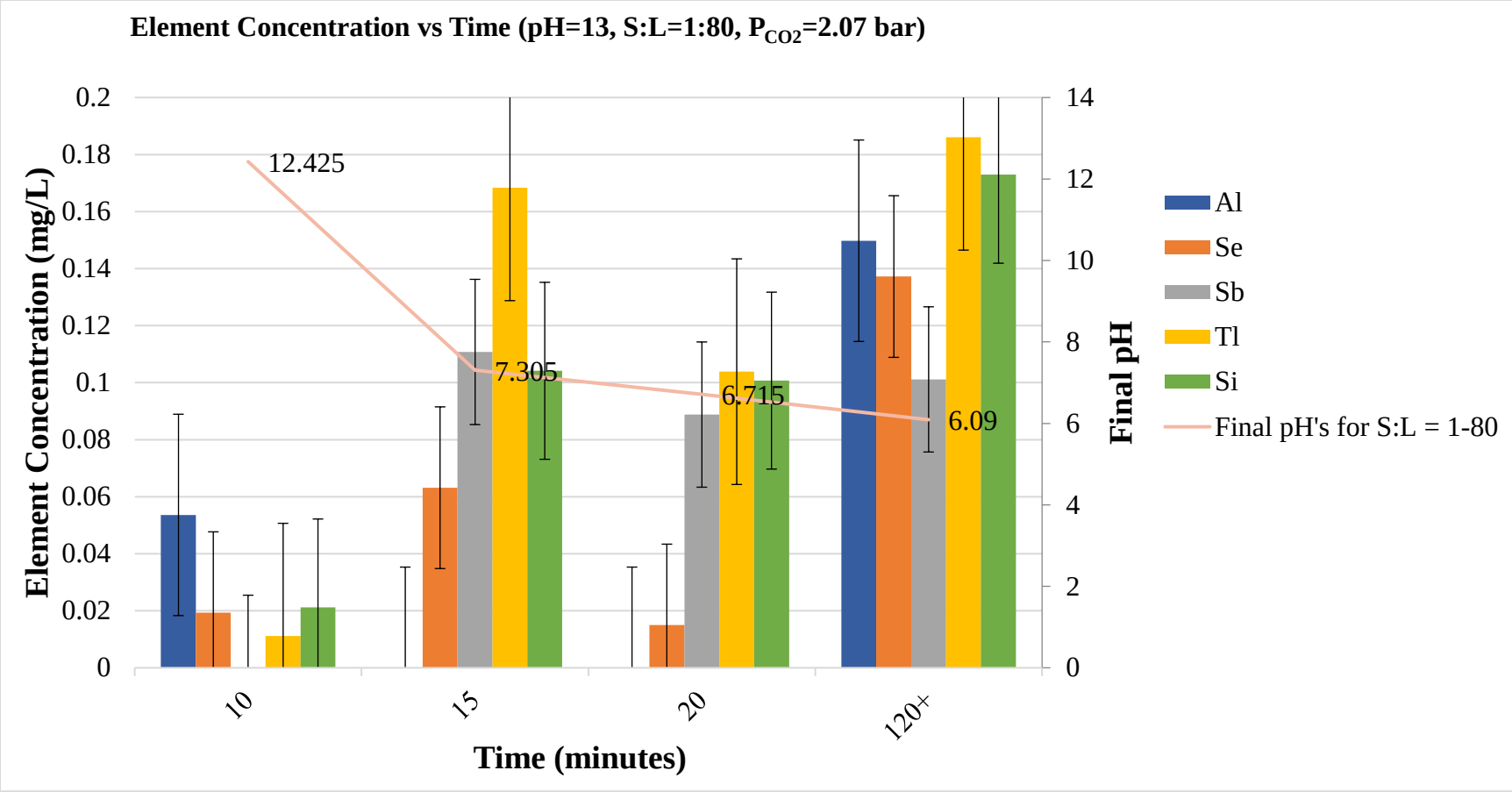

Element Concentration vs Time (pH=13, S:L=1:40, P_{CO2}=2.07 Bar)
Element Concentration (mg/L)
0.3
0.25
0.2
0.15
0.1
0.05
0
14
12
10
8
6
4
2
0
Final pH
10.3
7.385
6.645
6.12
Al
Se
Tl
Si
Final pH's for S:L = 1-40
10
15
20
120+
Time (minutes)

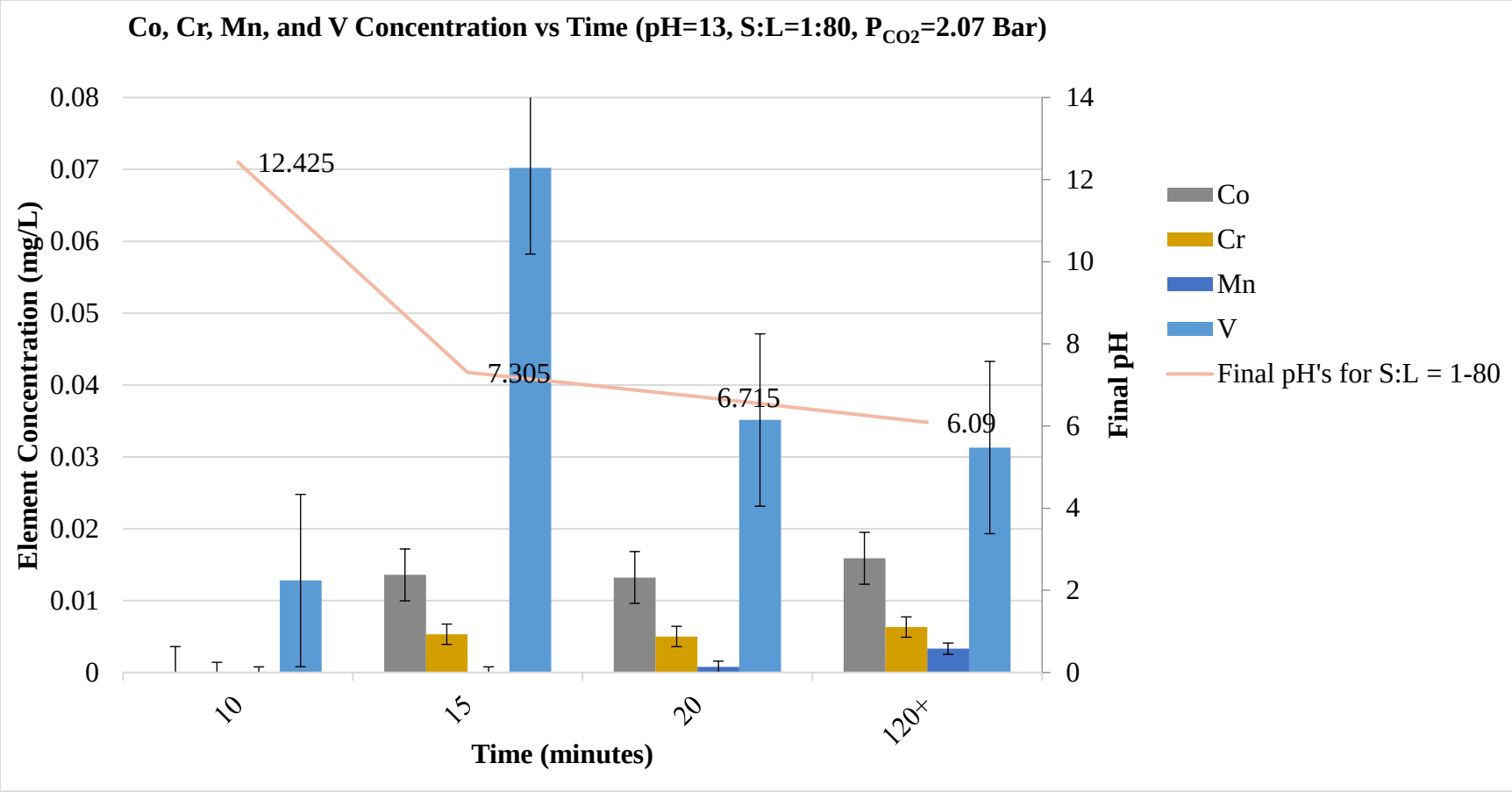

Element Concentration vs Time (pH=13, S:L=1:40, P_{CO2}=2.07 Bar)
Element Concentration (mg/L)
0.12
0.1
0.08
0.06
0.04
0.02
0
14
12
10
8
6
4
2
0
Final pH
10.3
7.385
6.645
6.12
As
Sb
V
Final pH's for S:L = 1-40
10
15
20
120+
Time (minutes)


Co, Cr, and Mn Concentration vs Time (pH=13, S:L=1:40, P_{CO2}=2.07 bar)
Element Concentration (mg/L)
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
Final pH
14
12
10
8
6
4
2
0
10.3
7.385
6.645
6.12
10
15
20
120+
Time (minutes)
Co
Cr
Mn
Final pH's for S:L = 1-40

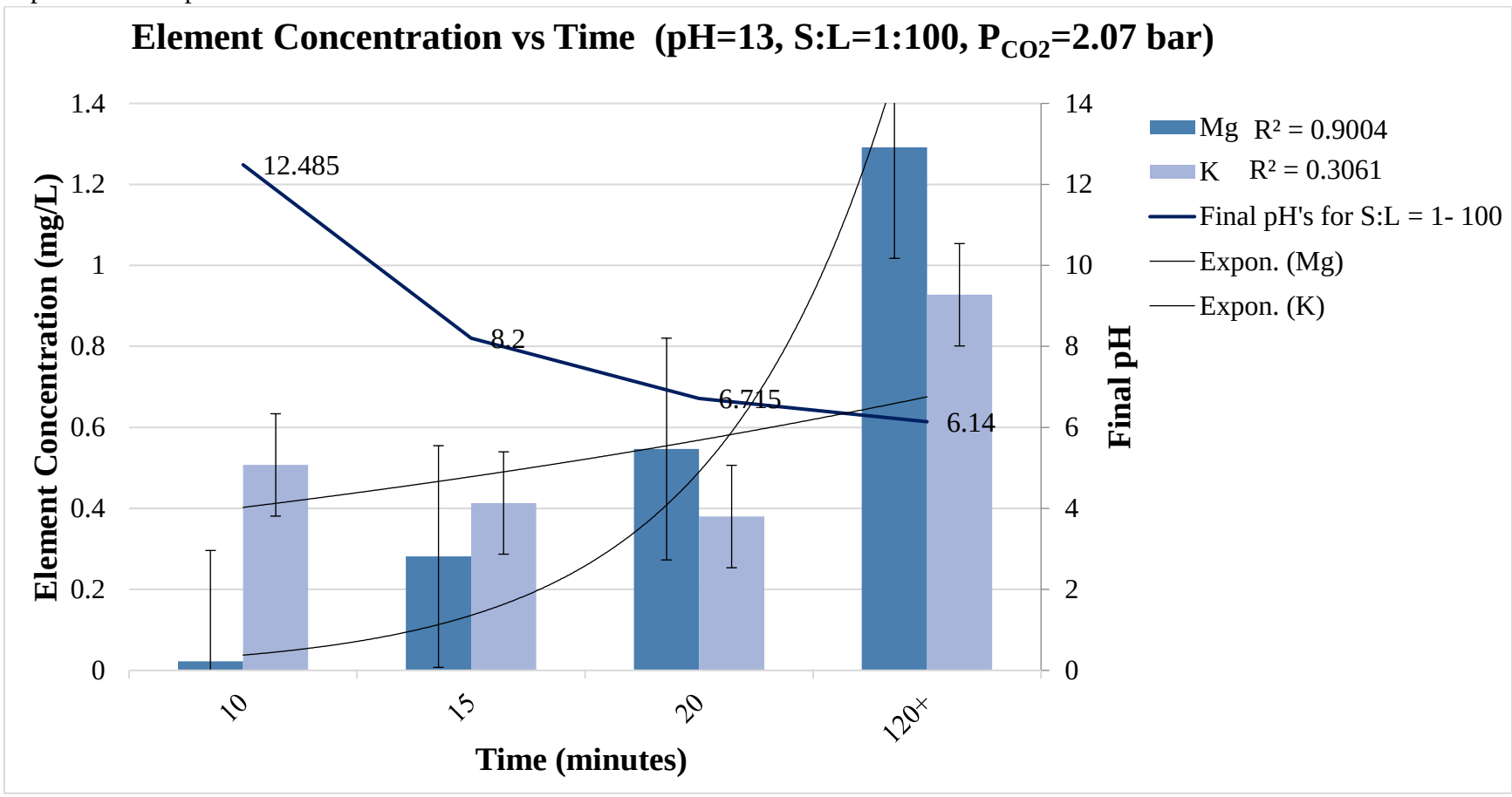
VII.III – Times Series Experiments (pH = 13, S:L = 1:80, P_{CO_2} = 2.07). Error bars represent the standard deviation calculated from experimental duplicates.

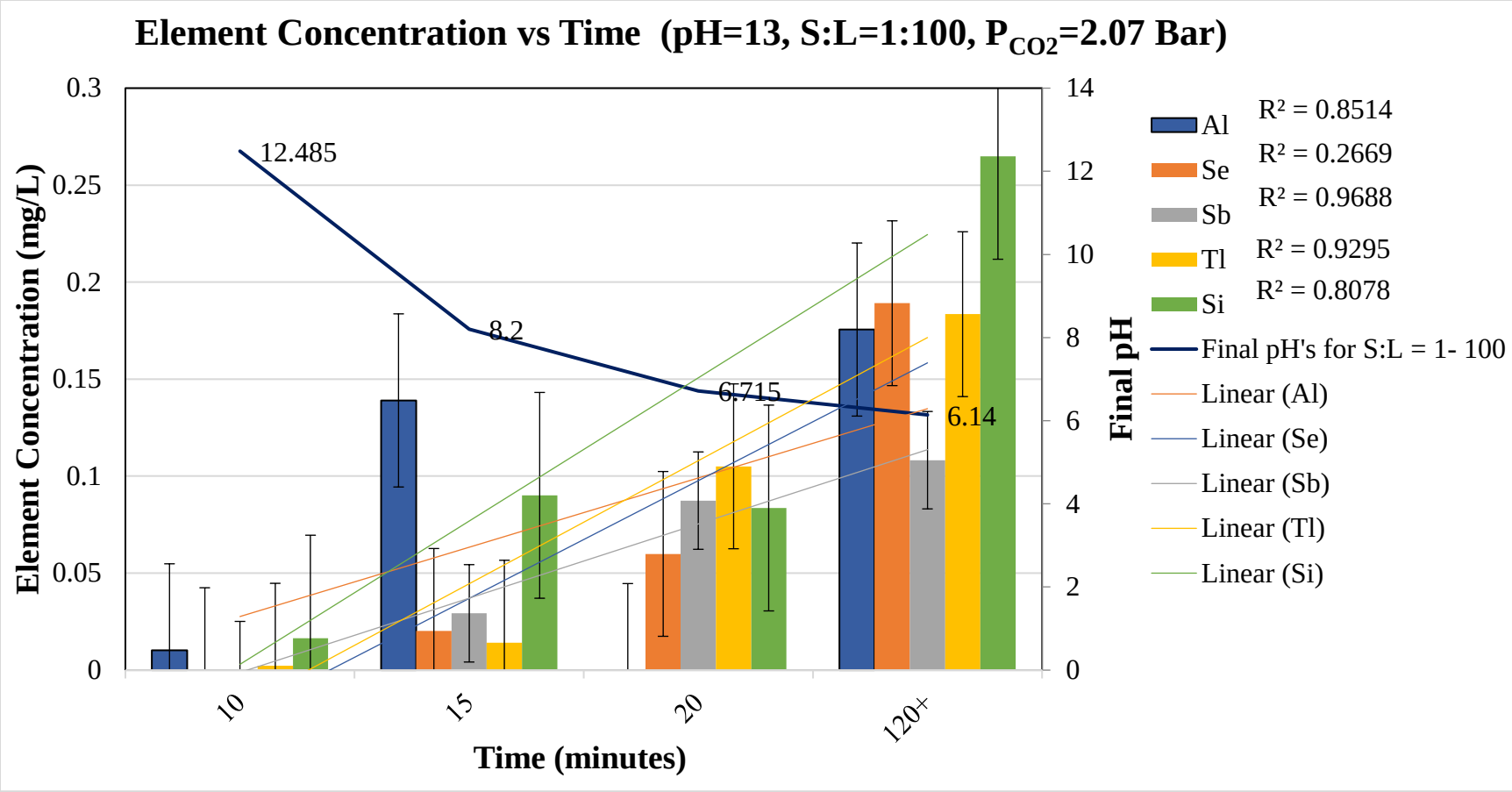


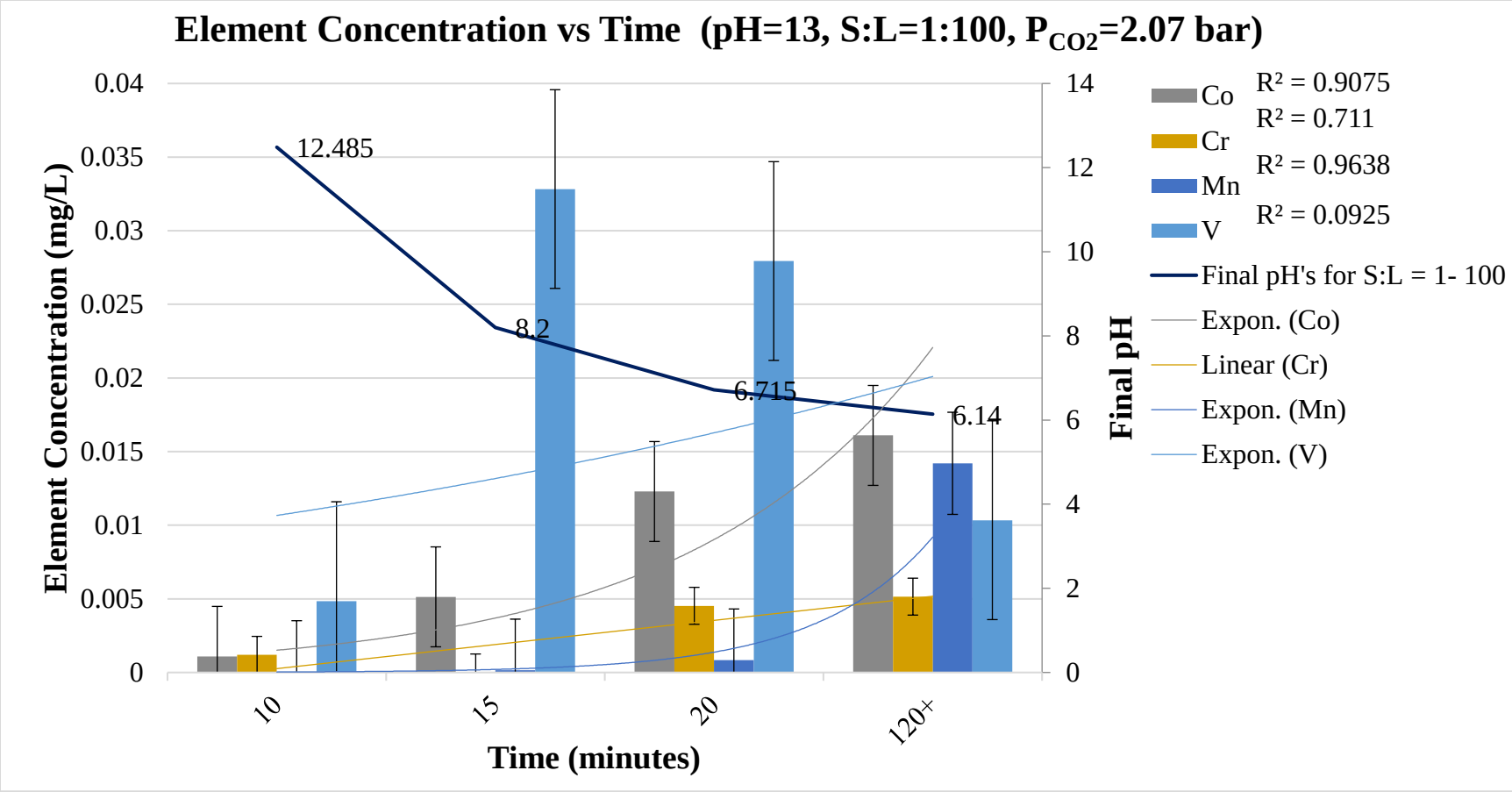

Element Concentration vs Time (pH=13, S:L=1:80, P_{CO2}=2.07 bar)
Element Concentration (mg/L)
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
14
12
10
8
6
4
2
0
Final pH
12.425
7.305
6.715
6.09
10
15
20
120+
Time (minutes)
Al
Se
Sb
Tl
Si
Final pH's for S:L = 1-80


Co, Cr, Mn, and V Concentration vs Time (pH=13, S:L=1:80, P_{CO2}=2.07 Bar)
Element Concentration (mg/L)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
14
12
10
8
6
4
2
0
Final pH
12.425
7.305
6.715
6.09
10
15
20
120+
Time (minutes)
Co
Cr
Mn
V
Final pH's for S:L = 1-80

VII.IV – Times Series Experiments (pH = 13, S:L = 1:100, P_{CO_2} = 2.07). Error bars represent the standard deviation calculated from experimental duplicates.

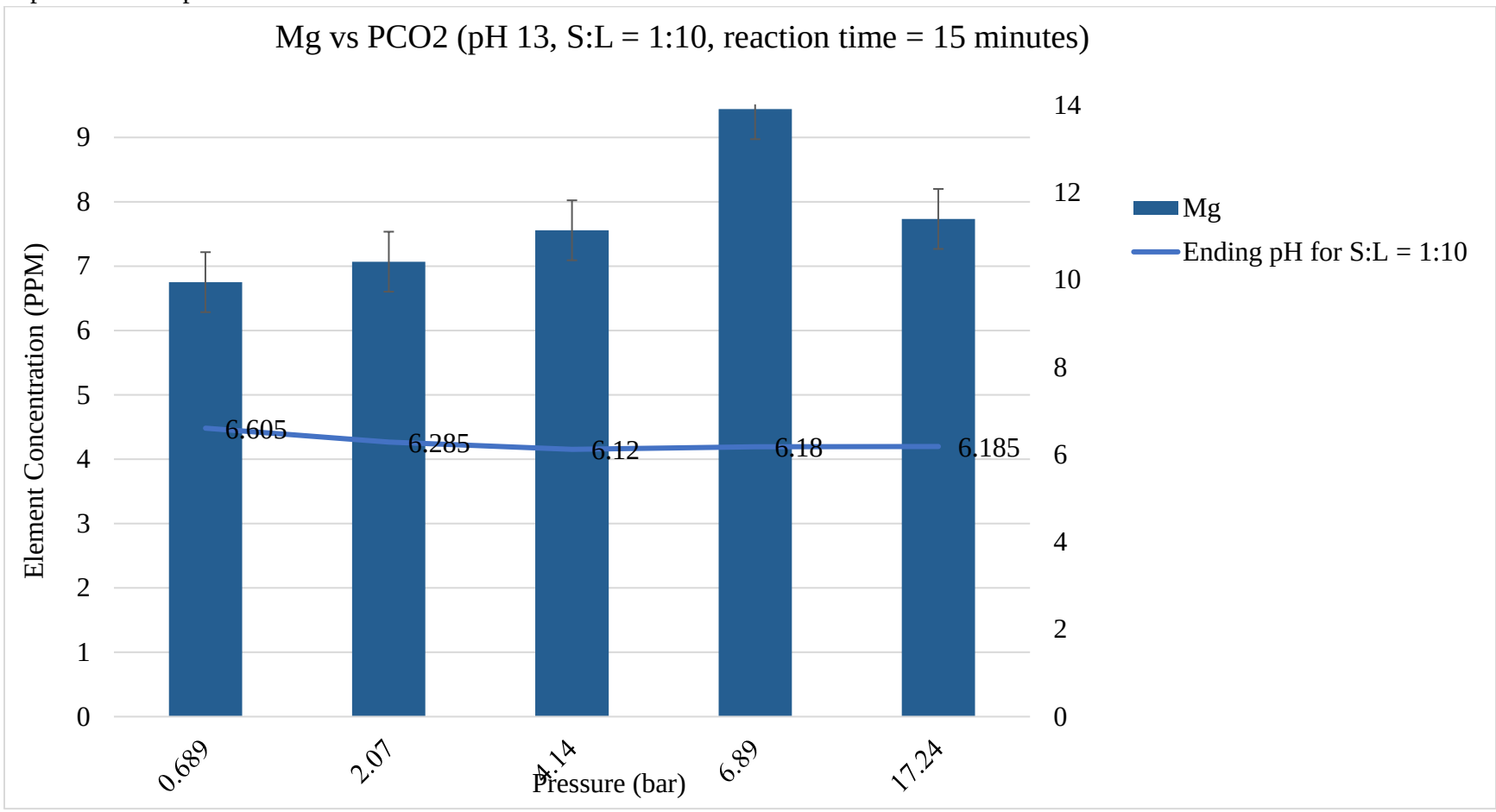


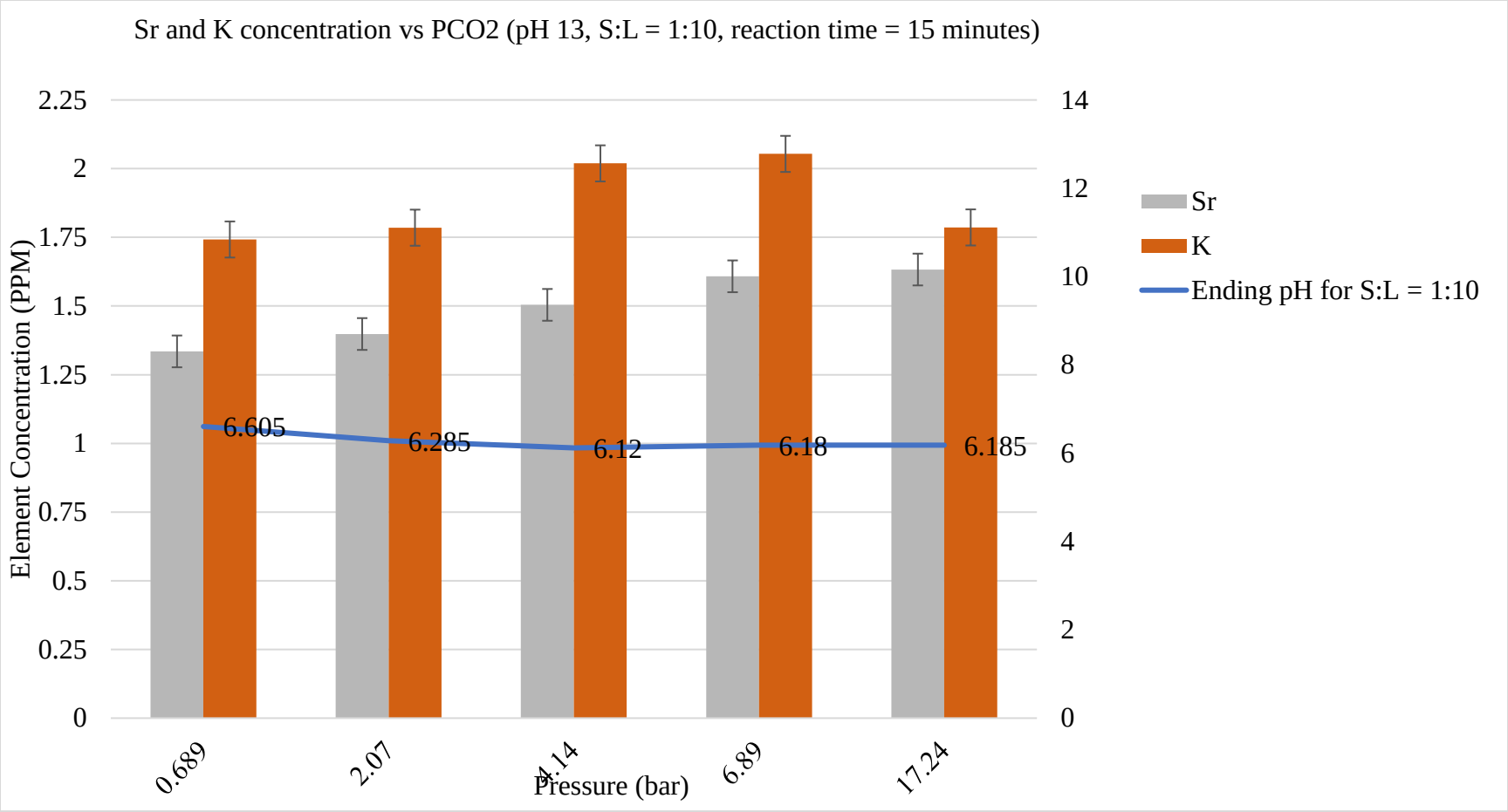

Element Concentration vs Time (pH=13, S:L=1:100, P_{CO2}=2.07 Bar)
Element Concentration (mg/L)
Final pH
Time (minutes)
0.3
0.25
0.2
0.15
0.1
0.05
0
14
12
10
8
6
4
2
0
10
15
20
120+
12.485
8.2
6.715
6.14
Al
Se
Sb
Tl
Si
R² = 0.8514
R² = 0.2669
R² = 0.9688
R² = 0.9295
R² = 0.8078
Final pH's for S:L = 1- 100
Linear (Al)
Linear (Se)
Linear (Sb)
Linear (Tl)
Linear (Si)

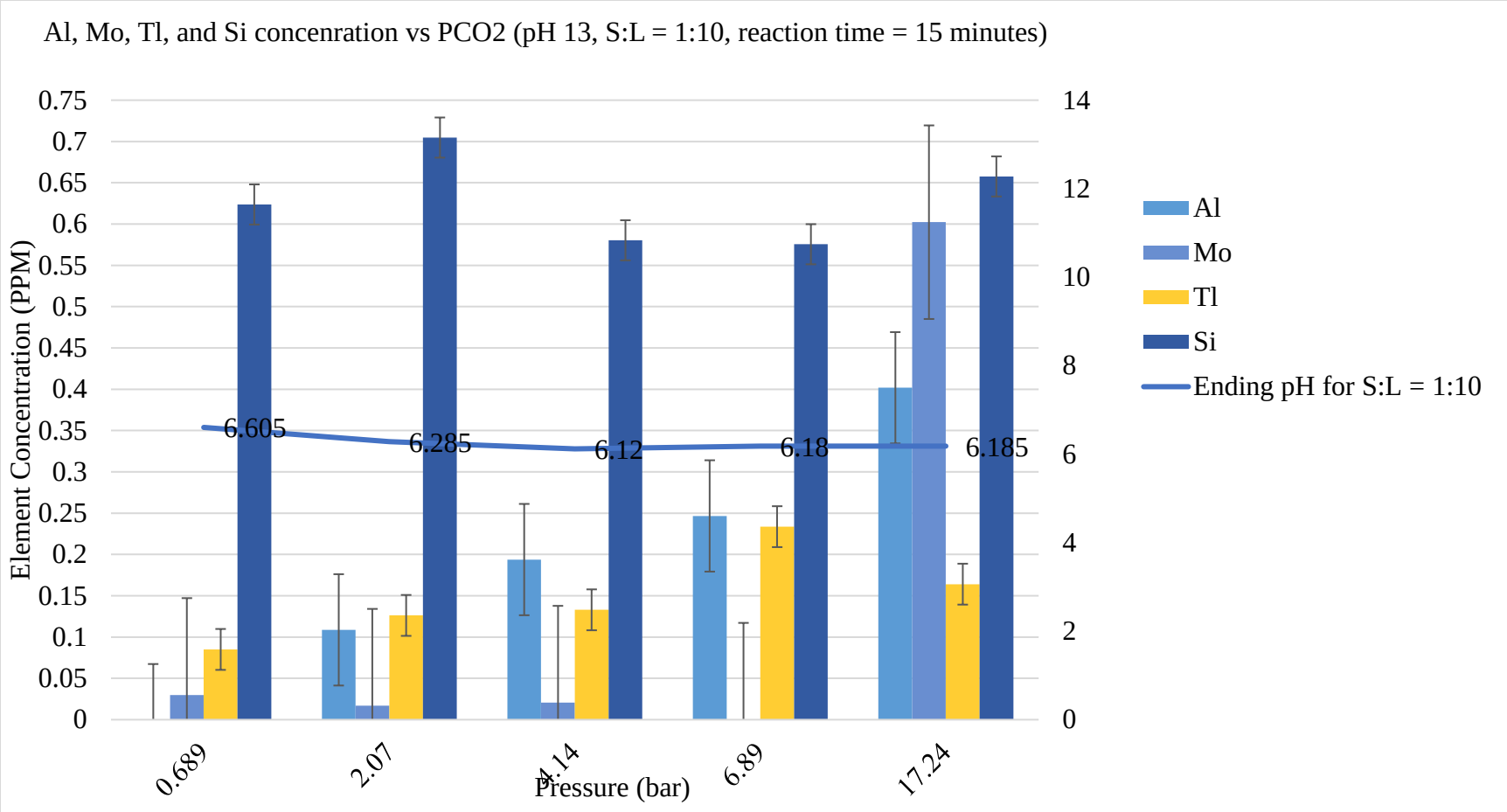

Element Concentration vs Time (pH=13, S:L=1:100, P_{CO2}=2.07 bar)
Element Concentration (mg/L)
Final pH
Time (minutes)
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
14
12
10
8
6
4
2
0
10
15
20
120+
12.485
8.2
6.715
6.14
Co
Cr
Mn
V
R² = 0.9075
R² = 0.711
R² = 0.9638
R² = 0.0925
Final pH's for S:L = 1- 100
Expon. (Co)
Linear (Cr)
Expon. (Mn)
Expon. (V)

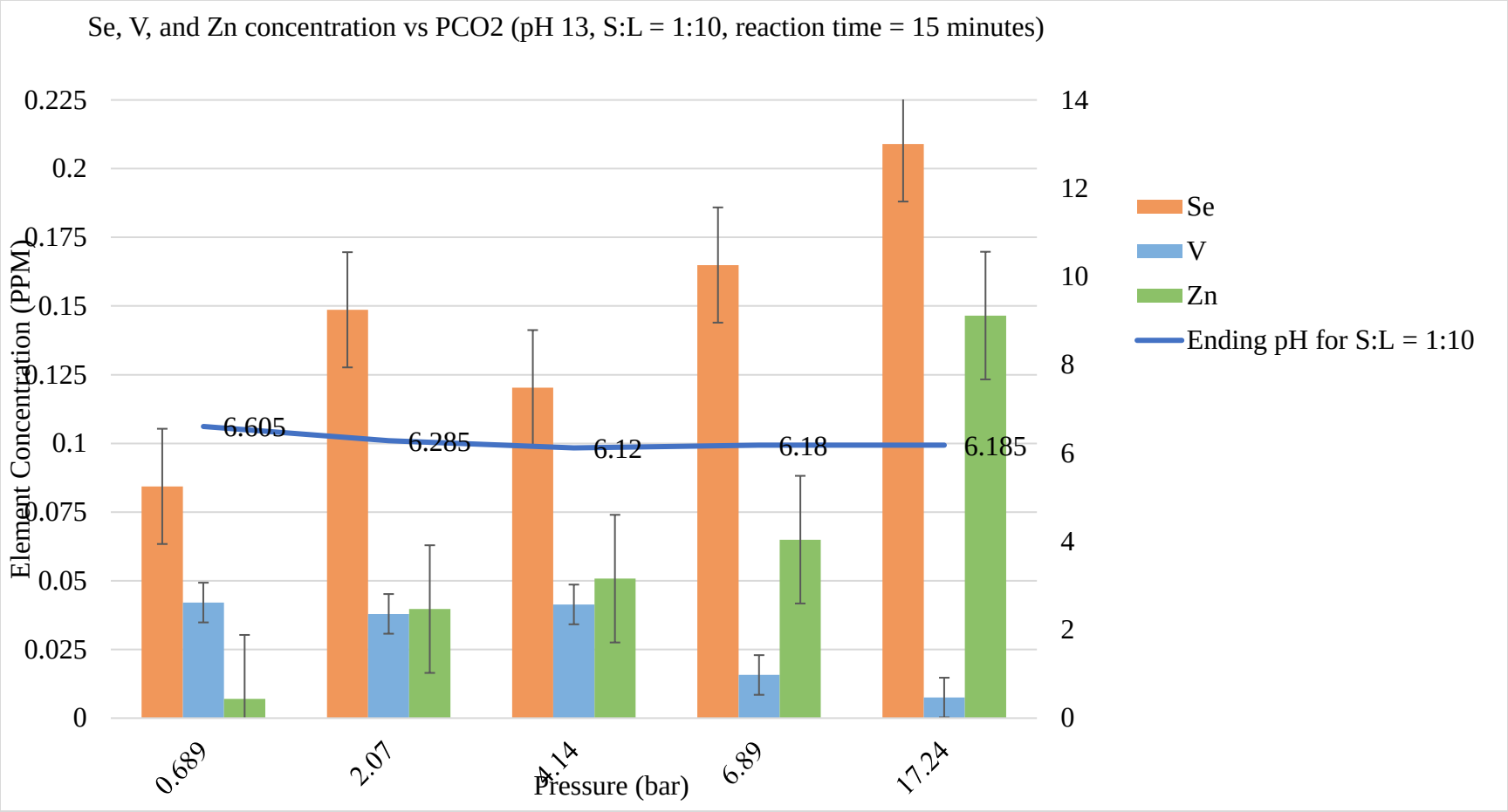
APPENDIX VIII: Wastewater Element Concentrations and pH vs Pco_2 Plots

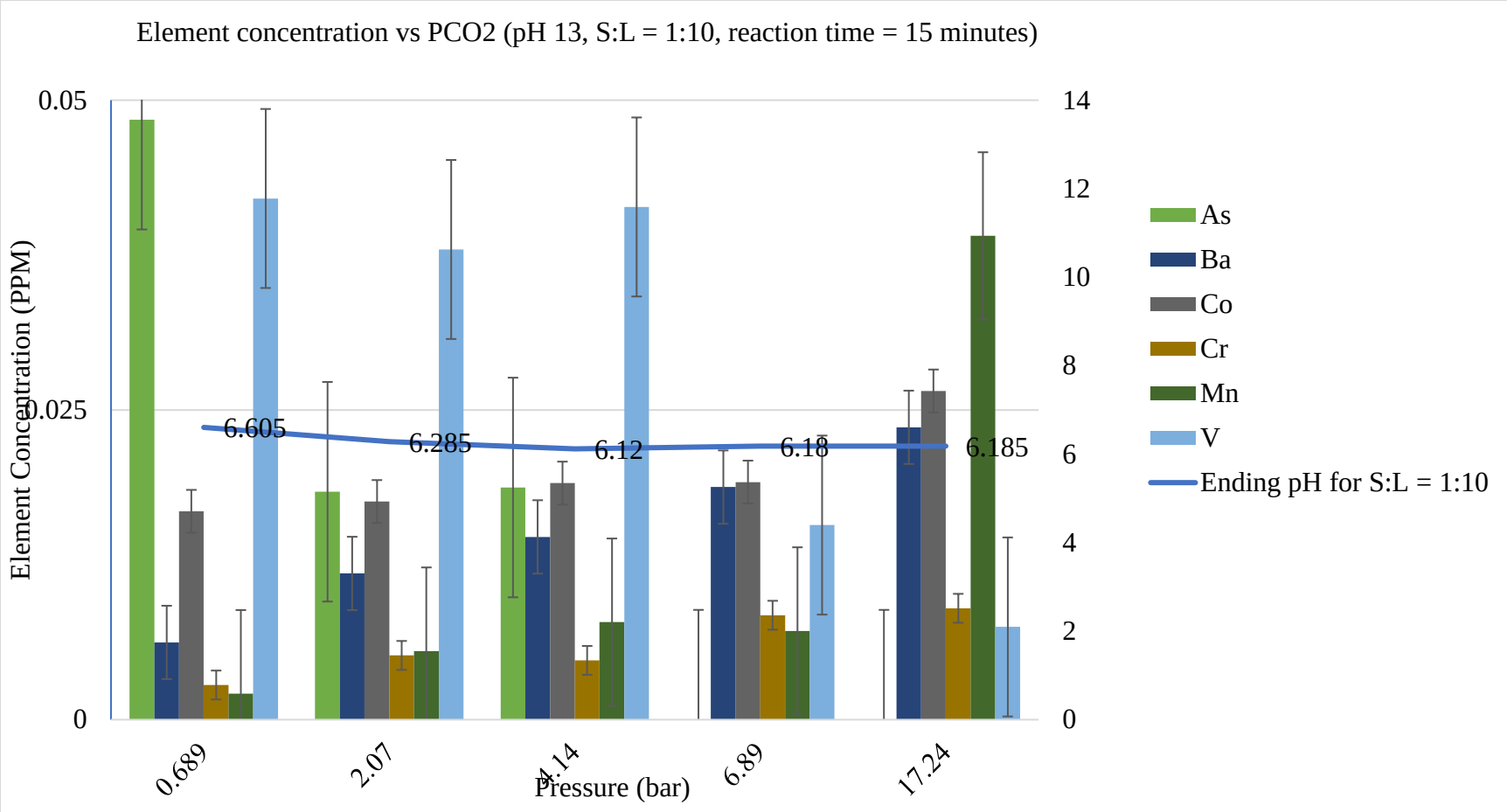
VIII.I – P_{CO_2} Series Experiments (pH = 13, S:L = 1:10, 15 min). Error bars represent the standard deviation calculated from experimental duplicates.



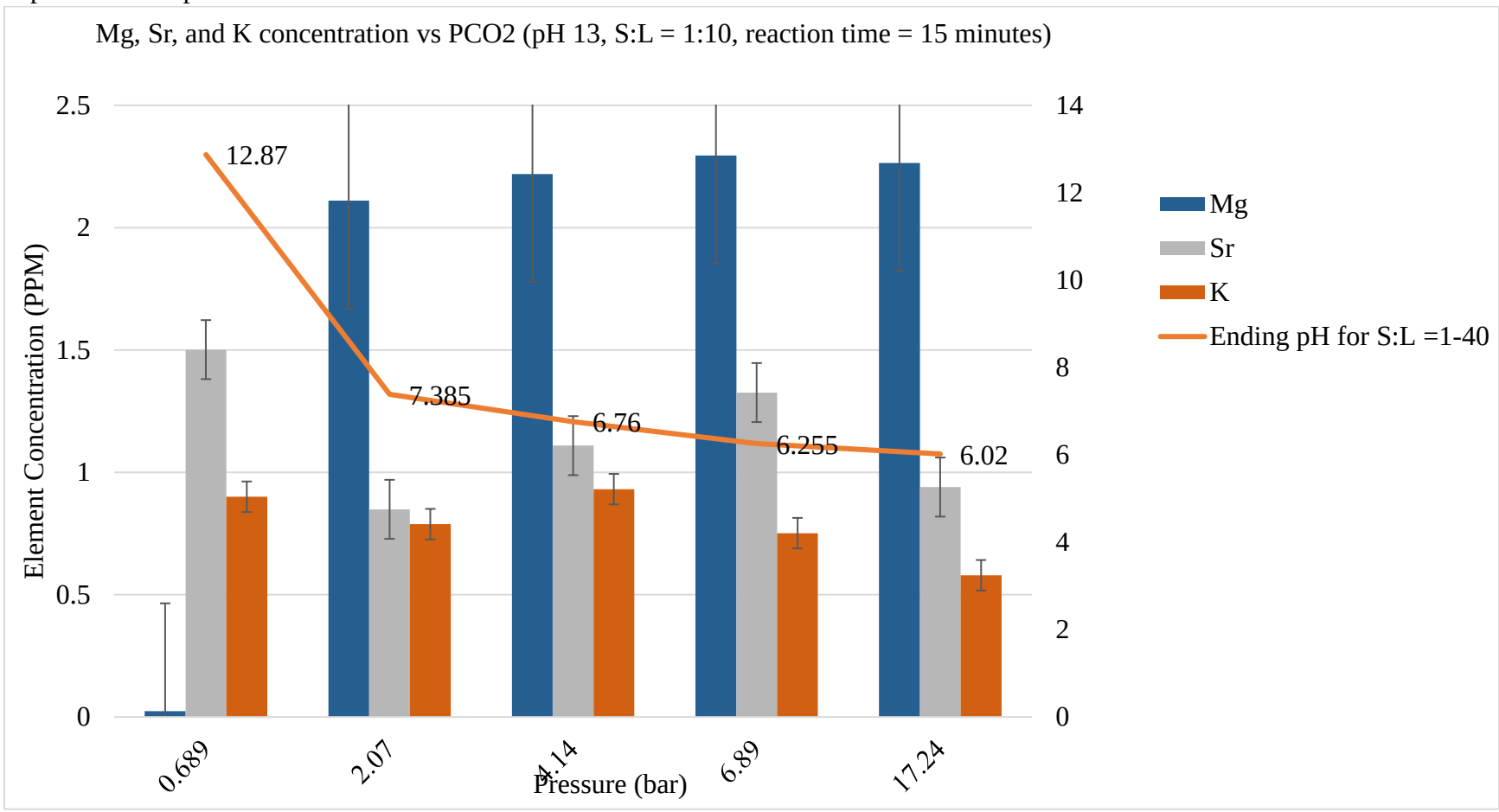

Sr and K concentration vs PCO2 (pH 13, S:L = 1:10, reaction time = 15 minutes)
Element Concentration (PPM)
2.25
2
1.75
1.5
1.25
1
0.75
0.5
0.25
0
14
12
10
8
6
4
2
0
6.605
6.285
6.12
6.18
6.185
0.689
2.07
4.14
6.89
17.24
Pressure (bar)
Sr
K
Ending pH for S:L = 1:10

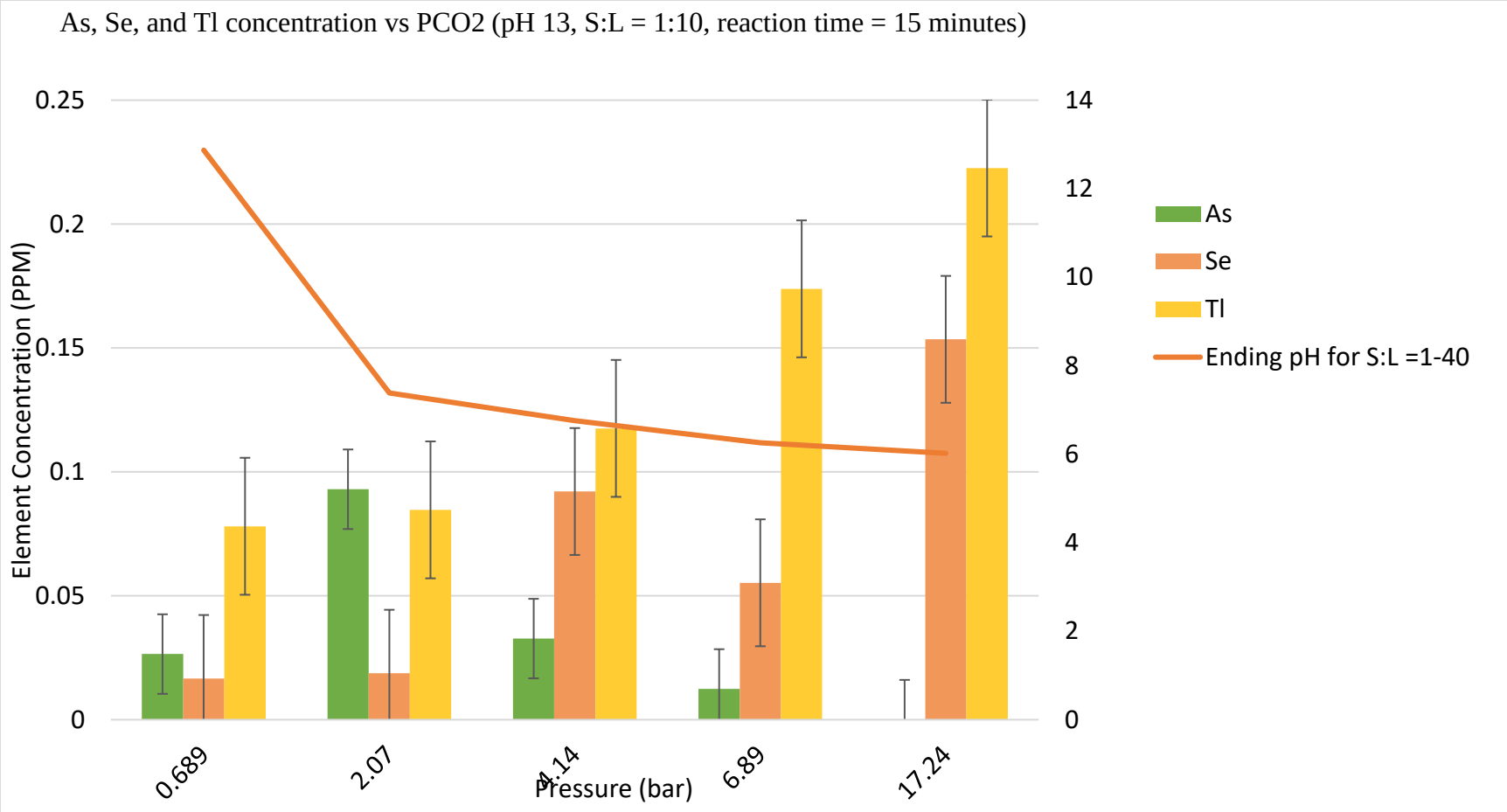

Al, Mo, Tl, and Si concenration vs PCO2 (pH 13, S:L = 1:10, reaction time = 15 minutes)
Element Concentration (PPM)
0.75
0.7
0.65
0.6
0.55
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
14
12
10
8
6
4
2
0
6.605
6.285
6.12
6.18
6.185
0.689
2.07
4.14
6.89
17.24
Pressure (bar)
Al
Mo
Tl
Si
Ending pH for S:L = 1:10

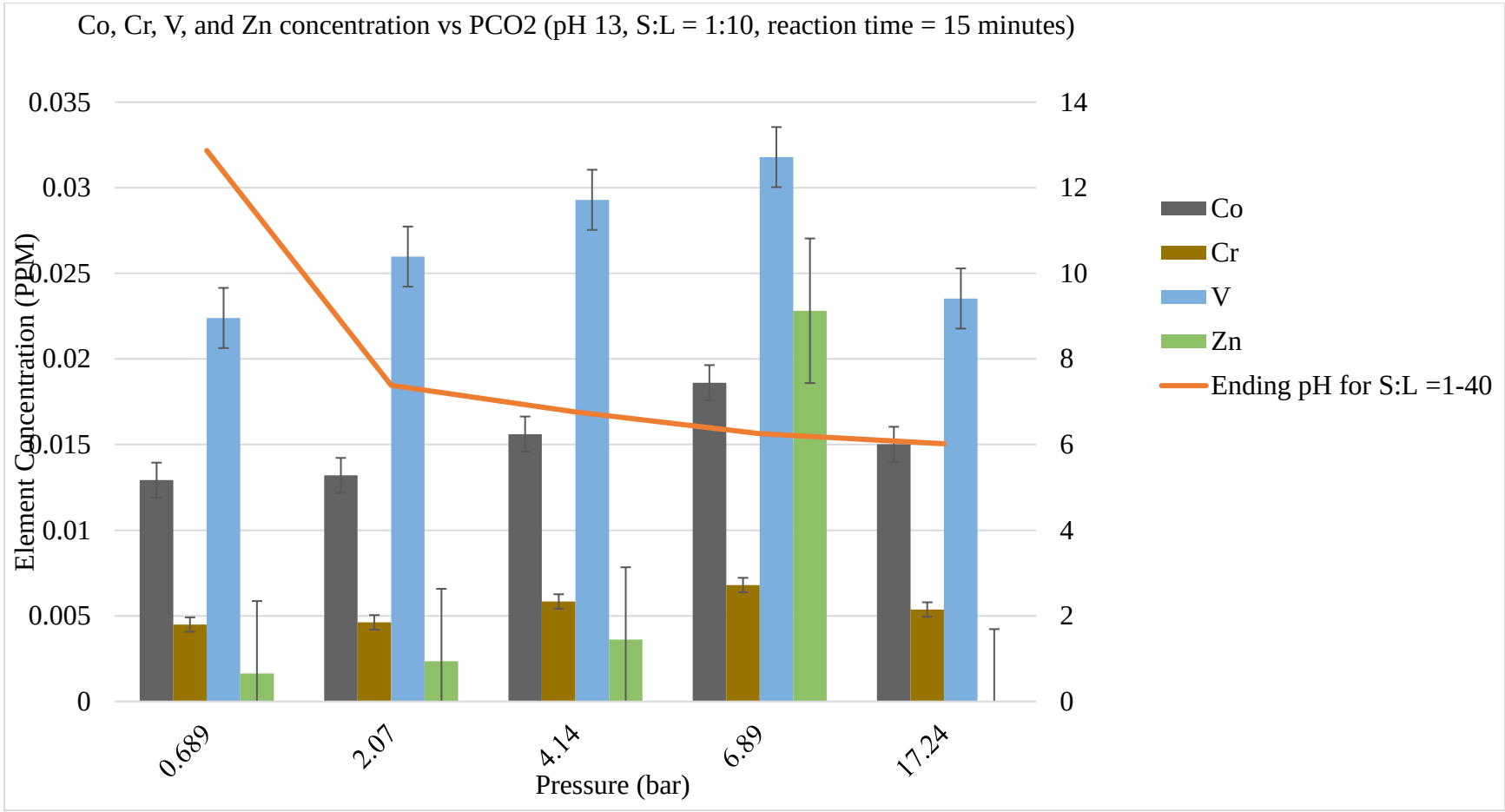

Se, V, and Zn concentration vs PCO2 (pH 13, S:L = 1:10, reaction time = 15 minutes)
Element Concentration (PPM)
0.225
0.2
0.175
0.15
0.125
0.1
0.075
0.05
0.025
0
14
12
10
8
6
4
2
0
6.605
6.285
6.12
6.18
6.185
0.689
2.07
4.14
6.89
17.24
Pressure (bar)
Se
V
Zn
Ending pH for S:L = 1:10


Element concentration vs PCO2 (pH 13, S:L = 1:10, reaction time = 15 minutes)
Element Concentration (PPM)
0.05
0.025
0
14
12
10
8
6
4
2
0
6.605
6.285
6.12
6.18
6.185
0.689
2.07
4.14
6.89
17.24
Pressure (bar)
As
Ba
Co
Cr
Mn
V
Ending pH for S:L = 1:10

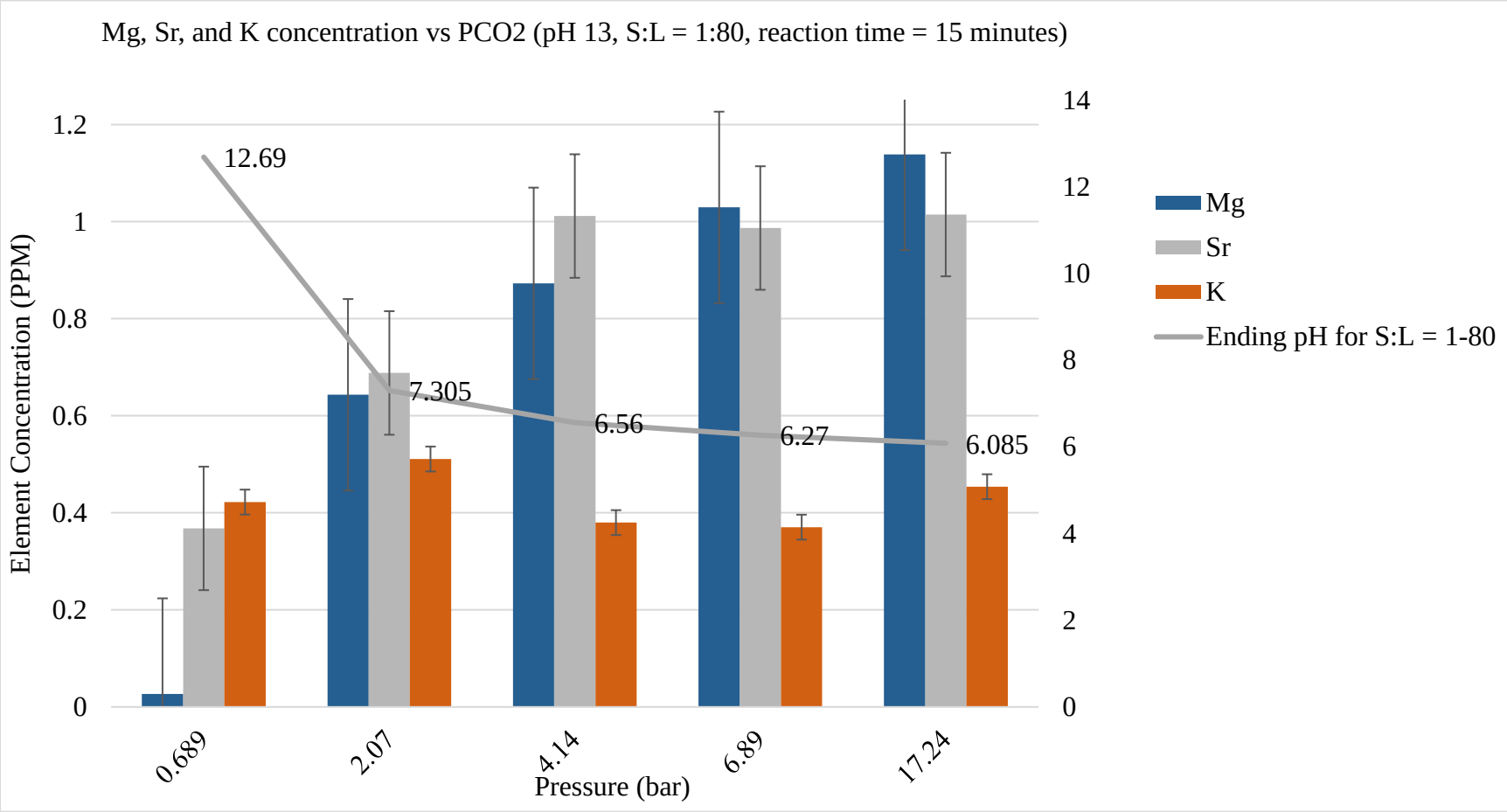
VIII.II – P_{CO_2} Series Experiments (pH = 13, S:L = 1:40, 15 min). Error bars represent the standard deviation calculated from experimental duplicates.

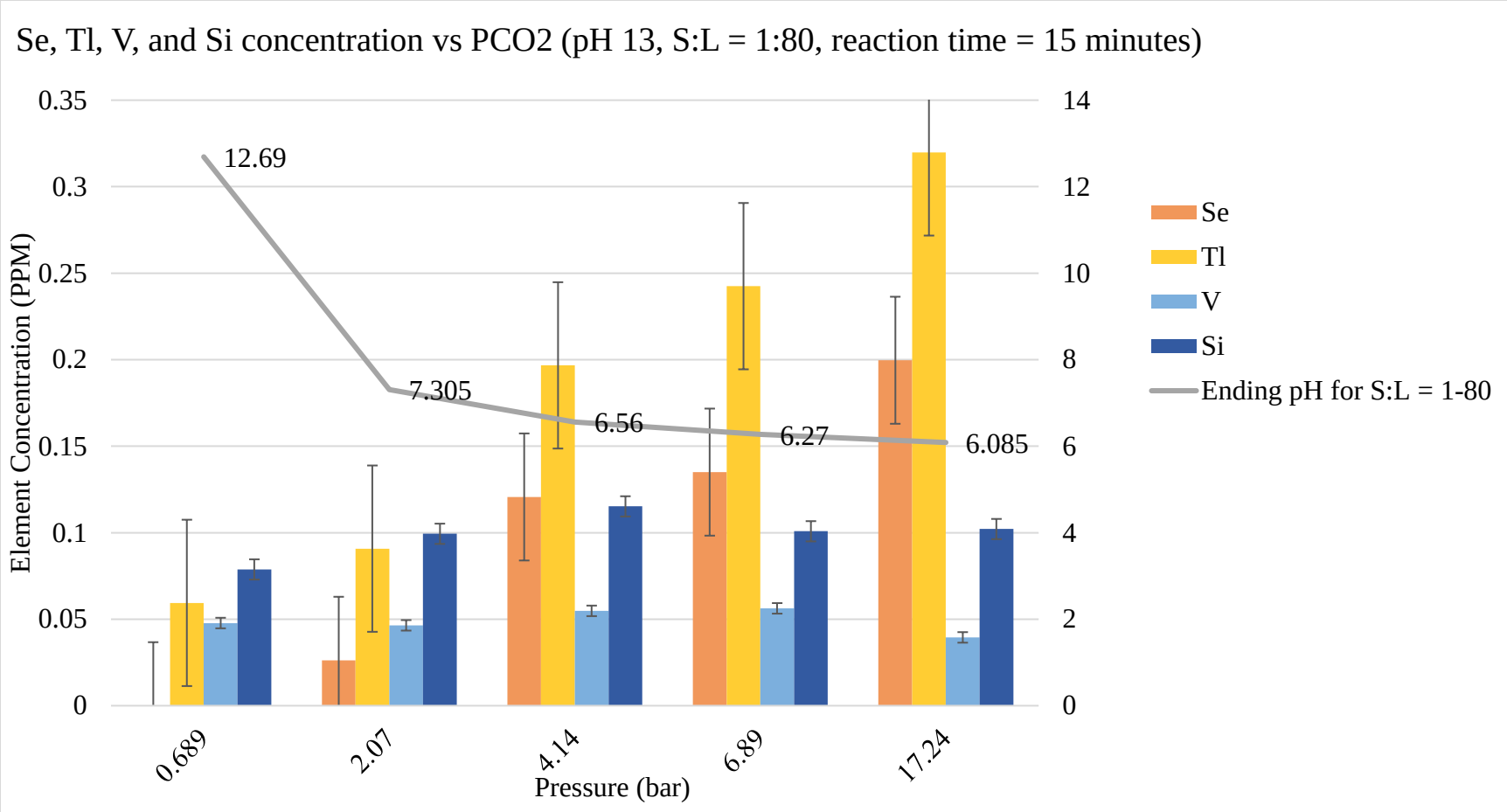


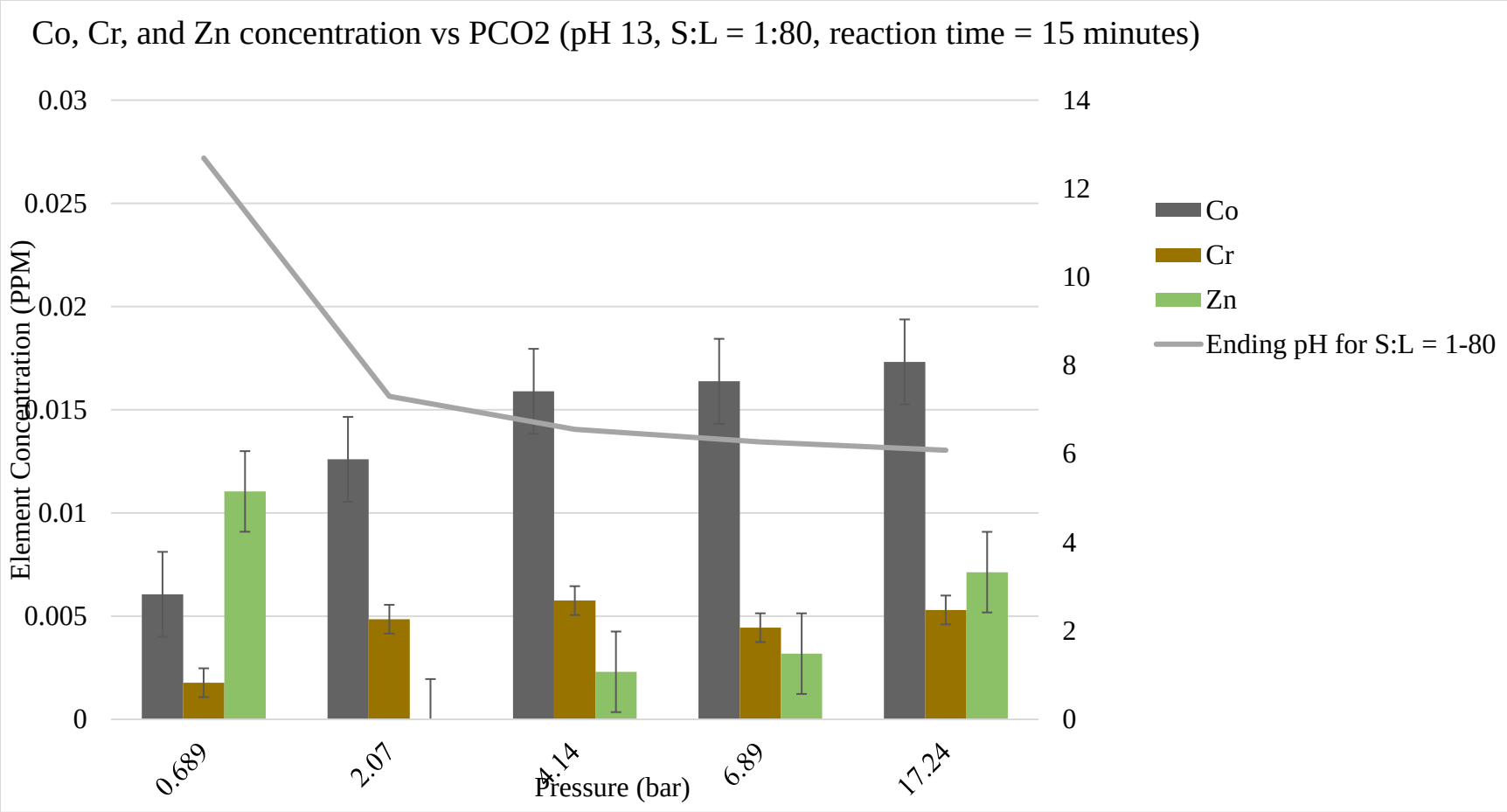

As, Se, and Tl concentration vs PCO2 (pH 13, S:L = 1:10, reaction time = 15 minutes)
Element Concentration (PPM)
0.25
0.2
0.15
0.1
0.05
0
14
12
10
8
6
4
2
0
0.689
2.07
4.14
6.89
17.24
Pressure (bar)
As
Se
Tl
Ending pH for S:L =1-40


Co, Cr, V, and Zn concentration vs PCO2 (pH 13, S:L = 1:10, reaction time = 15 minutes)
Element Concentration (PPM)
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
14
12
10
8
6
4
2
0
0.689
2.07
4.14
6.89
17.24
Pressure (bar)
Co
Cr
V
Zn
Ending pH for S:L =1-40

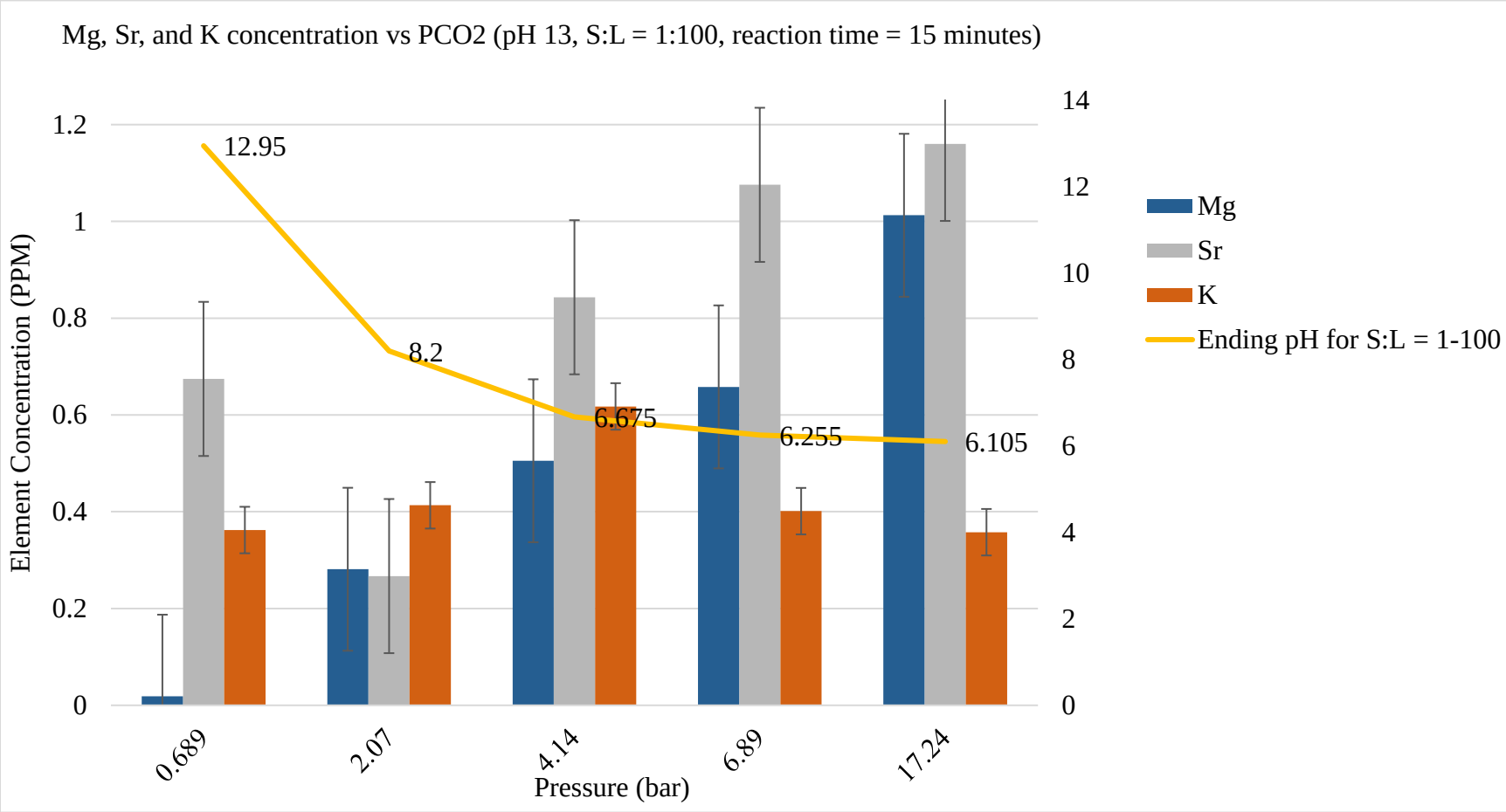
VIII.III – P_{CO_2} Series Experiments (pH = 13, S:L = 1:80, 15 min). Error bars represent the standard deviation calculated from experimental duplicates.

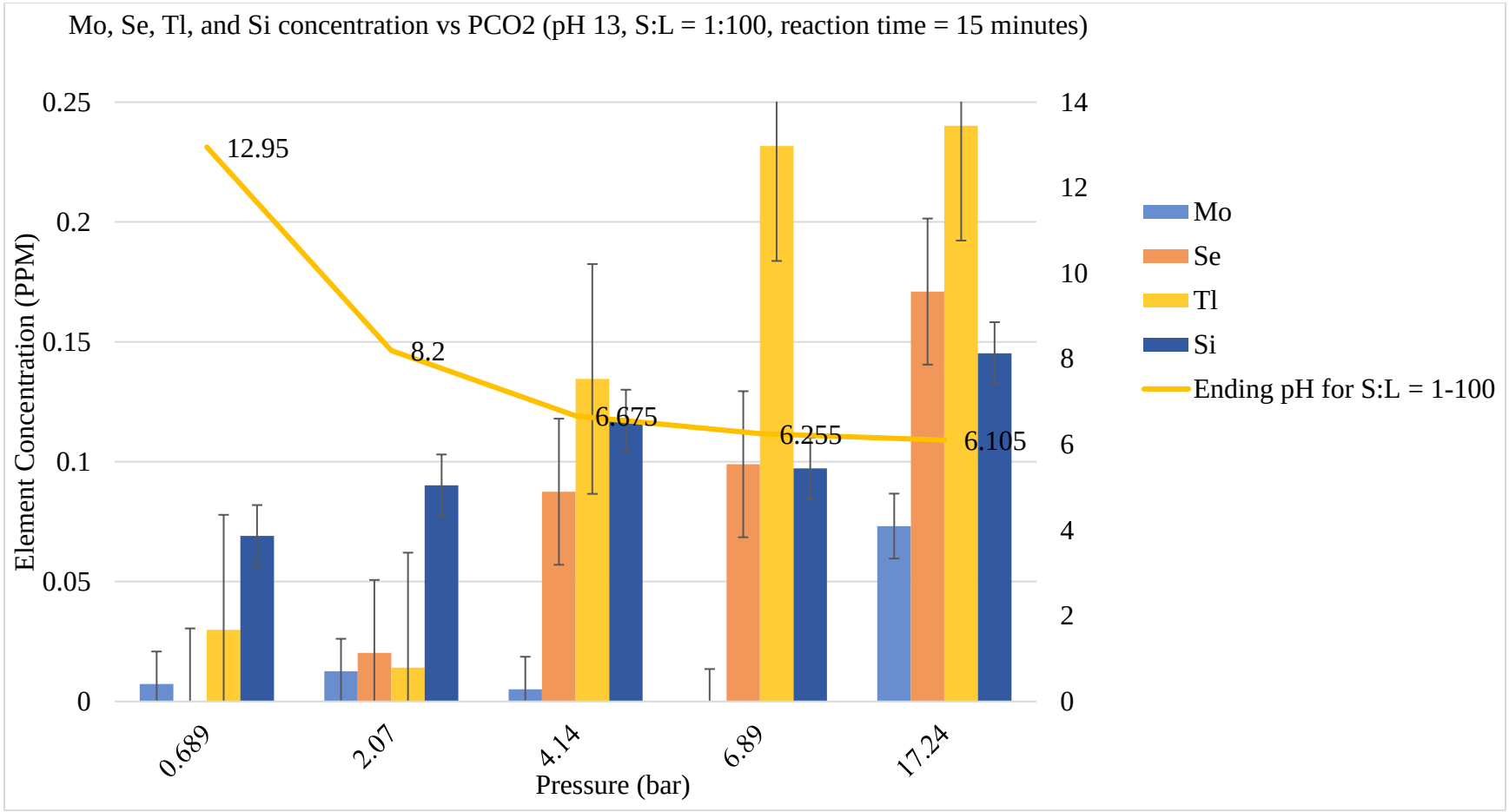


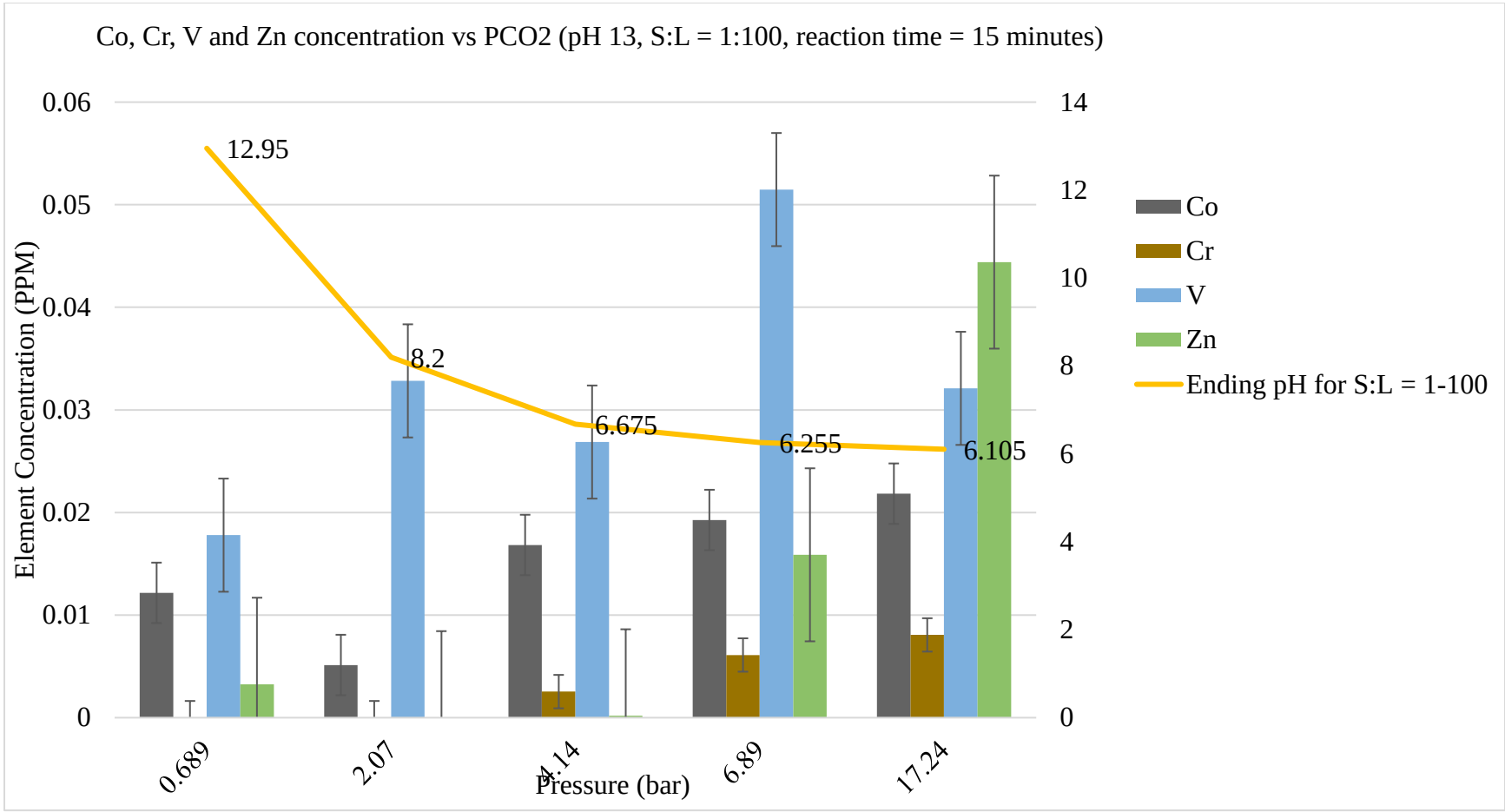

Se, Tl, V, and Si concentration vs PCO2 (pH 13, S:L = 1:80, reaction time = 15 minutes)
Element Concentration (PPM)
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
14
12
10
8
6
4
2
0
12.69
7.305
6.56
6.27
6.085
0.689
2.07
4.14
6.89
17.24
Pressure (bar)
Se
Tl
V
Si
Ending pH for S:L = 1-80


Co, Cr, and Zn concentration vs PCO2 (pH 13, S:L = 1:80, reaction time = 15 minutes)
Element Concentration (PPM)
0.03
0.025
0.02
0.015
0.01
0.005
0
14
12
10
8
6
4
2
0
0.689
2.07
4.14
6.89
17.24
Pressure (bar)
Co
Cr
Zn
Ending pH for S:L = 1-80

VIII.IV – P_{CO_2} Series Experiments (pH = 13, S:L = 1:100, 15 min). Error bars represent the standard deviation calculated from experimental duplicates.




Mo, Se, Tl, and Si concentration vs PCO2 (pH 13, S:L = 1:100, reaction time = 15 minutes)
Element Concentration (PPM)
0.25
0.2
0.15
0.1
0.05
0
14
12
10
8
6
4
2
0
12.95
8.2
6.675
6.255
6.105
0.689
2.07
4.14
6.89
17.24
Pressure (bar)
Mo
Se
Tl
Si
Ending pH for S:L = 1-100


Co, Cr, V and Zn concentration vs PCO2 (pH 13, S:L = 1:100, reaction time = 15 minutes)
Element Concentration (PPM)
0.06
0.05
0.04
0.03
0.02
0.01
0
14
12
10
8
6
4
2
0
12.95
8.2
6.675
6.255
6.105
0.689
2.07
4.14
6.89
17.24
Pressure (bar)
Co
Cr
V
Zn
Ending pH for S:L = 1-100

APPENDIX IX: Wastewater Composition Tables (determined by ICP-OES) and ICP-OES LOD/LOQ values.

Table 14. Element concentrations (pH = 12, S:L = 1:10, reaction time = 360 min).

P_{CO_2}	Al (Std. Dev.)	As (Std. Dev.)	B (Std. Dev.)	Ba (Std. Dev.)	Ca (Std. Dev.)	Co (Std. Dev.)
0	<LOD	<LOD	0.9214(0.0225)	0.0307(0.0001)	563.4985(2.8731)	0.0074(0.0001)
0.69	1.0461(0.0434)	<LOD	1.2515(0.0871)	0.0370(0.0014)	654.3635(2.3697)	0.0089(0.0001)
2.07	1.4753(0.0131)	<LOD	1.1562(0.0069)	0.0400(0.0005)	675.7992(9.5472)	0.0195(0.0002)
6.89	1.9754(0.0658)	<LOD	1.1233(0.0220)	0.0429(0.0006)	747.1072(31.7248)	0.0191(0.0086)
17.24	2.8250(0.0194)	<LOD	1.2044(0.0248)	0.0421(0.0007)	880.8472(2.7717)	0.1849(0.0305)
P_{CO_2}	**Cr**	**Fe**	**Mg**	**Mn**	**Mo**	**Ni**
0	0.0020(0.0002)	0.6402(0.6402)	0.0316(0.0004)	0.0047(0.0047)	0.0652(0.0154)	<LOD
0.69	0.0033(0.0001)	<LOD	15.7958(0.1630)	0.1207(0.0021)	0.0324(0.0024)	0.0161(0.0019)
2.07	0.0038(0.0002)	0.0088(0.0088)	15.7028(0.5101)	0.1783(0.0010)	0.1042(0.0056)	0.4441(0.0044)
6.8948	0.0074(0.0014)	0.0027(0.0027)	16.7378(0.0062)	0.2418(0.0278)	0.1158(0.0798)	0.6372(0.6176)
17.237	0.0335(0.0154)	0.0208(0.0171)	18.3401(0.2173)	0.4707(0.0456)	0.9734(0.0348)	7.8828(0.8233)
P_{CO_2}	**Se**	**Sb**	**Sr**	**Tl**	**V**	**Zn**
0	0.0624(0.0088)	0.0332(0.0014)	1.6050(0.0044)	0.0408(0.0013)	0.0093(0.0003)	<LOD
0.69	0.1484(0.0121)	0.0542(0.0004)	2.0988(0.0285)	0.0772(0.0093)	0.0243(0.0010)	0.1494(0.0098)
2.07	0.1703(0.0067)	0.0576(0.0010)	2.1038(0.0069)	0.0899(0.0008)	0.0217(0.0012)	0.4340(0.0293)
6.8948	0.1555(0.0066)	0.0510(0.0023)	2.4801(0.2813)	0.0768(0.0026)	0.0267(0.0040)	0.1016(0.1016)
17.237	0.1736(0.0108)	0.0406(0.0006)	2.4073(0.0040)	0.0986(0.0137)	<LOD	2.4003(0.2273)
P_{CO_2}	**Si**	**K**	**Na**			
0	0.9159(0.0048)	1.6626(0.0083)	227.7719(3.31)			
0.69	1.4926(0.0330)	1.8018(0.0621)	226.7628(2.83)			
2.07	1.6341(0.0849)	1.8368(0.0243)	213.0958(3.93)			
6.8948	2.1256(0.3571)	1.9099(0.0479)	212.8357(6.22)			
17.237	2.8949(0.0504)	1.9828(0.0335)	209.6240(1.46)			

Table 15. Element concentrations (pH = 12, S:L = Ratio 1:100, reaction time = 360 min).

P_{CO_2}	Al (Std. Dev.)	As (Std. Dev.)	B (Std. Dev.)	Ba (Std. Dev.)	Ca (Std. Dev.)	Co (Std. Dev.)
0	0.3209(0.0234)	<LOD	1.0109(0.0058)	0.0280(0.0034)	533.3449(18.0495)	0.0059(0)
0.69	0.3402(0.0564)	<LOD	0.1027(0.0025)	0.0197(0.0002)	582.7630(6.7269)	0.0085(0.0009)
2.07	0.7906(0.0760)	<LOD	0.1289(0.0072)	0.0193(0.0004)	560.3168(9.6108)	0.0128(0.0034)
6.89	0.6432(0)	<LOD	0.1106(0)	0.0192(0)	589.5591(0)	0.0082(0)
17.24	1.0771(0.0475)	<LOD	0.1258(0.0008)	0.0164(0.0013)	577.3865(11.8412)	0.1372(0.0010)
P_{CO_2}	**Cr**	**Fe**	**Mg**	**Mn**	**Mo**	**Ni**
0	0.0005(0.0005)	<LOD	0.0436(0.0058)	0.0001(0.0001)	0.0336(0.0017)	<LOD
0.69	0.0026(0.0001)	0.0238(0.0043)	1.8609(0.0010)	0.0281(0.0001)	0.0417(0.0138)	0.0159(0.0003)
2.07	0.0036(0.0002)	0.0673(0.0034)	2.2155(0.0011)	0.0427(0.0014)	0.0465(0.0271)	0.2481(0.1439)
6.89	0.0112(0)	0.0195(0)	2.1206(0)	0.0391(0)	0.0670(0)	0.0259(0)
17.24	0.1069(0.0401)	0.2394(0.1104)	2.3840(0.0223)	0.1160(0.0079)	0.4614(0.1513)	6.2980(0.0700)
P_{CO_2}	**Se**	**Sb**	**Sr**	**Tl**	**V**	**Zn**
0	0.0674(0.0046)	0.0381(0.0013)	1.6411(0.1355)	0.0467(0.0009)	0.0122(0.0013)	<LOD
0.69	0.0992(0.0031)	0.0525(0.0008)	0.8867(0.0068)	0.0687(0.0002)	0.0108(0.0012)	0.0264(0.0003)
2.07	0.0946(0.0111)	0.0478(0.0021)	0.8855(0.0122)	0.0723(0.0121)	0.0088(0.0008)	0.2318(0.1225)
6.89	0.0744(0)	0.0448(0)	0.8855(0)	0.0551(0)	0.0043(0)	0.0277(0)
17.24	0.0655(0.0106)	0.0290(0.0035)	0.8904(0.0015)	0.0559(0.0009)	<LOD	1.8162(0.4101)
P_{CO_2}	**Si**	**K**	**Na**			
0	1.1440(0.0437)	1.7018(0.0556)	220.7321(4.0)			
0.69	0.2628(0.0009)	0.0271(0.0096)	224.0574(1.6)			
2.07	1.3901(0.0543)	0.3041(0.2088)	93.2889(5.1)			
6.89	0.3674(0)	0.0222(0)	220.6337(0)			
17.24	0.8624(0.0387)	0.0849(0.0266)	219.3649(1.5)			

Table 16: Element concentrations (pH = 13, S:L = Ratio 1:10, reaction time = 360 min).

P_{CO_2}	Al (Std. Dev.)	As (Std. Dev.)	B (Std. Dev.)	Ba (Std. Dev.)	Ca (Std. Dev.)	Co (Std. Dev.)
0.69	<LOD	<LOD	1.0689(0.0327)	0.0186(0.0037)	566.6115(2.0)	0.0128(0.0005)
2.07	0.4106(0.0403)	<LOD	0.9734(0.0262)	0.0321(0.0011)	664.3980(24.9)	0.0196(0.0008)
6.89	0.4471(0.0661)	<LOD	0.9633(0.0126)	0.0316(0.0004)	671.6183(19.7)	0.0153(0.0003)
17.24	0.7646(0.0661)	<LOD	1.0803(0.0066)	0.0332(0.0017)	890.3663(3.9)	0.0213(0)
P_{CO_2}	**Cr**	**Fe**	**Mg**	**Mn**	**Mo**	**Ni**
0.69	0.0060(0.0001)	<LOD	13.1328(0.2210)	0.0241(0.0100)	0.0448(0.0079)	0.0034(0.0034)
2.07	0.0066(0)	0.0071(0.0041)	13.1413(0.1729)	0.1610(0.0381)	0.0527(0.0165)	0.0741(0.0320)
6.89	0.0107(0.0027)	0.0024(0.0021)	12.7700(0.0872)	0.1164(0.0013)	0.0143(0.0016)	<LOD
17.24	0.0119(0.0009)	0.0190(0.0038)	14.2640(0.3911)	0.1836(0.0024)	0.0581(0.0179)	0.1984(0.1361)
P_{CO_2}	**Se**	**Sb**	**Sr**	**Tl**	**V**	**Zn**
0.69	0.2080(0.0205)	0.0899(0.0012)	1.9319(0.0330)	0.1250(0.0019)	0.0297(0.0004)	0.0494(0.0168)
2.07	0.1521(0.0079)	0.0867(0.0080)	2.1631(0.0193)	0.1333(0.0004)	0.0306(0.0020)	0.0954(0.0190)
6.89	0.2099(0.0130)	0.0981(0.0056)	1.9982(0.0248)	0.1667(0.0031)	0.0335(0.0015)	0.0922(0.0067)
17.24	0.2096(0.0451)	0.1112(0.0029)	2.1477(0.0382)	0.1598(0.0027)	0.0412(0.0024)	0.2570(0.0273)
P_{CO_2}	**Si**	**K**	**Na**			
0.69	1.5441(0.0704)	2.8429(0.0812)	2108.8822(103.5)			
2.07	1.2572(0.0725)	2.8968(0.0852)	2036.1402(20.7)			
6.89	1.3405(0.0340)	2.5703(0.0180)	1929.1610(48.5)			
17.24	2.2408(0.0984)	2.8518(0.0123)	2000.1411(17.6)			

Table 17: Element concentrations (pH = 13, S:L Ratio = 1:100, reaction time = 360 min).

P_{CO_2}	Al (Std. Dev.)	As (Std. Dev.)	B (Std. Dev.)	Ba (Std. Dev.)	Ca (Std. Dev.)	Co (Std. Dev.)
0.69	0.0438(0.0438)	<LOD	<LOD	0.0177(0.0003)	796.88(44.42)	0.0143(0.0001)
2.07	0.1552(0.0026)	<LOD	<LOD	0.0192(0.0021)	800.95(0.51)	0.0132(0.0007)
6.89	0.1022(0.0118)	<LOD	<LOD	0.0217(0.0005)	840.64(0.08)	0.0155(0.0004)
17.24	0.1023(0.0735)	<LOD	<LOD	0.0238(0.0004)	861.66(10.22)	0.0191(0.0032)
P_{CO_2}	**Cr**	**Fe**	**Mg**	**Mn**	**Mo**	**Ni**
0.69	0.0048(0)	<LOD	1.3846(0.0247)	0.0070(0.0029)	0.0119(0.0067)	<LOD
2.07	0.0051(0.0003)	<LOD	1.2884(0.0250)	0.0138(0.0003)	0.0039(0.0039)	0.0089(0.0066)
6.89	0.0076(0.0007)	0.0015(0.0015)	1.3377(0.0390)	0.0214(0.0008)	<LOD	<LOD
17.24	0.0093(0.0031)	0.0170(0.0036)	1.4064(0.0760)	0.0337(0.0010)	0.1631(0.1467)	0.4804(0.4524)
P_{CO_2}	**Se**	**Sb**	**Sr**	**Tl**	**V**	**Zn**
0.69	0.1273(0.0154)	0.1013(0)	1.0396(0.0948)	0.1287(0.0022)	0.0142(0.0018)	0.1332(0.1065)
2.07	0.1891(0.0216)	0.1082(0.0100)	0.9822(0.0636)	0.1714(0.0033)	0.0103(0.0022)	0.0312(0.0123)
6.89	0.1779(0.0060)	0.1144(0.0088)	1.1770(0.0205)	0.1825(0.0028)	0.0113(0.0024)	0.0268(0.0021)
17.24	0.1097(0.0022)	0.0964(0.0052)	1.1571(0.0203)	0.1597(0.0084)	0.0061(0.0061)	0.0529(0.0051)
P_{CO_2}	**Si**	**K**	**Na**			
0.69	0.2598(0.0322)	0.6987(0.0514)	2011.3863(9.81)			
2.07	0.2582(0.0065)	0.6113(0.0190)	1958.8148(41.64)			
6.89	0.2221(0.0067)	0.5633(0.0082)	1942.6117(7.66)			
17.24	0.2997(0.0083)	1.0883(0.4507)	2010.0566(13.88)			

Table 18: Element concentrations (pH = 13.5, S:L = Ratio 1:10, reaction time = 360 min).

P_{CO_2}	Al (Std. Dev.)	As (Std. Dev.)	B (Std. Dev.)	Ba (Std. Dev.)	Ca (Std. Dev.)	Co (Std. Dev.)
0.69	<LOD	<LOD	<LOD	0.0114(0.0024)	380.29(127.4275)	0.0239(0.0020)
2.07	<LOD	<LOD	<LOD	<LOD	139.39(62.5747)	0.0057(0.0013)
6.89	<LOD	<LOD	<LOD	<LOD	146.01(23.5005)	0.0103(0.0006)
17.24	<LOD	<LOD	<LOD	<LOD	15.56(7.3626)	<LOD
P_{CO_2}	**Cr**	**Fe**	**Mg**	**Mn**	**Mo**	**Ni**
0.69	0.0062(0.0062)	<LOD	13.0481(0.6949)	0.0031(0.0016)	<LOD	<LOD
2.07	<LOD	<LOD	6.4830(6.1121)	0.0032(0.0013)	0.0759(0.0759)	0.1958(0.1958)
6.89	<LOD	<LOD	13.1904(0.0341)	<LOD	<LOD	<LOD
17.24	<LOD	<LOD	6.7157(0.3964)	<LOD	0.3065(0.0536)	0.0492(0.0015)
P_{CO_2}	**Se**	**Sb**	**Sr**	**Tl**	**V**	**Zn**
0.69	0.3072(0.0040)	0.0976(0.0059)	1.8748(0.1208)	0.1326(0.0294)	0.1511(0.0062)	<LOD
2.07	0.4353(0.0299)	<LOD	0.6506(0.4509)	0.1618(0.0336)	0.0750(0.0082)	<LOD
6.89	0.5336(0.0469)	0.0934(0.0008)	1.6868(0.0257)	0.1928(0.0068)	0.0926(0.0024)	<LOD
17.24	0.8020(0.0848)	0.0239(0.0239)	0.8668(0.1131)	0.3337(0.0222)	0.0564(0.0140)	<LOD
P_{CO_2}	**Si**	**K**	**Na**			
0.69	2.1634(0.1344)	3.3578(0.0537)	4891.06(1451.2921)			
2.07	1.0803(0.6261)	2.4780(0.9707)	6409.58(26.3091)			
6.89	1.9816(0.1793)	4.1035(0.1308)	6161.96(160.9204)			
17.24	1.8312(0.1161)	3.2642(0.1919)	6546.90(101.2903)			

Table 19: Element concentrations (pH = 13.5, S:L Ratio = 1:100, reaction time = 360 min)

P_{CO_2}	Al (Std. Dev.)	As (Std. Dev.)	B (Std. Dev.)	Ba (Std. Dev.)	Ca (Std. Dev.)	Co (Std. Dev.)
0.69	<LOD	0.0431(0.0077)	<LOD	<LOD	459.65(2.4174)	0.0025(0.0004)
2.07	<LOD	0.0201(0.0201)	<LOD	<LOD	415.28(78.1731)	0.0029(0.0014)
6.89	<LOD	<LOD	<LOD	<LOD	493.11(15.3880)	0.0038(0.0004)
17.24	<LOD	0.0158(0.0158)	<LOD	<LOD	368.43(144.2878)	0.0023(0.0023)
P_{CO_2}	**Cr**	**Fe**	**Mg**	**Mn**	**Mo**	**Ni**
0.69	0.0040(0.0005)	0.0080(0.0080)	2.4509(0.0030)	0.0003(0)	0.0498(0.0078)	<LOD
2.07	0.0026(0.0005)	<LOD	2.9857(0.1448)	0.0003(0.0003)	0.0529(0.0160)	0.0219(0.0219)
6.89	0.0041(0.0005)	0.0119(0.0119)	2.7275(0.0971)	0.0008(0.0002)	0.0342(0.0016)	0.0026(0.0026)
17.24	0.0029(0.0007)	<LOD	2.7808(0.0275)	<LOD	0.0242(0.0007)	<LOD
P_{CO_2}	**Se**	**Sb**	**Sr**	**Tl**	**V**	**Zn**
0.69	0.1424(0.0021)	0.0316(0.0043)	0.4991(0.0523)	0.0206(0.0056)	0.0413(0.0041)	<LOD
2.07	0.1536(0.0195)	0.0257(0.0064)	0.4573(0.0482)	0.0213(0.0003)	0.0261(0.0121)	<LOD
6.89	0.1294(0.0195)	0.0306(0.0006)	0.5163(0.0096)	0.0304(0.0100)	0.0422(0.0006)	0.0006(0.0006)
17.24	0.1567(0.0191)	0.0248(0.0007)	0.3357(0.0190)	0.0349(0.0146)	0.0452(0.0041)	<LOD
P_{CO_2}	**Si**	**K**	**Na**			
0.69	0.4803(0.0261)	1.5717(0.0643)	6078.26(305.0064)			
2.07	0.4508(0.1871)	1.5715(0.0720)	5970.87(35.6473)			
6.89	0.4160(0.0123)	1.6692(0.1206)	6286.01(111.7044)			
17.24	0.3879(0.0362)	1.5687(0.0570)	6280.39(93.3665)			

Table 20: Element concentrations (pH = 14, S:L= Ratio = 1:10, reaction time = 360 min).

P_{CO_2}	Al (Std. Dev.)	As (Std. Dev.)	B (Std. Dev.)	Ba (Std. Dev.)	Ca (Std. Dev.)	Co (Std. Dev.)
0.69	0.0200(0.0200)	<LOD	<LOD	<LOD	0.5253(0.0221)	<LOD
2.07	0.0229(0.0064)	<LOD	<LOD	<LOD	3.6635(0.6480)	<LOD
6.89	0.0051(0.0051)	<LOD	<LOD	<LOD	255.9028(252.5937)	0.0017(0.0017)
17.24	0.0109(0.0014)	<LOD	<LOD	<LOD	2.6631(0.5012)	<LOD
P_{CO_2}	**Cr**	**Fe**	**Mg**	**Mn**	**Mo**	**Ni**
0.69	0.0060(0.0005)	0.0004(0.0004)	0.0293(0.0139)	<LOD	0.0036(0.0036)	0.0033(0.0033)
2.07	0.0108(0.0078)	0.0323(0.0323)	0.0715(0.0155)	0.0004(0.0004)	0.0082(0.0082)	0.0227(0.0227)
6.89	0.0045(0.0001)	<LOD	1.4499(1.3747)	0.0003(0.0003)	0.0163(0.0163)	0.0064(0.0012)
17.24	0.0015(0.0015)	<LOD	0.1083(0.0044)	<LOD	<LOD	0.0057(0.0010)
P_{CO_2}	**Se**	**Sb**	**Sr**	**Tl**	**V**	**Zn**
0.69	0.2838(0.0189)	0.0394(0.0052)	0.0010(0.0010)	0.2194(0.0122)	0.0259(0.0015)	<LOD
2.07	0.2692(0.0003)	0.0360(0.0046)	0.0318(0.0035)	0.2023(0.0145)	0.0230(0.0024)	<LOD
6.89	0.1381(0.0282)	0.0245(0.0067)	0.2776(0.2290)	0.0881(0.0476)	0.0327(0.0089)	<LOD
17.24	0.2647(0.0139)	0.0301(0.0052)	0.0984(0.0055)	0.2134(0.0048)	0.0232(0.0048)	<LOD
P_{CO_2}	**Si**	**K**	**Na**			
0.69	0.2181(0.0540)	1.0245(0.0073)	13142.9(221.1)			
2.07	0.1550(0.0070)	1.1601(0.0329)	13141.0(260.1)			
6.89	0.4567(0.3236)	1.5387(0.3977)	13214.2(134.5)			
17.24	0.1585(0.0057)	1.0119(0.0419)	13021.5(90.4)			

Table 21: Element concentrations (pH = 14, S:L = Ratio 1:100, reaction time = 360 min).

P_{CO_2}	Al (Std. Dev.)	As (Std. Dev.)	B (Std. Dev.)	Ba (Std. Dev.)	Ca (Std. Dev.)	Co (Std. Dev.)
0.69	0.02(0.02)	<LOD	<LOD	<LOD	0.5253(0.0221)	<LOD
2.07	0.0229(0.0064)	<LOD	<LOD	<LOD	3.6635(0.6480)	<LOD
6.89	0.0051(0.0051)	<LOD	<LOD	<LOD	255.9(252.5937)	0.0017(0.0017)
17.24	0.0109(0.0014)	<LOD	<LOD	<LOD	2.6631(0.5012)	<LOD
P_{CO_2}	**Cr**	**Fe**	**Mg**	**Mn**	**Mo**	**Ni**
0.69	0.006(0.0005)	0.0004(0.0004)	0.0293(0.0139)	<LOD	0.0036(0.0036)	0.0033(0.0033)
2.07	0.0108(0.0078)	0.0323(0.0323)	0.0715(0.0155)	0.0004(0.0004)	0.0082(0.0082)	0.0227(0.0227)
6.89	0.0045(0.0001)	<LOD	1.4499(1.3747)	0.0003(0.0003)	0.0163(0.0163)	0.0064(0.0012)
17.24	0.0015(0.0015)	<LOD	0.1083(0.0044)	<LOD	<LOD	0.0057(0.0010)
P_{CO_2}	**Se**	**Sb**	**Sr**	**Tl**	**V**	**Zn**
0.69	0.2838(0.0189)	0.0394(0.0052)	0.001(0.0010)	0.2194(0.0122)	0.0259(0.0015)	0()
2.07	0.2692(0.0003)	0.036(0.0046)	0.0318(0.0035)	0.2023(0.0145)	0.023(0.0024)	0()
6.89	0.1381(0.0282)	0.0245(0.0067)	0.2776(0.2290)	0.0881(0.0476)	0.0327(0.0089)	0()
17.24	0.2647(0.0139)	0.0301(0.0052)	0.0984(0.0055)	0.2134(0.0048)	0.0232(0.0048)	0()
P_{CO_2}	**Si**	**K**	**Na**			
0.69	0.2181(0.0540)	1.0245(0.0073)	13143(221.0526)			
2.07	0.155(0.0070)	1.1601(0.0329)	13141(260.1259)			
6.89	0.4567(0.3236)	1.5387(0.3977)	13214(134.5105)			
17.24	0.1585(0.0057)	0.0419	13022(90.4349)			

Table 22: Element concentrations (pH = 13, Pco_2 = 2.07 Bar, reaction time = 10).

Ratio	Al (Std. Dev.)	As (Std. Dev.)	Ba (Std. Dev.)	Ca (Std. Dev.)	Co (Std. Dev.)	Cr (Std. Dev.)
1:10	0()	<LOD	0.0073(0.0001)	670.6032(8.5244)	0.0148(0.0001)	0.0068(0.0003)
1:40	0.2140(0.0120)	0.0415(0.0415)	<LOD	394.1807(12.7081)	0.0120(0.0006)	0.0045(0.0005)
1:80	0.0536(0.0034)	<LOD	<LOD	3.7808(1.6721)	<LOD	<LOD
1:100	0.0102(0.0102)	<LOD	<LOD	25.4913(0.8572)	0.0011(0.0011)	0.0012(0.0012)
Ratio	**Mg**	**Mn**	**Mo**	**Ni**	**Se**	**Sb**
1:10	8.1170(0.6778)	0.0024(0.0003)	<LOD	<LOD	0.1529(0.0025)	0.1177(0.0011)
1:40	0.8109(0.2458)	0.0004(0)	<LOD	<LOD	<LOD	0.0913(0.0058)
1:80	0.0314(0.0083)	<LOD	<LOD	<LOD	0.0193(0.0193)	<LOD
1:100	0.0224(0.0086)	<LOD	<LOD	<LOD	<LOD	<LOD
Ratio	**Sr**	**Tl**	**V**	**Si**	**K**	**Na**
1:10	1.3921(0.0334)	0.1519(0.0149)	0.0425(0.0017)	0.3860(0.0064)	2.2567(0.1477)	2080.2876(48.7107)
1:40	0.6839(0.0010)	0.0670(0.0087)	0.0320(0.0062)	0.1378(0.0078)	0.7600(0.0430)	2108.5510(2.4702)
1:80	0.0109(4.06E-05)	0.0111(0.0111)	0.0128(0.0045)	0.0211(0.0036)	0.7084(0.2496)	2120.6992(19.8992)
1:100	0.0302(0.0026)	0.0023(0.0023)	0.0048(0.0048)	0.0165(0.0001)	0.5073(0.0209)	1981.2361(39.9190)

Table 23: Element concentrations (pH = 13, Pco_2 = 2.07 Bar, reaction time = 15 min).

Ratio	Al (Std. Dev.)	As (Std. Dev.)	Ba (Std. Dev.)	Ca (Std. Dev.)	Co (Std. Dev.)	Cr (Std. Dev.)
Ratio	Al	As	Ba	Ca	Co	**Cr**
1:10	0.1088(0.0361)	0.0184(0.0184)	0.0118(0.0008)	581.2622(0.4229)	0.0176(2.163E-05)	0.0052(0.0001)
1:40	0.0821(0.0821)	0.0796(0.0266)	<LOD	481.6072(34.7547)	0.0122(0.0004)	0.0049(0.0003)
1:80	<LOD	<LOD	<LOD	476.6742(170)	0.0136(0.0027)	0.0053(0.0005)
1:100	0.1390(0.0027)	<LOD	<LOD	106.6670(21.5997)	0.0051(0.0017)	<LOD
Ratio	**Mg**	**Mn**	**Mo**	**Ni**	**Se**	**Sb**
1:10	7.0691(0.0009)	0.0055(0.0003)	0.0169(0.0058)	<LOD	0.1486(0.0618)	0.1070(0.0075)
1:40	1.1066(1.0775)	0.0007(0.0002)	<LOD	<LOD	<LOD	0.0888(0.0047)
1:80	0.6912(0.1515)	<LOD	<LOD	<LOD	0.0632(0.0632)	0.1108(0.0240)
1:100	0.2812(0.0866)	0.0002(0.0002)	0.0126(0.0049)	<LOD	0.0202(0.0202)	0.0293(0.0004)
Ratio	**Sr**	**Tl**	**V**	**Si**	**K**	**Na**
1:10	1.3981(0.0223)	0.1262(0.0495)	0.0379(0.0010)	0.7047(0.0081)	1.7851(0.0270)	2089.2437(38.5173)
1:40	1.1339(0.3728)	0.0770(0.0048)	0.0227(0.0008)	0.1163(0.0534)	0.7412(0.0063)	2122.2919(35.9222)
1:80	0.7770(0.2353)	0.1683(0.0852)	0.0702(0.0075)	0.1042(0.0057)	0.4204(0.0933)	2123.5603(22.7136)
1:100	0.2671(0.0138)	0.0141(0.0108)	0.0328(0.0130)	0.0901(0.0077)	0.4133(0.0599)	2132.3240(28.33)

Table 24: Element concentrations (pH = 13, Pco_2 = 2.07 bar , reaction time = 20 min).

Ratio	Al (Std. Dev.)	As (Std. Dev.)	Ba (Std. Dev.)	Ca (Std. Dev.)	Co (Std. Dev.)	Cr (Std. Dev.)
1:10	0.1926(0.0088)	0.0505(0.0030)	0.0143(0.0003)	630.8845(24.8675)	0.0145(0.0009)	0.0068(0.0008)
1:40	<LOD	0.0333(0.0085)	0.0037(0.0014)	576.3556(10.0462)	0.0139(0.0004)	0.0055(0.0003)
1:80	<LOD	0.0301(0.0120)	<LOD	627.8646(21.2812)	0.0132(0.0001)	0.0050(0.0004)
1:100	<LOD	0.0102(0.0102)	<LOD	493.8060(21.3094)	0.0123(0.0008)	0.0045(0.0006)
Ratio	**Mg**	**Mn**	**Mo**	**Ni**	**Se**	**Sb**
1:10	8.4098(0.0137)	0.0053(0.0002)	<LOD	<LOD	0.0967(0.0063)	0.0913(0.0111)
1:40	2.0712(0.2227)	0.0013(0.0003)	<LOD	<LOD	0.0564(0.0160)	0.0822(0.0022)
1:80	0.7719(0.0069)	0.0008(2.127E-05)	<LOD	<LOD	0.0150(0.0150)	0.0888(0.0001)
1:100	0.5465(0.0285)	0.0008(3.79E-05)	<LOD	<LOD	0.0599(0.0067)	0.0874(0.0078)
Ratio	**Sr**	**Tl**	**V**	**Si**	**K**	**Na**
1:10	1.3881(0.0148)	0.1235(0.0104)	0.0453(0.0044)	0.4916(0.0184)	1.8555(0.0571)	2073.6153(65.3461)
1:40	0.9081(0.0137)	0.1088(0.0152)	0.0349(0.0064)	0.1771(0.0249)	0.7685(0.1106)	2043.5164(101.6861)
1:80	0.8977(0.0121)	0.1039(0.0021)	0.0351(0.0054)	0.1007(0.0046)	0.4127(0.0722)	2094.8175(63.2208)
1:100	0.7826(0.0428)	0.1051(0.0031)	0.0279(0.0012)	0.0836(0.0040)	0.3800(0.0665)	1987.9743(69.2505)

Table 25: Element concentrations (pH = 13, Pco_2 = 2.07 Bar, reaction time = 120+ min).

Ratio	Al (Std. Dev.)	As (Std. Dev.)	Ba (Std. Dev.)	Ca (Std. Dev.)	Co (Std. Dev.)	Cr (Std. Dev.)
1:10	0.4104(0.0401)	<LOD	0.0410(0.0012)	664.4014(24.8701)	0.0196(0.0011)	0.0066(4.59E-05)
1:40	0.1903(0.0444)	<LOD	0.0181(0.0003)	599.9715(8.2764)	0.0141(0.0004)	0.0070(0.0006)
1:80	0.1498(0.0153)	<LOD	0.0138(0.0002)	774.5460(25.7145)	0.0159(0.0012)	0.0063(0.0001)
1:100	0.1756(0.0087)	<LOD	0.0282(0.0020)	801.0651(0.4395)	0.0161(0.0016)	0.0051(0.0003)
Ratio	**Mg**	**Mn**	**Mo**	**Ni**	**Se**	**Sb**
1:10	13.1410(0.1731)	0.1611(0.0381)	0.0527(0.0165)	0.0739(0.0318)	0.1521(0.0079)	0.0867(0.0080)
1:40	2.2611(0.1762)	0.0054(0.0002)	<LOD	<LOD	0.1510(0.0153)	0.1045(0.0105)
1:80	1.0621(0.0023)	0.0033(0.0005)	<LOD	<LOD	0.1372(0.0229)	0.1011(0.0045)
1:100	1.2913(0.0259)	0.0142(0.0004)	0.0039(0.0039)	0.0094(0.0062)	0.1891(0.0216)	0.1082(0.0100)
Ratio	**Sr**	**Tl**	**V**	**Si**	**K**	**Na**
1:10	2.1672(0.0192)	0.1454(0.0004)	0.0306(0.0020)	1.3250(0.0829)	3.2130(0.0852)	2036.1875(20.7383)
1:40	1.2454(0.0874)	0.2017(0.0033)	0.0413(0.0038)	0.2751(0.0148)	0.7956(0.0886)	2067.0695(11.9433)
1:80	0.9637(0.0093)	0.1861(0.0081)	0.0313(0.0033)	0.1729(0.0044)	0.4884(0.0228)	2056.9245(38.6677)
1:100	0.9863(0.0637)	0.1835(0.0033)	0.0103(0.0022)	0.2648(0.0142)	0.9275(0.0190)	1958.8921(41.5682)

Appendix X: LOD values and checks

X.I: Element LOD and LOQ Values for ICP-OES Analyses (Runs 16–27)

	Sc	**Sc**	**Al 396.153**	**As 188.979**	**As 197.197**	**B 249.772**	**B 208.889**	**Ba 233.527**	**Be 313.107**
BLANK	0.98561	0.98405	0.00017	0.00071	-0.00405	-0.00643	-0.00584	-0.00007	0.00000
BLANK	0.98855	0.98856	0.00007	0.00226	0.00070	0.00318	0.00313	-0.00008	-0.00002
BLANK	0.98187	0.98861	-0.00010	0.00090	-0.00103	-0.00326	-0.00146	-0.00002	-0.00002
BLANK	0.98296	0.99339	0.00054	-0.00289	-0.00146	-0.01632	-0.01518	0.00000	-0.00004
BLANK	0.98487	0.98079	0.00067	-0.00143	-0.00402	-0.00984	-0.01015	-0.00002	-0.00002
BLANK	0.98234	0.98389	0.00069	-0.00038	-0.00224	-0.01862	-0.02011	-0.00006	0.00000
BLANK	0.98889	0.98880	0.00045	0.00079	-0.00043	0.01422	0.01513	-0.00004	0.00004
BLANK	0.97987	0.97957	0.00061	-0.00129	0.00231	-0.01878	-0.01949	-0.00006	0.00001
Avg	0.98437	0.98596	0.00039	-0.00017	-0.00128	-0.00698	-0.00675	-0.00004	-0.00001
Standard Deviation	0.00321	0.00467	0.00030	0.00165	0.00220	0.01157	0.01212	0.00003	0.00002
LOD	0.99401	0.99996	0.00129	0.00477	0.00531	0.02772	0.02962	0.00004	0.00006
LOQ	1.01651	1.03263	0.00339	0.01629	0.02069	0.10869	0.11446	0.00025	0.00022

	Ca 317.933	**Cd 228.802**	**Cd 214.440**	**Co 228.616**	**Cr 267.716**	**Cu 327.393**	**Fe 238.204**	**Mg 285.213**	**Mn 257.610**
BLANK	0.00038	-0.00006	-0.00010	-0.00002	-0.00007	-0.00050	0.00002	0.00009	0.00003
BLANK	0.00015	0.00003	0.00001	0.00019	-0.00014	0.00071	0.00002	0.00015	0.00007
BLANK	0.00033	-0.00003	0.00006	-0.00005	-0.00012	0.00044	-0.00004	0.00009	0.00003
BLANK	-0.00007	-0.00022	-0.00020	0.00005	-0.00033	-0.00065	0.00002	0.00003	0.00006
BLANK	0.00024	-0.00019	-0.00010	0.00006	-0.00023	0.00030	-0.00004	0.00013	0.00009
BLANK	-0.00011	-0.00030	-0.00016	-0.00010	-0.00014	-0.00071	0.00000	0.00015	0.00011
BLANK	-0.00016	-0.00005	0.00012	-0.00017	-0.00030	0.00102	-0.00001	0.00006	0.00004
BLANK	0.00022	-0.00034	-0.00020	-0.00007	-0.00027	-0.00117	0.00002	0.00007	0.00013
Avg	0.00012	-0.00015	-0.00007	-0.00001	-0.00020	-0.00007	0.00000	0.00010	0.00007
Standard Deviation	0.00021	0.00014	0.00012	0.00011	0.00010	0.00079	0.00003	0.00005	0.00004
LOD	0.00074	0.00027	0.00029	0.00033	0.00009	0.00229	0.00008	0.00023	0.00018
LOQ	0.00219	0.00124	0.00115	0.00111	0.00075	0.00780	0.00027	0.00055	0.00045

	Mo 202.031	Ni 231.604	Pb 220.353	Se 196.026	Sb 206.836	Ag 328.068	Sn 189.927	Sr 407.771	Tl 190.801
BLANK	-0.00034	-0.00013	-0.00061	0.00152	0.00009	-0.00003	-0.00098	0.00004	-0.00157
BLANK	0.00010	0.00004	0.00032	0.00208	-0.00047	-0.00007	-0.00042	0.00001	-0.00117
BLANK	-0.00012	-0.00012	-0.00082	0.00101	-0.00119	-0.00036	-0.00061	0.00008	0.00020
BLANK	-0.00102	0.00005	-0.00235	-0.00034	-0.00033	-0.00002	-0.00096	0.00014	-0.00203
BLANK	-0.00044	0.00012	-0.00067	0.00206	-0.00115	0.00011	0.00015	0.00002	-0.00190
BLANK	-0.00123	0.00029	-0.00225	0.00194	0.00034	0.00024	-0.00130	0.00002	-0.00244
BLANK	0.00119	0.00004	0.00206	0.00263	0.00138	0.00011	0.00057	-0.00001	-0.00155
BLANK	-0.00074	-0.00011	-0.00212	0.00146	-0.00151	0.00007	-0.00079	0.00000	-0.00337
Avg	-0.00033	0.00002	-0.00080	0.00154	-0.00035	0.00001	-0.00054	0.00004	-0.00173
Standard Deviation	0.00076	0.00014	0.00150	0.00090	0.00095	0.00018	0.00062	0.00005	0.00103
LOD	0.00194	0.00046	0.00369	0.00426	0.00251	0.00054	0.00133	0.00019	0.00136
LOQ	0.00724	0.00146	0.01419	0.01058	0.00918	0.00179	0.00571	0.00054	0.00856

	Ti 334.940	V 290.880	Zn 206.200	Si 251.611	Si	K 766.490	K	Na 589.592	Na
BLANK	0.00001	0.00042	-0.00040	0.00032	-0.00101	0.00560	0.00006	-0.00405	0.00012
BLANK	0.00008	0.00061	0.00008	0.00022	-0.00200	-0.00856	-0.00059	-0.00072	-0.00200
BLANK	-0.00004	0.00091	0.00009	-0.00009	-0.00273	0.00985	-0.00016	-0.00412	-0.00199
BLANK	0.00004	0.00074	-0.00158	0.00038	-0.00236	-0.01863	-0.00059	-0.00682	-0.00283
BLANK	0.00002	0.00052	0.00067	-0.00055	-0.00218	-0.00413	-0.00053	-0.00502	-0.00159
BLANK	0.00001	-0.00002	-0.00134	-0.00142	-0.00226	-0.00981	-0.00105	-0.00662	-0.00354
BLANK	0.00006	-0.00030	0.00077	-0.00016	-0.00101	-0.01692	-0.00113	-0.00710	-0.00353
BLANK	-0.00003	0.00032	-0.00112	-0.00115	-0.00254	-0.00403	-0.00115	-0.00358	-0.00352
Avg	0.00002	0.00040	-0.00035	-0.00031	-0.00201	-0.00583	-0.00064	-0.00476	-0.00236
Standard Deviation	0.00004	0.00040	0.00091	0.00068	0.00065	0.00995	0.00045	0.00213	0.00127
LOD	0.00014	0.00159	0.00237	0.00173	-0.00005	0.02402	0.00071	0.00164	0.00146
LOQ	0.00043	0.00438	0.00871	0.00648	0.00453	0.09367	0.00385	0.01656	0.01037

LOD and LOQ check for DF 100

	Sc 361.383	**Sc**	**Al 396.153**	**As 188.979**	**As 197.197**	**B 249.772**	**B 208.889**	**Ba 233.527**	**Be 313.107**
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 100	0.99703	<LOD	0.01102	<LOD	<LOD	<LOD	<LOD	0.00042	<LOD
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 100	1.00694	<LOD	0.00784	<LOD	<LOD	<LOD	<LOD	0.00042	<LOD
S:L = 1:100, pH 12, P_{CO2} = 0.69, DF = 100	1.00973	<LOD	0.00145	<LOD	<LOD	<LOD	<LOD	0.00027	<LOD
S:L = 1:100, pH 12, P_{CO2} = 0.69, DF = 100	1.00663	<LOD	0.00191	<LOD	<LOD	<LOD	<LOD	0.00025	<LOD
S:L = 1:10, pH 12, P_{CO2} = 2.07, DF = 100	1.00080	<LOD	0.01201	<LOD	<LOD	<LOD	<LOD	0.00044	<LOD
S:L = 1:10, pH 12, P_{CO2} = 2.07, DF = 100	1.01481	<LOD	0.01117	<LOD	<LOD	<LOD	<LOD	0.00039	<LOD
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 100	1.00274	<LOD	0.00700	<LOD	<LOD	<LOD	<LOD	0.00034	<LOD
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 100	1.00762	<LOD	0.00553	<LOD	<LOD	<LOD	<LOD	0.00022	<LOD
S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 100	1.00882	<LOD	0.01539	<LOD	<LOD	<LOD	<LOD	0.00045	<LOD
S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 100	0.99783	<LOD	0.01522	<LOD	<LOD	<LOD	<LOD	0.00043	<LOD

	Ca 317.933	**Cd 228.802**	**Cd 214.440**	**Co 228.616**	**Cr 267.716**	**Cu 327.393**	**Fe 238.204**	**Mg 285.213**	**Mn 257.610**
	6.56784	<LOD	<LOD	<LOD	<LOD	<LOD	0.00098	0.14471	0.00144
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 100	6.52021	<LOD	<LOD	0.00047	<LOD	<LOD	<LOD	0.14392	0.00137
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 100	5.76066	<LOD	<LOD	0.00038	<LOD	<LOD	0.00033	0.01663	0.00041
S:L = 1:100, pH 12, P_{CO2} = 0.69, DF = 100	5.89548	<LOD	<LOD	<LOD	<LOD	<LOD	0.00025	0.01691	0.00041
S:L = 1:100, pH 12, P_{CO2} = 0.69, DF = 100	6.85366	<LOD	<LOD	0.00044	<LOD	<LOD	<LOD	0.13595	0.00197
S:L = 1:10, pH 12, P_{CO2} = 2.07, DF = 100	6.66296	<LOD	<LOD	0.00040	<LOD	<LOD	0.00025	0.13975	0.00188
S:L = 1:10, pH 12, P_{CO2} = 2.07, DF = 100	5.69957	<LOD	<LOD	0.00038	<LOD	<LOD	0.00079	0.02047	0.00059

S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 100	5.50748	<LOD	<LOD	<LOD	<LOD	<LOD	0.00056	0.01922	0.00052
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 100	7.71786	<LOD	<LOD	0.00071	<LOD	<LOD	0.00021	0.15032	0.00278
S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 100	7.31301	<LOD	<LOD	0.00058	<LOD	<LOD	0.00008	0.14436	0.00258

	Mo 202.031	**Ni 231.604**	**Pb 220.353**	**Se 196.026**	**Sb 206.836**	**Ag 328.068**	**Sn 189.927**	**Sr 407.771**	**Tl 190.801**
	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.02044	<LOD
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	<LOD	0.00293	<LOD	<LOD	0.01998	<LOD
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00851	0.00150
S:L = 1:100, pH 12, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00874	<LOD
S:L = 1:100, pH 12, P_{CO2} = 0.69, DF = 100	<LOD	0.00397	<LOD	<LOD	<LOD	<LOD	<LOD	0.01976	0.00225
S:L = 1:10, pH 12, P_{CO2} = 2.07, DF = 100	<LOD	0.00436	<LOD	0.00569	0.00357	<LOD	<LOD	0.01858	0.00186
S:L = 1:10, pH 12, P_{CO2} = 2.07, DF = 100	<LOD	0.00343	<LOD	<LOD	<LOD	<LOD	<LOD	0.00861	0.00156
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 100	<LOD	0.00058	<LOD	<LOD	<LOD	<LOD	<LOD	0.00823	<LOD
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 100	<LOD	0.00686	<LOD	<LOD	0.00265	<LOD	<LOD	0.01997	<LOD
S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 100	<LOD	0.00199	<LOD	0.00426	0.00321	<LOD	<LOD	0.01896	<LOD

	Ti 334.940	**V 290.880**	**Zn 206.200**	**Si 251.611**	**Si**	**K 766.490**	**K**	**Na 589.592**	**Na**
	<LOD	<LOD	<LOD	0.01344	0.01098	<LOD	0.01079	2.29630	1.75505
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	0.01243	0.00944	<LOD	0.01001	2.23946	1.73182
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	2.22513	1.69401
S:L = 1:100, pH 12, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	<LOD	0.00028	<LOD	<LOD	2.25675	1.72358

S:L = 1:100, pH 12, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	0.00298	0.01446	0.01253	<LOD	0.01025	2.17052	1.67892
S:L = 1:10, pH 12, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	0.00332	0.01194	0.01039	<LOD	0.00953	2.09168	1.61554
S:L = 1:10, pH 12, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	0.00237	0.01163	0.00972	<LOD	0.00284	0.98442	0.73756
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	<LOD	0.00998	0.00929	<LOD	<LOD	0.88139	0.66611
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	0.00875	0.02263	0.02022	<LOD	0.00900	0.90006	0.67896
S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	0.00430	0.02176	0.01950	<LOD	0.00910	0.85522	0.65565

LOD and LOQ check for DF 2

	Sc 361.383	**Sc**	**Al 396.153**	**As 188.979**	**As 197.197**	**B 249.772**	**B 208.889**	**Ba 233.527**	**Be 313.107**
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 2	<LOD	<LOD	0.55766	<LOD	<LOD	0.64430	0.66930	0.02371	0.00007
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 2	<LOD	<LOD	0.50544	<LOD	<LOD	0.55553	0.58223	0.02222	0.00011
S:L = 1:100, pH 12, P_{CO2} = 0.69, DF = 2	<LOD	<LOD	0.14406	<LOD	<LOD	0.05588	0.05008	0.01447	<LOD
S:L = 1:100, pH 12, P_{CO2} = 0.69, DF = 2	<LOD	<LOD	0.20165	<LOD	<LOD	0.05808	0.05262	0.01423	<LOD
S:L = 1:10, pH 12, P_{CO2} = 2.07, DF = 2	<LOD	<LOD	0.74804	<LOD	<LOD	0.56118	0.58159	0.02472	0.00010
S:L = 1:10, pH 12, P_{CO2} = 2.07, DF = 2	<LOD	<LOD	0.73372	<LOD	<LOD	0.55726	0.57465	0.02420	0.00010
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 2	<LOD	<LOD	0.44376	<LOD	<LOD	0.07542	0.06807	0.01427	<LOD
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 2	<LOD	<LOD	0.36619	<LOD	<LOD	0.06642	0.06085	0.01386	<LOD
S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 2	<LOD	<LOD	1.00144	<LOD	<LOD	0.58446	0.60899	0.02703	0.00009
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 2	<LOD	<LOD	1.00230	<LOD	<LOD	0.57166	0.59300	0.02635	0.00012

	Ca 317.933	Cd 228.802	Cd 214.440	Co 228.616	Cr 267.716	Cu 327.393	Fe 238.204	Mg 285.213	Mn 257.610
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 2	361.00990	0.00367	0.00361	0.00508	0.00161	<LOD	0.00435	7.98536	0.06191
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 2	383.97274	0.00238	0.00247	0.00487	0.00172	<LOD	0.00381	7.81722	0.05941
S:L = 1:100, pH 12, P_{CO2} = 0.69, DF = 2	322.50503	0.00051	0.00074	0.00399	0.00136	<LOD	0.01896	0.93229	0.01419
S:L = 1:100, pH 12, P_{CO2} = 0.69, DF = 2	318.68008	0.00052	0.00067	0.00543	0.00126	<LOD	0.01674	0.93179	0.01433
S:L = 1:10, pH 12, P_{CO2} = 2.07, DF = 2	413.65913	0.00259	0.00293	0.00987	0.00181	<LOD	0.00468	7.59783	0.08964
S:L = 1:10, pH 12, P_{CO2} = 2.07, DF = 2	396.37613	0.00279	0.00292	0.01018	0.00203	<LOD	0.01381	8.10789	0.08866
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 2	328.59160	0.00196	0.00216	0.00917	0.00190	<LOD	0.04021	1.10930	0.02203
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 2	317.67260	0.00043	0.00067	0.00549	0.00166	<LOD	0.03713	1.10849	0.02065
S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 2	476.49172	0.00563	0.00598	0.01481	0.00279	<LOD	0.01402	8.87838	0.13122
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 2	473.17583	0.00289	0.00302	0.01004	0.00243	<LOD	0.00693	8.52628	0.12711

	Mo 202.031	Ni 231.604	Pb 220.353	Se 196.026	Sb 206.836	Ag 328.068	Sn 189.927	Sr 407.771	Tl 190.801
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 2	0.01739	0.00925	<LOD	0.06814	0.02690	<LOD	<LOD	1.06568	0.03997
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 2	0.01500	0.00732	<LOD	0.08023	0.02726	<LOD	<LOD	1.03713	0.04924
S:L = 1:100, pH 12, P_{CO2} = 0.69, DF = 2	0.02773	0.00804	<LOD	0.04801	0.02668	<LOD	<LOD	0.44195	0.04046
S:L = 1:100, pH 12, P_{CO2} = 0.69, DF = 2	0.01398	0.00898	<LOD	0.05115	0.02586	<LOD	<LOD	0.44877	0.04027
S:L = 1:10, pH 12, P_{CO2} = 2.07, DF = 2	0.05489	0.21985	<LOD	0.08180	0.02932	<LOD	<LOD	1.05733	0.05137
S:L = 1:10, pH 12, P_{CO2} = 2.07, DF = 2	0.04933	0.22427	<LOD	0.08853	0.02833	<LOD	<LOD	1.05042	0.05056
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 2	0.03684	0.19632	<LOD	0.05282	0.02491	<LOD	<LOD	0.45082	0.04824

S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 2	0.00969	0.05240	<LOD	0.04176	0.02286	<LOD	<LOD	0.43862	0.03611
S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 2	0.06384	0.37515	<LOD	0.06164	0.01854	<LOD	<LOD	1.13666	0.03189
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 2	0.02516	0.12818	<LOD	0.10179	0.02840	<LOD	<LOD	1.12256	0.06117

	Ti 334.940	**V 290.880**	**Zn 206.200**	**Si 251.611**	**Si**	**K 766.490**	**K**	**Na 589.592**	**Na**
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 2	<LOD	0.01263	0.09094	0.75175	0.76281	0.81075	1.10100	86.90744	
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 2	<LOD	0.01167	0.08078	0.70617	0.73032	0.87090	1.02925	83.14546	
S:L = 1:100, pH 12, P_{CO2} = 0.69, DF = 2	<LOD	0.00479	0.02314	0.13696	0.13489	0.10591	0.17453	83.49462	
S:L = 1:100, pH 12, P_{CO2} = 0.69, DF = 2	<LOD	0.00598	0.03015	0.13225	0.13243	0.12030	0.18424	83.64959	
S:L = 1:10, pH 12, P_{CO2} = 2.07, DF = 2	<LOD	0.01027	0.21020	0.83766	0.85947	0.81666	1.06517	84.30123	
S:L = 1:10, pH 12, P_{CO2} = 2.07, DF = 2	<LOD	0.01142	0.23984	0.75766	0.77457	0.84068	1.08998	85.52654	
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 2	<LOD	0.00476	0.19024	0.70253	0.72456	0.37099	0.41625	43.32597	
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 2	<LOD	0.00555	0.06508	0.64781	0.66969	0.20499	0.20660	41.57572	
S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 2	<LOD	0.01249	0.55061	1.34572	1.37770	0.95142	1.11001	43.64272	
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 2	<LOD	0.01421	0.33266	1.33922	1.39645	0.92860	1.08753	42.76727	

	Sc 361.383	**Sc**	**Al 396.153**	**As 188.979**	**As 197.197**	**B 249.772**	**B 208.889**	**Ba 233.527**	**Be 313.107**
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 2	1.00628	1.00453	0.02590	<LOD	<LOD	<LOD	<LOD	0.00026	<LOD
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 2	1.01144	<LOD	0.00818	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, pH 12, P_{CO2} = 0.69, DF = 2	1.00428	1.00925	0.00432	<LOD	<LOD	<LOD	<LOD	0.00019	<LOD

S:L = 1:100, pH 12, P_{CO2} = 0.69, DF = 2	1.01241	1.00901	0.00669	<LOD	<LOD	<LOD	<LOD	0.00011	<LOD
S:L = 1:10, pH 12, P_{CO2} = 2.07, DF = 2	1.01144	1.01191	0.00771	<LOD	<LOD	<LOD	<LOD	0.00006	<LOD
S:L = 1:10, pH 12, P_{CO2} = 2.07, DF = 2	1.00651	1.00382	0.00520	<LOD	<LOD	<LOD	<LOD	0.00008	<LOD
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 2	1.00010	1.00808	0.02089	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 2	1.00800	1.00834	0.01777	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 2	0.99626	1.00256	0.01678	<LOD	<LOD	<LOD	<LOD	0.00016	<LOD
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 2	1.00016	1.00288	0.00304	<LOD	<LOD	<LOD	<LOD	0.00013	0.00056

	Ca 317.933	**Cd 228.802**	**Cd 214.440**	**Co 228.616**	**Cr 267.716**	**Cu 327.393**	**Fe 238.204**	**Mg 285.213**	**Mn 257.610**
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 2	0.05095	<LOD	<LOD	0.00113	<LOD	<LOD	0.00662	0.01195	0.00112
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 2	0.02675	<LOD	0.00032	0.00097	<LOD	<LOD	0.00111	0.00166	0.00022
S:L = 1:100, pH 12, P_{CO2} = 0.69, DF = 2	0.02957	<LOD	<LOD	0.00035	<LOD	<LOD	0.00074	0.00266	0.00034
S:L = 1:100, pH 12, P_{CO2} = 0.69, DF = 2	0.05822	<LOD	<LOD	0.00146	<LOD	<LOD	0.00483	0.00371	0.00047
S:L = 1:10, pH 12, P_{CO2} = 2.07, DF = 2	0.01996	<LOD	<LOD	0.00040	<LOD	<LOD	0.00093	0.00294	<LOD
S:L = 1:10, pH 12, P_{CO2} = 2.07, DF = 2	0.04392	<LOD	<LOD	0.00066	<LOD	<LOD	0.00104	0.00294	<LOD
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 2	0.02904	<LOD	<LOD	0.00209	<LOD	<LOD	0.00060	0.00199	<LOD
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 2	0.04167	<LOD	<LOD	0.00158	<LOD	<LOD	0.00124	0.00255	<LOD
S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 2	0.05308	<LOD	<LOD	0.00424	<LOD	<LOD	0.00131	0.00433	0.00022
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 2	0.07660	<LOD	<LOD	0.00068	0.00027	<LOD	0.34380	0.00285	0.00253

	Mo 202.031	Ni 231.604	Pb 220.353	Se 196.026	Sb 206.836	Ag 328.068	Sn 189.927	Sr 407.771	Tl 190.801
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 2	<LOD	0.00055	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 2	<LOD	0.00046	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, pH 12, P_{CO2} = 0.69, DF = 2	<LOD	0.00047	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, pH 12, P_{CO2} = 0.69, DF = 2	<LOD	0.00181	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:10, pH 12, P_{CO2} = 2.07, DF = 2	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:10, pH 12, P_{CO2} = 2.07, DF = 2	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 2	<LOD	0.00058	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 2	<LOD	0.00058	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 2	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00024	<LOD
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 2	<LOD	0.00102	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD

	Ti 334.940	V 290.880	Zn 206.200	Si 251.611	Si	K 766.490	K	Na 589.592	Na
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 2	<LOD	<LOD	0.00969	<LOD	<LOD	<LOD	0.02196	0.03555	0.02471
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 2	<LOD	<LOD	0.00887	0.00263	0.00097	<LOD	0.00257	0.01486	0.00971
S:L = 1:100, pH 12, P_{CO2} = 0.69, DF = 2	<LOD	<LOD	0.00714	0.00878	0.00608	<LOD	0.01528	0.01693	0.01256
S:L = 1:100, pH 12, P_{CO2} = 0.69, DF = 2	<LOD	<LOD	0.02049	0.00834	0.00295	<LOD	0.01555	0.05630	0.03628
S:L = 1:10, pH 12, P_{CO2} = 2.07, DF = 2	0.00015	<LOD	0.00258	0.00297	<LOD	<LOD	0.00158	0.01731	0.01030
S:L = 1:10, pH 12, P_{CO2} = 2.07, DF = 2	<LOD	<LOD	0.00330	0.00383	-0.00003	<LOD	0.00269	0.01075	0.00723
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 2	<LOD	<LOD	0.01316	0.00877	0.00470	<LOD	0.00337	0.00310	0.00189

S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 2	<LOD	0.00313	0.00780	0.00585	0.00363	<LOD	0.00170	<LOD	0.00172
S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 2	<LOD	<LOD	0.00949	0.00414	0.00157	<LOD	0.02602	0.01666	0.01520
S:L = 1:10, pH 12, P_{CO2} = 0.69, DF = 2	<LOD	<LOD	0.00675	0.00759	0.00386	<LOD	0.01212	0.01495	0.01330

X.II Element LOD and LOQ Values for ICP-OES Analyses (Runs 22 – 41)

Blank LOD and LOQ calculation

	Sc 361.383	**Sc**	**Al 396.153**	**As 188.979**	**As 197.197**	**B 249.772**	**B 208.889**	**Ba 233.527**	**Be 313.107**
BLANK	0.96902	0.99681	0.00034	0.00010	-0.00997	-0.00237	-0.00148	-0.00003	0.00007
BLANK	0.98848	1.00071	0.00080	-0.00277	-0.00331	0.00634	0.00709	0.00002	0.00001
BLANK	0.96255	0.98665	0.00051	-0.00253	-0.00383	0.00219	0.00367	0.00020	-0.00007
BLANK	0.95351	0.97935	0.00047	-0.00311	-0.00681	-0.01166	-0.01039	-0.00003	-0.00006
BLANK	0.97328	0.99361	0.00118	-0.00335	-0.00371	0.01457	0.01560	0.00004	-0.00005
BLANK	0.97001	0.98574	0.00116	-0.00192	-0.00552	-0.00080	0.00062	0.00002	0.00002
BLANK	0.95655	0.98504	0.00100	-0.00439	-0.00598	-0.01155	-0.00991	0.00006	-0.00001
Avg	0.96763	0.98970	0.00078	-0.00257	-0.00559	-0.00047	0.00074	0.00004	-0.00001
Standard Deviation	0.01171	0.00754	0.00035	0.00140	0.00233	0.00941	0.00924	0.00008	0.00005
LOD	1.00274	1.01231	0.00181	0.00164	0.00141	0.02777	0.02846	0.00027	0.00014
LOQ	1.08468	1.06507	0.00423	0.01145	0.01776	0.09365	0.09312	0.00081	0.00050

	Ca 317.933	**Cd 228.802**	**Cd 214.440**	**Co 228.616**	**Cr 267.716**	**Cu 327.393**	**Fe 238.204**	**Mg 285.213**	**Mn 257.610**
BLANK	0.00040	-0.00007	-0.00005	-0.00029	-0.00014	-0.00024	0.00006	0.00006	-0.00005
BLANK	-0.00107	0.00003	0.00005	0.00005	-0.00002	-0.00005	0.00182	-0.00002	-0.00001
BLANK	0.00023	0.00035	0.00022	0.00030	0.00016	-0.00031	0.00115	-0.00008	-0.00002
BLANK	0.00048	-0.00020	-0.00022	-0.00015	-0.00027	-0.00042	-0.00004	0.00008	-0.00004
BLANK	-0.00124	0.00001	0.00001	0.00003	-0.00015	0.00040	0.00025	0.00010	-0.00003
BLANK	-0.00097	0.00002	-0.00006	-0.00002	-0.00019	-0.00037	0.00002	0.00010	-0.00004
BLANK	-0.00087	-0.00007	-0.00028	-0.00019	-0.00047	-0.00125	0.00057	0.00014	-0.00004
Avg	-0.00043	0.00001	-0.00005	-0.00004	-0.00015	-0.00032	0.00055	0.00006	-0.00003
Standard Deviation	0.00076	0.00017	0.00017	0.00019	0.00020	0.00050	0.00070	0.00008	0.00001
LOD	0.00185	0.00052	0.00046	0.00054	0.00044	0.00117	0.00265	0.00029	0.00001
LOQ	0.00719	0.00172	0.00164	0.00190	0.00181	0.00465	0.00756	0.00084	0.00010

	Mo 202.031	Ni 231.604	Pb 220.353	Se 196.026	Sb 206.836	Ag 328.068	Sn 189.927	Sr 407.771	Tl 190.801
BLANK	-0.00004	-0.00016	-0.00114	-0.00173	-0.00011	0.00001	-0.00178	-0.00002	-0.00037
BLANK	0.00074	0.00002	0.00044	-0.00256	0.00023	0.00013	-0.00088	-0.00001	0.00140
BLANK	0.00040	0.00045	0.00115	-0.00339	-0.00056	-0.00014	-0.00164	-0.00001	0.00029
BLANK	-0.00052	-0.00016	-0.00312	0.00155	-0.00053	-0.00011	-0.00143	-0.00004	0.00035
BLANK	0.00195	0.00010	0.00238	-0.00062	-0.00035	-0.00022	-0.00136	-0.00003	0.00068
BLANK	-0.00028	-0.00034	-0.00102	-0.00266	-0.00049	0.00028	-0.00267	0.00006	-0.00025
BLANK	-0.00052	-0.00023	-0.00393	-0.00414	-0.00256	-0.00014	-0.00248	-0.00005	-0.00141
Avg	0.00025	-0.00005	-0.00075	-0.00194	-0.00062	-0.00003	-0.00175	-0.00001	0.00010
Standard Deviation	0.00089	0.00026	0.00227	0.00191	0.00090	0.00018	0.00063	0.00004	0.00089
LOD	0.00290	0.00075	0.00605	0.00378	0.00207	0.00050	0.00016	0.00010	0.00277
LOQ	0.00910	0.00259	0.02192	0.01712	0.00837	0.00175	0.00460	0.00035	0.00899

	Ti 334.940	V 290.880	Zn 206.200	Si 251.611	Si	K 766.490	K	Na 589.592	Na
BLANK	0.00002	-0.00044	-0.00006	-0.00048	-0.00413	0.00758	0.00035	-0.00008	0.00036
BLANK	0.00006	0.00029	0.00061	-0.00073	-0.00149	0.00375	-0.00056	-0.00319	-0.00031
BLANK	0.00010	0.00007	0.00157	0.00010	-0.00084	0.01787	0.00046	-0.00368	0.00006
BLANK	0.00000	-0.00022	-0.00037	-0.00042	-0.00237	0.00478	0.00059	0.00192	0.00085
BLANK	0.00008	0.00039	0.00110	0.00026	-0.00329	-0.00629	-0.00007	-0.00332	0.00014
BLANK	0.00001	-0.00010	0.00049	-0.00117	-0.00141	0.00668	0.00029	0.00052	-0.00020
BLANK	0.00005	-0.00115	-0.00037	-0.00105	-0.00280	0.01182	0.00057	-0.00002	0.00123
Avg	0.00005	-0.00017	0.00042	-0.00050	-0.00233	0.00660	0.00024	-0.00112	0.00030
Standard Deviation	0.00004	0.00052	0.00074	0.00054	0.00117	0.00745	0.00041	0.00223	0.00056
LOD	0.00015	0.00140	0.00265	0.00112	0.00117	0.02893	0.00148	0.00557	0.00198
LOQ	0.00041	0.00504	0.00786	0.00491	0.00933	0.08105	0.00438	0.02119	0.00588

LOD and LOQ check for DF 100

	Sc 361.383	Sc	Al 396.153	As 188.979	As 197.197	B 249.772	B 208.889	Ba 233.527	Be 313.107
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	0.00486	<LOD	<LOD	<LOD	<LOD	0.00033	<LOD
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	0.00300	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	0.01600	<LOD	<LOD	<LOD	<LOD	0.00052	<LOD
S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	0.01556	<LOD	<LOD	<LOD	<LOD	0.00045	<LOD
S:L = 1:100, pH 12, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	0.00471	<LOD	<LOD	<LOD	<LOD	0.00030	<LOD
S:L = 1:100, pH 12, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	0.00475	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:10, pH 12, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	0.02282	<LOD	<LOD	<LOD	<LOD	0.00052	<LOD
S:L = 1:10, pH 12, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	0.02206	<LOD	<LOD	<LOD	<LOD	0.00047	<LOD
S:L = 1:100, pH 12, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	0.00813	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, pH 12, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	0.00888	<LOD	<LOD	<LOD	<LOD	0.00031	<LOD
S:L = 1:10, pH 12, P_{CO2} = 0, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00037	<LOD
S:L = 1:10, pH 12, P_{CO2} = 0, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00039	<LOD
S:L = 1:100, pH 12, P_{CO2} = 0, DF = 100	<LOD	<LOD	0.00182	<LOD	<LOD	<LOD	<LOD	0.00034	<LOD
S:L = 1:100, pH 12, P_{CO2} = 0, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00042	<LOD

	Ca 317.933	Cd 228.802	Cd 214.440	Co 228.616	Cr 267.716	Cu 327.393	Fe 238.204	Mg 285.213	Mn 257.610
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 100	5.97632	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01997	0.00038
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 100	5.56661	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01703	0.00035

S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 100	7.78865	<LOD	<LOD	0.00073	<LOD	<LOD	<LOD	0.15118	0.00290
S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 100	7.15431	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.14539	0.00217
S:L = 1:100, pH 12, P_{CO2} = 4.14, DF = 100	5.89618	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.02030	0.00039
S:L = 1:100, pH 12, P_{CO2} = 4.14, DF = 100	5.61827	<LOD	<LOD	0.00075	<LOD	<LOD	<LOD	0.01974	0.00064
S:L = 1:10, pH 12, P_{CO2} = 17.24, DF = 100	8.83664	<LOD	<LOD	0.00181	<LOD	<LOD	<LOD	0.16973	0.00435
S:L = 1:10, pH 12, P_{CO2} = 17.24, DF = 100	8.78102	<LOD	<LOD	0.00254	<LOD	<LOD	<LOD	0.16235	0.00532
S:L = 1:100, pH 12, P_{CO2} = 17.24, DF = 100	5.65570	<LOD	<LOD	0.00162	0.00119	<LOD	0.00405	0.02235	0.00114
S:L = 1:100, pH 12, P_{CO2} = 17.24, DF = 100	5.89282	<LOD	<LOD	0.00165	<LOD	<LOD	<LOD	0.02311	0.00134
S:L = 1:10, pH 12, P_{CO2} = 0, DF = 100	5.66400	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00045	0.00001
S:L = 1:10, pH 12, P_{CO2} = 0, DF = 100	5.60679	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00044	<LOD
S:L = 1:100, pH 12, P_{CO2} = 0, DF = 100	5.15344	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00051	<LOD
S:L = 1:100, pH 12, P_{CO2} = 0, DF = 100	5.51562	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00048	<LOD

	Mo 202.031	**Ni 231.604**	**Pb 220.353**	**Se 196.026**	**Sb 206.836**	**Ag 328.068**	**Sn 189.927**	**Sr 407.771**	**Tl 190.801**
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	<LOD	<LOD	0.00314	<LOD	<LOD	0.00891	<LOD
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 100	<LOD	0.00117	<LOD	<LOD	<LOD	<LOD	<LOD	0.00818	<LOD
S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 100	<LOD	0.01233	<LOD	<LOD	<LOD	<LOD	<LOD	0.02579	<LOD

S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01991	<LOD
S:L = 1:100, pH 12, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00876	<LOD
S:L = 1:100, pH 12, P_{CO2} = 4.14, DF = 100	<LOD	0.02641	<LOD	<LOD	<LOD	<LOD	<LOD	0.00827	<LOD
S:L = 1:10, pH 12, P_{CO2} = 17.24, DF = 100	0.00814	0.07288	<LOD	<LOD	<LOD	<LOD	<LOD	0.02177	<LOD
S:L = 1:10, pH 12, P_{CO2} = 17.24, DF = 100	0.00862	0.08968	<LOD	<LOD	<LOD	<LOD	<LOD	0.02188	<LOD
S:L = 1:100, pH 12, P_{CO2} = 17.24, DF = 100	0.00543	0.06489	<LOD	<LOD	<LOD	<LOD	<LOD	0.00840	<LOD
S:L = 1:100, pH 12, P_{CO2} = 17.24, DF = 100	<LOD	0.06777	<LOD	<LOD	<LOD	<LOD	<LOD	0.00843	0.00358
S:L = 1:10, pH 12, P_{CO2} = 0, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01529	<LOD
S:L = 1:10, pH 12, P_{CO2} = 0, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01498	<LOD
S:L = 1:100, pH 12, P_{CO2} = 0, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01337	<LOD
S:L = 1:100, pH 12, P_{CO2} = 0, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01652	<LOD

	Ti 334.940	**V 290.880**	**Zn 206.200**	**Si 251.611**	**Si**	**K 766.490**	**K**	**Na 589.592**	**Na**
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	<LOD	0.00234	0.00461	<LOD	0.00180	2.23945	1.72194
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 100	<LOD	0.00194	<LOD	0.00159	0.00255	<LOD	<LOD	2.07078	1.52327
S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 100	<LOD	0.00287	0.00384	0.02214	0.01746	<LOD	0.01031	2.19102	1.64049
S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 100	<LOD	0.00157	<LOD	0.01490	0.01020	<LOD	0.00956	2.06632	1.64649
S:L = 1:100, pH 12, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	0.00257	0.00232	<LOD	0.00190	2.20682	1.70080
S:L = 1:100, pH 12, P_{CO2} = 4.14, DF = 100	<LOD	0.00140	0.00286	0.00234	<LOD	<LOD	<LOD	2.06672	1.58820
S:L = 1:10, pH 12, P_{CO2} = 17.24, DF = 100	<LOD	0.00160	0.02644	0.02464	0.02203	<LOD	0.01035	2.11111	1.64496

S:L = 1:10, pH 12, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	0.02166	0.02540	0.02171	<LOD	0.01067	2.08185	1.68699
S:L = 1:100, pH 12, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	0.02286	0.00627	<LOD	<LOD	0.00211	2.17846	1.70988
S:L = 1:100, pH 12, P_{CO2} = 17.24, DF = 100	<LOD	0.00181	0.01462	0.00731	0.00293	<LOD	0.00180	2.20928	1.70011
S:L = 1:10, pH 12, P_{CO2} = 0, DF = 100	<LOD	<LOD	<LOD	0.00807	0.00405	<LOD	0.00952	2.31118	1.85000
S:L = 1:10, pH 12, P_{CO2} = 0, DF = 100	<LOD	0.00221	<LOD	0.00697	0.00262	<LOD	0.00826	2.24496	1.69127
S:L = 1:100, pH 12, P_{CO2} = 0, DF = 100	<LOD	<LOD	<LOD	0.00853	0.00835	<LOD	0.00877	2.16722	1.70186
S:L = 1:100, pH 12, P_{CO2} = 0, DF = 100	<LOD	0.00152	<LOD	0.00999	0.00617	<LOD	0.00956	2.24963	1.78508

LOD and LOQ check for DF 2

	Sc 361.383	**Sc**	**Al 396.153**	**As 188.979**	**As 197.197**	**B 249.772**	**B 208.889**	**Ba 233.527**	**Be 313.107**
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 2	<LOD	<LOD	0.32109	<LOD	<LOD	0.05735	0.05259	0.01448	<LOD
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 2	<LOD	<LOD	0.24887	<LOD	<LOD	0.05365	0.04685	0.01407	<LOD
S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 2	<LOD	<LOD	1.01672	<LOD	<LOD	0.54373	0.55063	0.02619	<LOD
S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 2	<LOD	<LOD	1.02650	<LOD	<LOD	0.56328	0.57267	0.02556	<LOD
S:L = 1:100, pH 12, P_{CO2} = 4.14, DF = 2	<LOD	<LOD	0.32829	<LOD	<LOD	0.06164	0.05530	0.01403	<LOD
S:L = 1:100, pH 12, P_{CO2} = 4.14, DF = 2	<LOD	<LOD	0.32539	<LOD	<LOD	0.06619	0.05810	0.01408	<LOD
S:L = 1:10, pH 12, P_{CO2} = 17.24, DF = 2	<LOD	<LOD	1.42474	<LOD	<LOD	0.62735	0.61462	0.02510	<LOD
S:L = 1:10, pH 12, P_{CO2} = 17.24, DF = 2	<LOD	<LOD	1.40666	<LOD	<LOD	0.59555	0.58979	0.02583	<LOD
S:L = 1:100, pH 12, P_{CO2} = 17.24, DF = 2	<LOD	<LOD	0.51481	<LOD	<LOD	0.07457	0.06331	0.01197	<LOD
S:L = 1:100, pH 12, P_{CO2} = 17.24, DF = 2	<LOD	<LOD	0.56326	<LOD	<LOD	0.07453	0.06249	0.01334	<LOD
S:L = 1:10, pH 12, P_{CO2} = 0, DF = 2	<LOD	<LOD	<LOD	<LOD	0.00730	0.46394	0.47194	0.01980	<LOD

S:L = 1:10, pH 12, P_{CO2} = 0, DF = 2	<LOD	<LOD	<LOD	<LOD	0.00848	0.46145	0.47872	0.02001	<LOD
S:L = 1:100, pH 12, P_{CO2} = 0, DF = 2	<LOD	<LOD	0.17970	<LOD	<LOD	0.48658	0.50257	0.01671	<LOD
S:L = 1:100, pH 12, P_{CO2} = 0, DF = 2	<LOD	<LOD	0.15469	<LOD	0.00290	0.49012	0.50834	0.02053	<LOD

	Ca 317.933	**Cd 228.802**	**Cd 214.440**	**Co 228.616**	**Cr 267.716**	**Cu 327.393**	**Fe 238.204**	**Mg 285.213**	**Mn 257.610**
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 2	251.38308	<LOD	<LOD	0.00483	0.00197	<LOD	0.01199	1.02291	0.01878
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 2	246.83560	<LOD	<LOD	0.00568	0.00703	<LOD	0.03065	0.95235	0.01812
S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 2	317.96163	0.00235	0.00305	0.01827	0.00439	<LOD	0.00802	8.36754	0.13488
S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 2	302.76747	0.00253	0.00219	0.00562	0.00303	<LOD	0.00389	8.37299	0.10704
S:L = 1:100, pH 12, P_{CO2} = 4.14, DF = 2	255.34595	<LOD	<LOD	0.00440	0.00558	<LOD	0.01587	1.06187	0.01963
S:L = 1:100, pH 12, P_{CO2} = 4.14, DF = 2	251.17133	<LOD	0.00166	0.03145	0.01347	<LOD	0.03830	1.06420	0.03155
S:L = 1:10, pH 12, P_{CO2} = 17.24, DF = 2	359.81758	0.00405	0.00868	0.07735	0.02445	<LOD	0.02510	9.28043	0.21261
S:L = 1:10, pH 12, P_{CO2} = 17.24, DF = 2	360.92240	0.00285	0.00877	0.10880	0.00905	<LOD	0.00737	9.06255	0.25828
S:L = 1:100, pH 12, P_{CO2} = 17.24, DF = 2	243.96604	0.00170	0.00618	0.06911	0.07351	<LOD	0.18003	1.18190	0.05412
S:L = 1:100, pH 12, P_{CO2} = 17.24, DF = 2	250.08528	0.00237	0.00699	0.06835	0.03337	0.01521	0.06989	1.20489	0.06205
S:L = 1:10, pH 12, P_{CO2} = 0, DF = 2	250.14462	<LOD	<LOD	0.00371	0.00110	<LOD	0.64560	0.01730	0.00480
S:L = 1:10, pH 12, P_{CO2} = 0, DF = 2	254.10999	<LOD	<LOD	0.00409	0.00087	<LOD	0.00316	0.01736	0.00015
S:L = 1:100, pH 12, P_{CO2} = 0, DF = 2	248.76071	<LOD	<LOD	0.00347	<LOD	<LOD	<LOD	0.02631	0.00014
S:L = 1:100, pH 12, P_{CO2} = 0, DF = 2	257.15886	<LOD	<LOD	0.00376	0.00048	<LOD	<LOD	0.02394	0.00011

	Mo 202.031	Ni 231.604	Pb 220.353	Se 196.026	Sb 206.836	Ag 328.068	Sn 189.927	Sr 407.771	Tl 190.801
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 2	<LOD	0.00517	<LOD	0.04313	0.02205	<LOD	<LOD	0.45511	0.03717
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 2	0.04483	0.08377	<LOD	0.03611	0.02952	<LOD	<LOD	0.45071	0.03509
S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 2	0.09781	0.62764	<LOD	0.07445	0.02434	<LOD	<LOD	1.38273	0.04310
S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 2	0.01804	0.01034	<LOD	0.08101	0.02666	<LOD	<LOD	1.10149	0.04572
S:L = 1:100, pH 12, P_{CO2} = 4.14, DF = 2	0.03351	0.01339	<LOD	0.03718	0.02242	<LOD	<LOD	0.44482	0.03356
S:L = 1:100, pH 12, P_{CO2} = 4.14, DF = 2	0.08592	1.31984	<LOD	0.03497	0.02098	<LOD	<LOD	0.44956	0.03655
S:L = 1:10, pH 12, P_{CO2} = 17.24, DF = 2	0.46927	3.52978	<LOD	0.08139	0.02059	<LOD	<LOD	1.20365	0.04849
S:L = 1:10, pH 12, P_{CO2} = 17.24, DF = 2	0.50408	4.35340	<LOD	0.09223	0.02001	<LOD	<LOD	1.20765	0.06216
S:L = 1:100, pH 12, P_{CO2} = 17.24, DF = 2	0.30634	3.11435	<LOD	0.03806	0.01275	<LOD	<LOD	0.44643	0.03440
S:L = 1:100, pH 12, P_{CO2} = 17.24, DF = 2	0.15508	3.18399	<LOD	0.02742	0.01625	<LOD	<LOD	0.44798	0.03351
S:L = 1:10, pH 12, P_{CO2} = 0, DF = 2	0.04027	<LOD	<LOD	0.02677	0.01590	<LOD	<LOD	0.80235	0.02581
S:L = 1:10, pH 12, P_{CO2} = 0, DF = 2	0.02491	<LOD	<LOD	0.03560	0.01729	<LOD	<LOD	0.80679	0.02709
S:L = 1:100, pH 12, P_{CO2} = 0, DF = 2	0.01597	<LOD	<LOD	0.03140	0.01841	<LOD	<LOD	0.75480	0.02889
S:L = 1:100, pH 12, P_{CO2} = 0, DF = 2	0.01766	<LOD	<LOD	0.03596	0.01972	<LOD	<LOD	0.89053	0.02983

	Ti 334.940	V 290.880	Zn 206.200	Si 251.611	Si	K 766.490	K	Na 589.592	Na
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 2	<LOD	0.00644	0.03477	0.17982	0.18082	0.09967	0.17233	85.13785	
S:L = 1:100, pH 12, P_{CO2} = 2.07, DF = 2	<LOD	0.00309	0.07065	0.16390	0.16209	0.09723	0.17025	85.08914	
S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 2	<LOD	0.01133	0.17435	1.18864	1.25656	0.84638	1.13887	88.28716	

S:L = 1:10, pH 12, P_{CO2} = 4.14, DF = 2	<LOD	0.01535	0.11308	0.86939	0.88685	0.76235	1.09156	86.18186	
S:L = 1:100, pH 12, P_{CO2} = 4.14, DF = 2	<LOD	0.00214	0.02975	0.20422	0.19841	0.10344	0.17005	83.76604	
S:L = 1:100, pH 12, P_{CO2} = 4.14, DF = 2	<LOD	<LOD	0.15350	0.20577	0.20925	0.10103	0.17002	84.06385	
S:L = 1:10, pH 12, P_{CO2} = 17.24, DF = 2	<LOD	<LOD	1.32338	1.36143	1.42221	0.85631	1.16755	87.78018	
S:L = 1:10, pH 12, P_{CO2} = 17.24, DF = 2	<LOD	<LOD	1.10313	1.39881	1.47266	0.82405	1.13577	86.84872	
S:L = 1:100, pH 12, P_{CO2} = 17.24, DF = 2	<LOD	<LOD	1.12189	0.41786	0.41184	0.16837	0.21468	87.14346	
S:L = 1:100, pH 12, P_{CO2} = 17.24, DF = 2	<LOD	<LOD	0.71360	0.45176	0.45059	0.16039	0.19132	87.78851	
S:L = 1:10, pH 12, P_{CO2} = 0, DF = 2	<LOD	0.00479	0.00775	0.47105	0.46033	0.74546	0.98955	90.94015	
S:L = 1:10, pH 12, P_{CO2} = 0, DF = 2	<LOD	0.00450	0.00895	0.48024	0.45862	0.77219	0.99709	90.66853	
S:L = 1:100, pH 12, P_{CO2} = 0, DF = 2	<LOD	0.00546	0.00710	0.58248	0.55013	0.79373	1.03836	91.28842	
S:L = 1:100, pH 12, P_{CO2} = 0, DF = 2	<LOD	0.00677	0.00795	0.61423	0.59386	0.84927	1.01990	91.61200	

X.III Element LOD and LOQ for ICP-OES Analyses (Runs 43 – 58)

Blank LOD and LOQ calculation

	Sc 361.383	**Sc**	**Al 396.153**	**As 188.979**	**As 197.197**	**B 249.772**	**B 208.889**	**Ba 233.527**	**Be 313.107**
BLANK	0.96505	0.98541	0.00018	0.00097	0.00093	-0.00479	-0.00497	-0.00003	0.00004
BLANK	0.97959	0.98775	0.00040	0.00254	0.00038	0.01347	0.01455	0.00003	0.00002
BLANK	0.99294	1.00677	0.00046	0.00134	-0.00097	0.00350	0.00320	-0.00002	0.00003
BLANK	1.01109	0.99893	0.00041	-0.00156	-0.00291	-0.01765	-0.02205	-0.00007	-0.00002
BLANK	0.98694	1.01402	0.00046	0.00092	-0.00177	-0.01786	-0.02053	-0.00003	-0.00005
BLANK	0.95258	0.96037	-0.00012	-0.00115	-0.00293	-0.01757	-0.01956	-0.00004	-0.00006
BLANK	0.99541	0.99568	0.00004	0.00270	-0.00032	0.03069	0.02859	-0.00004	-0.00005
BLANK	0.93508	0.94113	-0.00055	0.00282	0.00211	0.03732	0.04171	-0.00009	0.00001
Avg	0.97734	0.98626	0.00016	0.00107	-0.00069	0.00339	0.00262	-0.00004	-0.00001
Standard Deviation	0.02495	0.02435	0.00036	0.00168	0.00181	0.02203	0.02402	0.00003	0.00004
LOD	1.05218	1.05931	0.00124	0.00612	0.00474	0.06949	0.07468	0.00007	0.00011
LOQ	1.22681	1.22976	0.00376	0.01791	0.01741	0.22372	0.24284	0.00031	0.00037

	Ca 317.933	**Cd 228.802**	**Cd 214.440**	**Co 228.616**	**Cr 267.716**	**Cu 327.393**	**Fe 238.204**	**Mg 285.213**	**Mn 257.610**
BLANK	-0.00024	-0.00011	0.00003	0.00016	-0.00004	0.00001	-0.00009	-0.00005	-0.00001
BLANK	-0.00055	-0.00012	0.00003	0.00004	0.00006	0.00034	-0.00004	-0.00005	0.00004
BLANK	-0.00053	-0.00005	0.00017	0.00018	-0.00032	-0.00142	0.00020	0.00005	0.00000
BLANK	-0.00155	-0.00017	0.00006	-0.00002	-0.00014	-0.00086	0.00049	0.00001	0.00005
BLANK	-0.00137	-0.00024	0.00002	0.00012	-0.00001	-0.00081	0.00039	-0.00009	0.00004
BLANK	-0.00081	-0.00001	-0.00011	-0.00021	0.00000	-0.00096	-0.00005	-0.00007	0.00003
BLANK	-0.00133	0.00001	0.00014	0.00010	0.00010	-0.00030	0.00024	-0.00002	0.00003
BLANK	-0.00126	0.00010	-0.00001	-0.00004	-0.00021	0.00077	-0.00077	0.00015	-0.00002
Avg	-0.00095	-0.00007	0.00004	0.00004	-0.00007	-0.00040	0.00005	-0.00001	0.00002
Standard Deviation	0.00048	0.00011	0.00009	0.00013	0.00014	0.00074	0.00039	0.00008	0.00003
LOD	0.00050	0.00025	0.00030	0.00043	0.00036	0.00181	0.00122	0.00023	0.00010
LOQ	0.00389	0.00100	0.00091	0.00133	0.00137	0.00698	0.00396	0.00077	0.00028

	Mo 202.031	Ni 231.604	Pb 220.353	Se 196.026	Sb 206.836	Ag 328.068	Sn 189.927	Sr 407.771	Tl 190.801
BLANK	0.00019	0.00038	0.00037	-0.00017	-0.00110	-0.00029	-0.00154	-0.00001	-0.00063
BLANK	0.00047	-0.00027	0.00059	0.00266	-0.00194	0.00027	-0.00075	0.00001	-0.00073
BLANK	0.00045	0.00044	0.00075	0.00199	-0.00112	-0.00038	-0.00113	-0.00003	-0.00152
BLANK	0.00011	0.00071	0.00106	0.00187	-0.00223	0.00032	-0.00175	0.00001	-0.00158
BLANK	-0.00015	0.00009	-0.00018	-0.00305	-0.00179	0.00035	-0.00250	-0.00004	-0.00373
BLANK	-0.00016	-0.00014	-0.00026	0.00180	0.00029	0.00029	-0.00194	-0.00003	0.00046
BLANK	0.00077	0.00039	0.00277	0.00380	-0.00046	0.00038	-0.00041	0.00001	-0.00158
BLANK	0.00068	0.00030	0.00176	0.00091	-0.00067	0.00040	-0.00049	0.00005	-0.00031
Avg	0.00029	0.00024	0.00086	0.00122	-0.00113	0.00017	-0.00131	0.00000	-0.00120
Standard Deviation	0.00035	0.00032	0.00101	0.00208	0.00084	0.00031	0.00074	0.00003	0.00125
LOD	0.00136	0.00120	0.00390	0.00747	0.00140	0.00111	0.00092	0.00009	0.00254
LOQ	0.00384	0.00345	0.01099	0.02204	0.00731	0.00330	0.00613	0.00029	0.01126

	Ti 334.940	V 290.880	Zn 206.200	Si 251.611	Si	K 766.490	K	Na 589.592	Na
BLANK	0.00003	-0.00076	-0.00032	0.00023	-0.00028	-0.00515	0.00023	0.00837	0.00160
BLANK	0.00015	-0.00051	0.00019	-0.00037	0.00005	-0.02695	-0.00043	-0.00289	-0.00236
BLANK	0.00010	0.00127	0.00001	-0.00174	-0.00266	-0.03796	-0.00114	-0.00324	-0.00305
BLANK	0.00013	-0.00020	-0.00053	-0.00321	-0.00520	-0.02984	0.00232	0.22906	0.10472
BLANK	0.00002	-0.00142	-0.00046	-0.00197	-0.00617	-0.03337	0.00205	0.15460	0.08256
BLANK	-0.00001	-0.00030	-0.00067	-0.00171	-0.00266	0.00798	0.00262	0.14694	0.07195
BLANK	0.00016	-0.00094	0.00033	-0.00017	-0.00284	-0.03059	-0.00060	0.03385	0.01279
BLANK	0.00016	-0.00109	0.00049	0.00008	-0.00001	0.04225	0.00187	0.13769	0.06277
Avg	0.00009	-0.00049	-0.00012	-0.00111	-0.00247	-0.01420	0.00087	0.08805	0.04137
Standard Deviation	0.00007	0.00082	0.00043	0.00122	0.00235	0.02769	0.00150	0.08955	0.04373
LOD	0.00030	0.00197	0.00118	0.00257	0.00457	0.06888	0.00538	0.35670	0.17256
LOQ	0.00079	0.00773	0.00422	0.01114	0.02098	0.26274	0.01591	0.98356	0.47867

LOD and LOQ check for DF = 100

	Sc 361.383	Sc	Al 396.153	As 188.979	As 197.197	B 249.772	B 208.889	Ba 233.527	Be 313.107
S:L = 1:10, pH 14, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00008	<LOD
S:L = 1:10, pH 14, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00011	<LOD
S:L = 1:100, pH 14, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, pH 14, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:10, pH 14, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	<LOD	<LOD	0.00789	<LOD	<LOD	0.00011	<LOD
S:L = 1:10, pH 14, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00007	<LOD
S:L = 1:100, pH 14, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, pH 14, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:10, pH 14, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:10, pH 14, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	<LOD	0.00749	<LOD	<LOD	0.00009	<LOD
S:L = 1:100, pH 14, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, pH 14, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00011	<LOD
S:L = 1:10, pH 14, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:10, pH 14, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, pH 14, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	0.01660	<LOD	<LOD	<LOD	<LOD	0.00018	<LOD
S:L = 1:100, pH 14, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00022	<LOD

	Ca 317.933	Cd 228.802	Cd 214.440	Co 228.616	Cr 267.716	Cu 327.393	Fe 238.204	Mg 285.213	Mn 257.610

S:L = 1:10, pH 14, P_{CO2} = 0.69, DF = 100	4.57228	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.09310	<LOD
S:L = 1:10, pH 14, P_{CO2} = 0.69, DF = 100	4.62062	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.08900	<LOD
S:L = 1:100, pH 14, P_{CO2} = 0.69, DF = 100	0.02066	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00072	<LOD
S:L = 1:100, pH 14, P_{CO2} = 0.69, DF = 100	0.02122	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00200	<LOD
S:L = 1:10, pH 14, P_{CO2} = 2.07, DF = 100	4.93456	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.10617	<LOD
S:L = 1:10, pH 14, P_{CO2} = 2.07, DF = 100	3.37110	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.12001	<LOD
S:L = 1:100, pH 14, P_{CO2} = 2.07, DF = 100	0.18796	<LOD	<LOD	<LOD	0.00071	<LOD	0.00254	0.00371	<LOD
S:L = 1:100, pH 14, P_{CO2} = 2.07, DF = 100	0.11963	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00215	<LOD
S:L = 1:10, pH 14, P_{CO2} = 4.14, DF = 100	4.77720	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.09018	<LOD
S:L = 1:10, pH 14, P_{CO2} = 4.14, DF = 100	5.08497	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.10584	<LOD
S:L = 1:100, pH 14, P_{CO2} = 4.14, DF = 100	0.13345	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00311	<LOD
S:L = 1:100, pH 14, P_{CO2} = 4.14, DF = 100	0.07340	<LOD	<LOD	0.00043	<LOD	<LOD	<LOD	0.00160	<LOD
S:L = 1:10, pH 14, P_{CO2} = 17.24, DF = 100	2.24143	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.09689	<LOD
S:L = 1:10, pH 14, P_{CO2} = 17.24, DF = 100	5.12719	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.10773	<LOD
S:L = 1:100, pH 14, P_{CO2} = 17.24, DF = 100	0.12959	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00785	<LOD
S:L = 1:100, pH 14, P_{CO2} = 17.24, DF = 100	0.08583	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00446	<LOD

	Mo 202.031	Ni 231.604	Pb 220.353	Se 196.026	Sb 206.836	Ag 328.068	Sn 189.927	Sr 407.771	Tl 190.801
S:L = 1:10, pH 14, P_{CO2} = 0.69, DF = 100	0.00194	<LOD	<LOD	<LOD	0.00262	<LOD	<LOD	0.02206	<LOD
S:L = 1:10, pH 14, P_{CO2} = 0.69, DF = 100	0.00237	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01722	<LOD
S:L = 1:100, pH 14, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00134	0.00018	0.00551
S:L = 1:100, pH 14, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	0.01099	<LOD	<LOD	0.00130	0.00009	0.00598
S:L = 1:10, pH 14, P_{CO2} = 2.07, DF = 100	0.00318	0.00245	<LOD	<LOD	<LOD	<LOD	<LOD	0.02013	0.00361
S:L = 1:10, pH 14, P_{CO2} = 2.07, DF = 100	0.00165	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01689	0.00292
S:L = 1:100, pH 14, P_{CO2} = 2.07, DF = 100	<LOD	0.00220	<LOD	0.01112	<LOD	<LOD	0.00177	0.00133	0.00701
S:L = 1:100, pH 14, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00156	0.00151	0.00747
S:L = 1:10, pH 14, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01921	<LOD
S:L = 1:10, pH 14, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	0.00939	<LOD	<LOD	<LOD	0.02060	<LOD
S:L = 1:100, pH 14, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00210	0.00684
S:L = 1:100, pH 14, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	0.01188	0.00166	<LOD	0.00376	0.00209	0.01007
S:L = 1:10, pH 14, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	<LOD	0.01205	<LOD	<LOD	<LOD	0.01327	<LOD
S:L = 1:10, pH 14, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	<LOD	<LOD	0.00256	<LOD	<LOD	0.01290	<LOD
S:L = 1:100, pH 14, P_{CO2} = 17.24, DF = 100	<LOD	0.00187	<LOD	0.00825	<LOD	<LOD	0.00149	0.00379	0.00663
S:L = 1:100, pH 14, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00188	0.00433	0.00578

	Ti 334.940	V 290.880	Zn 206.200	Si 251.611	Si	K 766.490	K	Na 589.592	Na
S:L = 1:10, pH 14, P_{CO2} = 0.69, DF = 100	<LOD	0.00440	<LOD	0.05112	0.04536	<LOD	0.05582	131.99595	
S:L = 1:10, pH 14, P_{CO2} = 0.69, DF = 100	<LOD	0.00341	<LOD	0.02908	0.02495	<LOD	0.05069	127.13116	
S:L = 1:100, pH 14, P_{CO2} = 0.69, DF = 100	0.00059	<LOD	<LOD	0.00676	<LOD	<LOD	0.03825	129.24464	
S:L = 1:100, pH 14, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	0.01103	0.00906	<LOD	0.04440	133.63911	
S:L = 1:10, pH 14, P_{CO2} = 2.07, DF = 100	<LOD	0.00361	<LOD	0.03786	0.03370	<LOD	0.05981	129.65724	
S:L = 1:10, pH 14, P_{CO2} = 2.07, DF = 100	<LOD	0.00305	<LOD	0.03762	0.03617	<LOD	0.06598	132.83687	
S:L = 1:100, pH 14, P_{CO2} = 2.07, DF = 100	0.00049	0.00283	<LOD	0.00715	0.00668	<LOD	0.04768	134.01164	
S:L = 1:100, pH 14, P_{CO2} = 2.07, DF = 100	0.00038	0.00227	<LOD	0.00554	<LOD	<LOD	0.04887	128.80913	
S:L = 1:10, pH 14, P_{CO2} = 4.14, DF = 100	<LOD	0.00428	<LOD	0.03066	0.02768	<LOD	0.05989	124.27076	
S:L = 1:10, pH 14, P_{CO2} = 4.14, DF = 100	<LOD	0.00359	<LOD	0.03170	0.02717	<LOD	0.06589	133.48720	
S:L = 1:100, pH 14, P_{CO2} = 4.14, DF = 100	0.00031	0.00390	<LOD	0.00502	<LOD	<LOD	0.04551	130.79699	
S:L = 1:100, pH 14, P_{CO2} = 4.14, DF = 100	0.00050	0.00285	<LOD	0.00368	<LOD	<LOD	0.03896	127.96082	
S:L = 1:10, pH 14, P_{CO2} = 17.24, DF = 100	<LOD	0.00349	<LOD	0.02782	0.02453	<LOD	0.06408	123.24385	
S:L = 1:10, pH 14, P_{CO2} = 17.24, DF = 100	<LOD	0.00300	<LOD	0.03651	0.03147	<LOD	0.06604	134.20992	
S:L = 1:100, pH 14, P_{CO2} = 17.24, DF = 100	0.00069	0.00216	<LOD	0.00318	<LOD	<LOD	0.04593	131.11948	
S:L = 1:100, pH 14, P_{CO2} = 17.24, DF = 100	0.00037	<LOD	<LOD	0.00290	<LOD	<LOD	0.04575	129.31078	

LOD and LOQ check for DF 20

	Sc 361.383	**Sc**	**Al 396.153**	**As 188.979**	**As 197.197**	**B 249.772**	**B 208.889**	**Ba 233.527**	**Be 313.107**
S:L = 1:10, pH 14, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	0.01017	<LOD	<LOD	<LOD	0.00068	<LOD
S:L = 1:10, pH 14, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	0.00707	0.00751	<LOD	<LOD	0.00049	<LOD
S:L = 1:100, pH 14, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	0.00719	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, pH 14, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	0.00836	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:10, pH 14, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	<LOD	<LOD	0.00503	<LOD	<LOD	0.00056	<LOD
S:L = 1:10, pH 14, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	<LOD	0.00805	0.00705	0.07308	<LOD	0.00023	<LOD
S:L = 1:100, pH 14, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	0.00619	<LOD	<LOD	<LOD	<LOD	0.00037	<LOD
S:L = 1:100, pH 14, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	0.00390	<LOD	<LOD	<LOD	<LOD	0.00039	<LOD
S:L = 1:10, pH 14, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00064	<LOD
S:L = 1:10, pH 14, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	<LOD	0.00595	<LOD	<LOD	0.00069	<LOD
S:L = 1:100, pH 14, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	0.00260	<LOD	<LOD	<LOD	<LOD	0.00053	<LOD
S:L = 1:100, pH 14, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	0.00736	<LOD	<LOD	<LOD	<LOD	0.00048	<LOD
S:L = 1:10, pH 14, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	<LOD	0.00631	<LOD	<LOD	<LOD	0.00008	<LOD
S:L = 1:10, pH 14, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, pH 14, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	0.00453	<LOD	<LOD	<LOD	<LOD	0.00105	<LOD
S:L = 1:100, pH 14, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	0.00317	<LOD	<LOD	<LOD	<LOD	0.00115	<LOD

	Ca 317.933	Cd 228.802	Cd 214.440	Co 228.616	Cr 267.716	Cu 327.393	Fe 238.204	Mg 285.213	Mn 257.610
S:L = 1:10, pH 14, P_{CO2} = 0.69, DF = 100	21.74306	<LOD	<LOD	0.00083	0.00083	<LOD	0.00594	0.49145	0.00011
S:L = 1:10, pH 14, P_{CO2} = 0.69, DF = 100	23.10314	<LOD	<LOD	0.00075	0.00089	<LOD	<LOD	0.49138	0.00010
S:L = 1:100, pH 14, P_{CO2} = 0.69, DF = 100	0.10947	<LOD	<LOD	<LOD	0.00110	<LOD	0.00164	0.00395	<LOD
S:L = 1:100, pH 14, P_{CO2} = 0.69, DF = 100	0.10065	<LOD	<LOD	<LOD	0.00129	<LOD	0.00198	0.00930	<LOD
S:L = 1:10, pH 14, P_{CO2} = 2.07, DF = 100	24.07593	<LOD	<LOD	0.00100	0.00042	<LOD	<LOD	0.56878	0.00014
S:L = 1:10, pH 14, P_{CO2} = 2.07, DF = 100	15.65323	<LOD	<LOD	0.00050	0.00062	<LOD	<LOD	0.62649	<LOD
S:L = 1:100, pH 14, P_{CO2} = 2.07, DF = 100	0.86229	<LOD	<LOD	<LOD	0.00372	<LOD	0.01534	0.01808	0.00021
S:L = 1:100, pH 14, P_{CO2} = 2.07, DF = 100	0.60310	<LOD	<LOD	<LOD	0.00058	<LOD	<LOD	0.01158	<LOD
S:L = 1:10, pH 14, P_{CO2} = 4.14, DF = 100	25.20789	<LOD	<LOD	0.00083	0.00071	<LOD	0.00723	0.52662	0.00022
S:L = 1:10, pH 14, P_{CO2} = 4.14, DF = 100	24.17682	<LOD	<LOD	0.00068	0.00092	<LOD	0.00194	0.56550	0.00015
S:L = 1:100, pH 14, P_{CO2} = 4.14, DF = 100	0.66182	<LOD	<LOD	<LOD	0.00088	<LOD	<LOD	0.01555	<LOD
S:L = 1:100, pH 14, P_{CO2} = 4.14, DF = 100	0.36752	<LOD	<LOD	0.00226	0.00052	<LOD	<LOD	0.00747	<LOD
S:L = 1:10, pH 14, P_{CO2} = 17.24, DF = 100	12.03889	<LOD	<LOD	<LOD	0.00044	<LOD	<LOD	0.55115	<LOD
S:L = 1:10, pH 14, P_{CO2} = 17.24, DF = 100	24.56479	<LOD	<LOD	0.00093	0.00074	<LOD	<LOD	0.56216	<LOD
S:L = 1:100, pH 14, P_{CO2} = 17.24, DF = 100	0.63285	<LOD	<LOD	<LOD	0.00079	<LOD	<LOD	0.02319	<LOD
S:L = 1:100, pH 14, P_{CO2} = 17.24, DF = 100	0.43237	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.02141	<LOD

	Mo 202.031	**Ni 231.604**	**Pb 220.353**	**Se 196.026**	**Sb 206.836**	**Ag 328.068**	**Sn 189.927**	**Sr 407.771**	**Tl 190.801**
S:L = 1:10, pH 14, P_{CO2} = 0.69, DF = 100	0.00839	<LOD	<LOD	0.02891	0.00717	<LOD	<LOD	0.11108	0.00542
S:L = 1:10, pH 14, P_{CO2} = 0.69, DF = 100	0.01153	<LOD	<LOD	0.02806	0.00546	<LOD	<LOD	0.09017	0.00766
S:L = 1:100, pH 14, P_{CO2} = 0.69, DF = 100	0.00146	<LOD	<LOD	0.06054	0.00892	<LOD	0.02510	0.00118	0.04872
S:L = 1:100, pH 14, P_{CO2} = 0.69, DF = 100	<LOD	0.00144	<LOD	0.05298	0.00683	<LOD	0.02162	0.00029	0.04386
S:L = 1:10, pH 14, P_{CO2} = 2.07, DF = 100	0.01378	0.00875	<LOD	0.02682	0.00386	<LOD	<LOD	0.10189	0.00673
S:L = 1:10, pH 14, P_{CO2} = 2.07, DF = 100	0.00737	<LOD	<LOD	0.03461	0.00641	<LOD	<LOD	0.08262	0.00662
S:L = 1:100, pH 14, P_{CO2} = 2.07, DF = 100	0.00327	0.00908	<LOD	0.05390	0.00813	<LOD	0.02087	0.00647	0.03997
S:L = 1:100, pH 14, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	<LOD	0.05378	0.00628	<LOD	0.02010	0.00786	0.04575
S:L = 1:10, pH 14, P_{CO2} = 4.14, DF = 100	0.00714	<LOD	<LOD	0.02978	0.00599	<LOD	<LOD	0.10597	0.00648
S:L = 1:10, pH 14, P_{CO2} = 4.14, DF = 100	0.00652	0.00130	<LOD	0.02199	0.00624	<LOD	<LOD	0.10212	0.01050
S:L = 1:100, pH 14, P_{CO2} = 4.14, DF = 100	<LOD	0.00152	<LOD	0.03325	0.00358	<LOD	0.01355	0.01052	0.02956
S:L = 1:100, pH 14, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	0.09699	0.01272	<LOD	0.04055	0.01069	0.08091
S:L = 1:10, pH 14, P_{CO2} = 17.24, DF = 100	0.00498	<LOD	<LOD	0.02753	0.00482	<LOD	<LOD	0.07173	0.00648
S:L = 1:10, pH 14, P_{CO2} = 17.24, DF = 100	0.00468	<LOD	<LOD	0.03515	0.00510	<LOD	<LOD	0.06414	0.01231
S:L = 1:100, pH 14, P_{CO2} = 17.24, DF = 100	<LOD	0.00124	<LOD	0.05572	0.00707	<LOD	0.02426	0.01937	0.04606
S:L = 1:100, pH 14, P_{CO2} = 17.24, DF = 100	<LOD	0.00134	<LOD	0.05015	0.00498	<LOD	0.02103	0.02158	0.04414

	Ti 334.940	**V 290.880**	**Zn 206.200**	**Si 251.611**	**Si**	**K 766.490**	**K**	**Na 589.592**
S:L = 1:10, pH 14, P_{CO2} = 0.69, DF = 100	<LOD	0.00907	0.00242	0.24690	0.25660	0.25423	0.44192	383.25564
S:L = 1:10, pH 14, P_{CO2} = 0.69, DF = 100	<LOD	0.00744	0.00200	0.15974	0.15108	0.25393	0.41136	384.94354
S:L = 1:100, pH 14, P_{CO2} = 0.69, DF = 100	0.00226	0.00550	<LOD	0.04601	0.04028	0.26630	0.27481	379.32290
S:L = 1:100, pH 14, P_{CO2} = 0.69, DF = 100	0.00133	0.00488	<LOD	0.06445	0.06080	0.27190	0.26668	368.98442
S:L = 1:10, pH 14, P_{CO2} = 2.07, DF = 100	<LOD	0.00280	0.00214	0.20132	0.19604	0.35934	0.42915	379.76257
S:L = 1:10, pH 14, P_{CO2} = 2.07, DF = 100	<LOD	0.00765	0.00243	0.19798	0.18854	0.24714	0.42161	379.04791
S:L = 1:100, pH 14, P_{CO2} = 2.07, DF = 100	0.00267	0.00412	<LOD	0.04447	0.04256	0.29029	0.28868	381.12987
S:L = 1:100, pH 14, P_{CO2} = 2.07, DF = 100	0.00147	0.00508	<LOD	0.04042	0.03830	0.38685	0.30183	384.39654
S:L = 1:10, pH 14, P_{CO2} = 4.14, DF = 100	<LOD	0.00856	0.00284	0.18049	0.17927	0.42903	0.44911	392.35571
S:L = 1:10, pH 14, P_{CO2} = 4.14, DF = 100	<LOD	0.00832	0.00187	0.17225	0.16815	0.41216	0.45052	391.02500
S:L = 1:100, pH 14, P_{CO2} = 4.14, DF = 100	0.00127	0.00476	<LOD	0.03867	0.03678	0.46028	0.29143	384.20674
S:L = 1:100, pH 14, P_{CO2} = 4.14, DF = 100	0.00145	0.00539	<LOD	0.04085	0.03670	0.40927	0.23201	370.06642
	0.00147	0.00527	<LOD	0.03555	0.03918	0.44170	0.27554	377.83465
S:L = 1:10, pH 14, P_{CO2} = 17.24, DF = 100	<LOD	0.00822	<LOD	0.17045	0.15951	0.44546	0.48347	382.00247
S:L = 1:10, pH 14, P_{CO2} = 17.24, DF = 100	<LOD	0.00987	<LOD	0.18981	0.18929	0.44940	0.42530	389.16352
S:L = 1:100, pH 14, P_{CO2} = 17.24, DF = 100	0.00156	0.00561	<LOD	0.04530	0.03550	0.50361	0.27400	385.54986
S:L = 1:100, pH 14, P_{CO2} = 17.24, DF = 100	0.00152	0.00368	<LOD	0.03595	0.03283	0.44231	0.25725	374.09171

X.IV Element LOD and LOQ Values for ICP-OES Analyses (Runs 59–74)

Blank LOD and LOQ calculations

	Sc 361.383	**Sc**	**Al 396.153**	**As 188.979**	**As 197.197**	**B 249.772**	**B 208.889**	**Ba 233.527**	**Be 313.107**
BLANK	0.951063	0.964863	-6.81E-05	-0.00262	0.003204	-0.00442	-0.00274	-4.80E-05	-5.78E-05
BLANK	0.980071	1.008829	0.0005	-0.00033	0.001155	0.011122	0.010435	9.31E-06	1.14E-06
BLANK	0.983606	1.004515	-0.00142	-0.00013	0.001542	0.003288	0.002946	-3.34E-05	-7.12E-05
BLANK	0.9505	0.991858	-5.77E-05	-0.00225	-0.00567	-0.01453	-0.0132	-2.57E-05	-0.00014
BLANK	0.972986	0.995408	-0.00238	0.000474	0.002506	0.026595	0.027906	-5.04E-05	-7.73E-05
BLANK	0.988844	0.996252	-0.00201	-0.00107	-0.00466	-0.01434	-0.01666	-7.81E-05	-2.72E-05
BLANK	0.951478	0.984906	0.00071	-0.00118	0.003678	-0.01487	-0.01348	-4.05E-05	3.99E-05
Avg	0.968364	0.992376	-0.00067	-0.00102	0.000249	-0.00102	-0.00069	-3.8E-05	-4.7E-05
Standard Deviation	0.0169	0.014464	0.001244	0.001125	0.003815	0.01577	0.01599	2.67E-05	5.73E-05
LOD	1.019065	1.035769	0.003058	0.002359	0.011694	0.046286	0.047286	4.2E-05	0.000125
LOQ	1.137369	1.13702	0.011766	0.010234	0.038396	0.156673	0.159218	0.000229	0.000526

	Ca 317.933	**Cd 228.802**	**Cd 214.440**	**Co 228.616**	**Cr 267.716**	**Cu 327.393**	**Fe 238.204**	**Mg 285.213**	**Mn 257.610**
BLANK	-8.22E-05	-1.27E-05	-7.42E-05	-0.0002	8.21E-05	0.001727	1.81E-05	4.84E-05	2.13E-05
BLANK	0.000463	7.22E-05	5.31E-05	6.71E-05	-0.00011	-4.59E-05	-5.70E-05	7.12E-06	-6.90E-07
BLANK	-0.00497	4.85E-05	-5.44E-05	-0.00017	6.35E-05	0.001272	0.000293	-0.00078	-1.01E-05
BLANK	-0.00022	-0.00026	-0.00012	5.21E-06	-0.00013	-0.00261	-5.69E-06	-7.51E-05	-3.05E-05
BLANK	-0.00575	3.04E-05	0.000114	2.60E-05	3.83E-07	0.000941	0.001005	-0.00084	-4.90E-05
BLANK	-0.00525	-0.00029	-0.00015	-0.00021	-6.27E-05	-4.17E-05	0.001012	-0.00077	4.72E-06
BLANK	-0.00025	-0.00017	-5.35E-05	-0.00016	-0.00016	8.43E-05	2.07E-05	-2.05E-05	-2.93E-05
Avg	-0.00229	-8.3E-05	-4.1E-05	-9.2E-05	-4.6E-05	0.000189	0.000327	-0.00035	-1.3E-05
Standard Deviation	0.002853	0.000153	9.37E-05	0.000119	9.62E-05	0.001418	0.000479	0.000424	2.42E-05
LOD	0.006265	0.000377	0.00024	0.000266	0.000243	0.004444	0.001765	0.000924	5.93E-05
LOQ	0.026237	0.001451	0.000896	0.001101	0.000916	0.014371	0.00512	0.003892	0.000229

	Mo 202.031	Ni 231.604	Pb 220.353	Se 196.026	Sb 206.836	Ag 328.068	Sn 189.927	Sr 407.771	Tl 190.801
BLANK	0.000135	-0.00038	-0.00082	-0.00423	-0.00369	0.000179	-0.0002	4.55E-05	-0.0006
BLANK	-0.00016	-7.72E-05	0.000218	0.001013	-0.00394	0.000266	-0.00177	-3.72E-05	0.000476
BLANK	2.56E-05	0.000132	-0.0004	-0.00513	-0.00152	0.000542	-0.00116	-7.08E-05	-0.00114
BLANK	-0.00019	-1.45E-05	-0.00117	-0.00164	-0.00351	0.000286	-0.00154	2.95E-05	-0.0002
BLANK	0.000622	1.58E-05	0.001747	0.004007	-0.00301	0.000586	-0.00103	-7.93E-05	-0.00036
BLANK	-0.0003	3.21E-05	-0.00101	5.28E-05	-0.00113	6.46E-05	-0.00244	-0.00012	-0.00259
BLANK	-6.53E-05	1.16E-06	-0.00061	-0.00281	-0.00348	6.82E-05	-0.00149	5.14E-06	0.00081
Avg	8.78E-06	-4.1E-05	-0.00029	-0.00125	-0.0029	0.000285	-0.00137	-3.3E-05	-0.00051
Standard Deviation	0.000307	0.00016	0.001008	0.003188	0.001116	0.00021	0.000693	6.25E-05	0.001123
LOD	0.000928	0.00044	0.002732	0.008315	0.000448	0.000914	0.000705	0.000155	0.002854
LOQ	0.003074	0.001562	0.009791	0.030628	0.008258	0.002383	0.005558	0.000592	0.010712

	Ti 334.940	V 290.880	Zn 206.200	Si 251.611	Si	K 766.490	K	Na 589.592	Na
BLANK	-0.00003	-0.00282	-0.00020	0.00083	-0.00052	0.01236	0.00008	-0.00609	0.00108
BLANK	0.00011	-0.00063	0.00050	0.00092	-0.00102	-0.02905	-0.00073	-0.00420	-0.00319
BLANK	0.00010	-0.00160	0.00043	-0.00042	-0.00017	-0.03304	-0.00124	-0.00964	-0.00488
BLANK	0.00002	-0.00093	-0.00065	0.00017	-0.00221	-0.01778	0.00000	-0.00742	0.00036
BLANK	0.00007	-0.00203	0.00127	0.00146	0.00136	-0.03520	-0.00074	-0.00934	-0.00306
BLANK	0.00011	-0.00331	-0.00048	-0.00087	-0.00138	-0.03810	-0.00145	-0.00650	-0.00037
BLANK	0.00000	-0.00333	0.00163	-0.00036	-0.00187	-0.02020	0.00410	0.12410	0.09007
Avg	0.00006	-0.00209	0.00036	0.00025	-0.00083	-0.02300	0.00000	0.01156	0.01143
Standard Deviation	0.00006	0.00110	0.00087	0.00085	0.00120	0.01732	0.00190	0.04966	0.03474
LOD	0.00022	0.00121	0.00295	0.00280	0.00277	0.02895	0.00569	0.16054	0.11566
LOQ	0.00062	0.00892	0.00901	0.00874	0.01118	0.15017	0.01896	0.50816	0.35886

LOD and LOQ check for DF 100

	Sc 361.383	**Sc**	**Al 396.153**	**As 188.979**	**As 197.197**	**B 249.772**	**B 208.889**	**Ba 233.527**	**Be 313.107**
S:L = 1:10, pH 13, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00035	<LOD
S:L = 1:10, pH 13, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00034	<LOD
S:L = 1:100, pH 13, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00026	<LOD
S:L = 1:100, pH 13, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00031	<LOD
S:L = 1:10, pH 13, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00025	<LOD
S:L = 1:10, pH 13, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00019	<LOD
S:L = 1:100, pH 13, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00022	<LOD
S:L = 1:100, pH 13, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00016	<LOD
S:L = 1:10, pH 13, P_{CO2} = 2.07, DF = 100	<LOD	1.03594	<LOD	<LOD	<LOD	<LOD	<LOD	0.00030	<LOD
S:L = 1:10, pH 13, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00039	<LOD
S:L = 1:100, pH 13, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00019	<LOD
S:L = 1:100, pH 13, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00022	<LOD
S:L = 1:10, pH 13, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00033	<LOD
S:L = 1:10, pH 13, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00028	<LOD
S:L = 1:100, pH 13, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00024	<LOD
S:L = 1:100, pH 13, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00024	<LOD

	Ca 317.933	Cd 228.802	Cd 214.440	Co 228.616	Cr 267.716	Cu 327.393	Fe 238.204	Mg 285.213	Mn 257.610
S:L = 1:10, pH 13, P_{CO2} = 17.24, DF = 100	8.94319	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.12943	0.00189
S:L = 1:10, pH 13, P_{CO2} = 17.24, DF = 100	8.86525	<LOD	<LOD	0.00044	<LOD	<LOD	<LOD	0.13713	0.00206
S:L = 1:100, pH 13, P_{CO2} = 17.24, DF = 100	8.71927	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01152	0.00030
S:L = 1:100, pH 13, P_{CO2} = 17.24, DF = 100	8.51519	<LOD	<LOD	<LOD	0.00026	<LOD	<LOD	0.01293	0.00031
S:L = 1:10, pH 13, P_{CO2} = 0.69, DF = 100	5.64636	<LOD	<LOD	0.00029	<LOD	<LOD	<LOD	0.12635	0.00029
S:L = 1:10, pH 13, P_{CO2} = 0.69, DF = 100	5.68682	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.13217	0.00010
S:L = 1:100, pH 13, P_{CO2} = 0.69, DF = 100	8.41349	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01199	<LOD
S:L = 1:100, pH 13, P_{CO2} = 0.69, DF = 100	7.52492	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01202	<LOD
S:L = 1:10, pH 13, P_{CO2} = 2.07, DF = 100	6.39547	<LOD	<LOD	0.00031	<LOD	<LOD	<LOD	0.12991	0.00134
S:L = 1:10, pH 13, P_{CO2} = 2.07, DF = 100	6.89338	<LOD	<LOD	0.00035	<LOD	<LOD	<LOD	0.12810	0.00221
S:L = 1:100, pH 13, P_{CO2} = 2.07, DF = 100	8.00626	<LOD	<LOD	0.00040	<LOD	<LOD	<LOD	0.01078	0.00009
S:L = 1:100, pH 13, P_{CO2} = 2.07, DF = 100	8.01505	<LOD	<LOD	0.00035	<LOD	<LOD	<LOD	0.01100	0.00008
S:L = 1:10, pH 13, P_{CO2} = 4.14, DF = 100	6.91406	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.12054	0.00109
S:L = 1:10, pH 13, P_{CO2} = 4.14, DF = 100	6.51909	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.11895	0.00118
S:L = 1:100, pH 13, P_{CO2} = 4.14, DF = 100	8.40816	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01163	0.00016
S:L = 1:100, pH 13, P_{CO2} = 4.14, DF = 100	8.40617	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01128	0.00015

	Mo 202.031	Ni 231.604	Pb 220.353	Se 196.026	Sb 206.836	Ag 328.068	Sn 189.927	Sr 407.771	Tl 190.801
S:L = 1:10, pH 13, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	<LOD	<LOD	0.00226	<LOD	<LOD	0.02062	0.00350
S:L = 1:10, pH 13, P_{CO2} = 17.24, DF = 100	<LOD	0.00313	<LOD	<LOD	<LOD	<LOD	<LOD	0.02065	0.00476
S:L = 1:100, pH 13, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01136	0.00325
S:L = 1:100, pH 13, P_{CO2} = 17.24, DF = 100	0.00303	0.00926	<LOD	<LOD	<LOD	<LOD	<LOD	0.01175	0.00372
S:L = 1:10, pH 13, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01916	<LOD
S:L = 1:10, pH 13, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01978	<LOD
S:L = 1:100, pH 13, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00937	<LOD
S:L = 1:100, pH 13, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01115	<LOD
S:L = 1:10, pH 13, P_{CO2} = 2.07, DF = 100	<LOD	0.00046	<LOD	<LOD	<LOD	<LOD	<LOD	0.02200	0.00349
S:L = 1:10, pH 13, P_{CO2} = 2.07, DF = 100	<LOD	0.00120	<LOD	<LOD	<LOD	<LOD	<LOD	0.02203	<LOD
S:L = 1:100, pH 13, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00976	0.00392
S:L = 1:100, pH 13, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00910	0.00327
S:L = 1:10, pH 13, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01958	<LOD
S:L = 1:10, pH 13, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01845	0.00381
S:L = 1:100, pH 13, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01159	0.00519
S:L = 1:100, pH 13, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01141	<LOD

	Ti 334.940	V 290.880	Zn 206.200	Si 251.611	Si	K 766.490	K	Na 589.592	Na
S:L = 1:10, pH 13, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	<LOD	0.02187	0.01805	<LOD	0.01585	19.82559	
S:L = 1:10, pH 13, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	<LOD	0.02400	0.01998	<LOD	0.01759	20.17723	
S:L = 1:100, pH 13, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	20.23939	
S:L = 1:100, pH 13, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	<LOD	0.00296	<LOD	<LOD	0.00954	19.96175	
S:L = 1:10, pH 13, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	0.01486	0.01020	<LOD	0.01766	20.05356	
S:L = 1:10, pH 13, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	0.01702	0.01442	<LOD	0.01785	22.12409	
S:L = 1:100, pH 13, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	20.21202	
S:L = 1:100, pH 13, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	20.01571	
S:L = 1:10, pH 13, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	<LOD	0.01311	0.00776	<LOD	0.01705	20.15449	
S:L = 1:10, pH 13, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	<LOD	0.01119	0.00763	<LOD	0.01765	20.56926	
S:L = 1:100, pH 13, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	19.17324	
S:L = 1:100, pH 13, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	<LOD	0.00366	<LOD	<LOD	<LOD	20.00460	
S:L = 1:10, pH 13, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	0.01299	0.01286	<LOD	0.01536	19.77684	
S:L = 1:10, pH 13, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	0.01211	0.00723	<LOD	0.01488	18.80699	
S:L = 1:100, pH 13, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	19.34966	
S:L = 1:100, pH 13, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	19.50276	

LOD and LOQ check for DF 2

	Sc 361.383	Sc	Al 396.153	As 188.979	As 197.197	B 249.772	B 208.889	Ba 233.527	Be 313.107
S:L = 1:10, pH 13, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	0.16745	<LOD	<LOD	0.23147	0.21473	0.00886	<LOD
S:L = 1:10, pH 13, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	0.14111	<LOD	<LOD	0.23794	0.21739	0.00812	<LOD
S:L = 1:100, pH 13, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	0.00676	<LOD	<LOD	<LOD	<LOD	0.00661	<LOD
S:L = 1:100, pH 13, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	0.03567	<LOD	<LOD	<LOD	<LOD	0.00644	<LOD
S:L = 1:10, pH 13, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	0.23616	0.22031	0.00629	<LOD
S:L = 1:10, pH 13, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	0.22658	0.20725	0.00475	<LOD
S:L = 1:100, pH 13, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	0.01938	<LOD	0.01524	<LOD	<LOD	0.00537	<LOD
S:L = 1:100, pH 13, P_{CO2} = 0.69, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00529	<LOD
S:L = 1:10, pH 13, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	0.07726	<LOD	<LOD	0.21691	0.19992	0.00801	<LOD
S:L = 1:10, pH 13, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	0.09129	<LOD	<LOD	0.20669	0.18943	0.00856	<LOD
S:L = 1:100, pH 13, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	0.03685	<LOD	<LOD	<LOD	<LOD	0.00605	<LOD
S:L = 1:100, pH 13, P_{CO2} = 2.07, DF = 100	<LOD	<LOD	0.03338	<LOD	<LOD	<LOD	<LOD	0.00525	<LOD
S:L = 1:10, pH 13, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	0.11177	<LOD	<LOD	0.20649	0.19014	0.00819	<LOD
S:L = 1:10, pH 13, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	0.07112	<LOD	<LOD	0.23659	0.21397	0.00801	<LOD
S:L = 1:100, pH 13, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	0.01922	<LOD	<LOD	<LOD	<LOD	0.00623	<LOD
S:L = 1:100, pH 13, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	0.02333	<LOD	<LOD	<LOD	<LOD	0.00600	<LOD

	Ca 317.933	Cd 228.802	Cd 214.440	Co 228.616	Cr 267.716	Cu 327.393	Fe 238.204	Mg 285.213	Mn 257.610

S:L = 1:10, pH 13, P_{CO2} = 17.24, DF = 100	115.09084	<LOD	<LOD	0.00427	0.00257	<LOD	0.00782	2.93198	0.03628
S:L = 1:10, pH 13, P_{CO2} = 17.24, DF = 100	115.29740	0.00065	0.00054	0.00454	0.00219	<LOD	0.00535	2.77498	0.03723
S:L = 1:100, pH 13, P_{CO2} = 17.24, DF = 100	110.14226	<LOD	<LOD	0.00318	0.00124	<LOD	0.00450	0.26670	0.00653
S:L = 1:100, pH 13, P_{CO2} = 17.24, DF = 100	109.37557	<LOD	<LOD	0.00472	0.00247	<LOD	0.00592	0.29708	0.00696
S:L = 1:10, pH 13, P_{CO2} = 0.69, DF = 100	78.94602	<LOD	<LOD	0.00287	0.00123	<LOD	<LOD	2.67149	0.00685
S:L = 1:10, pH 13, P_{CO2} = 0.69, DF = 100	75.61718	<LOD	<LOD	0.00247	0.00117	<LOD	<LOD	2.58279	0.00284
S:L = 1:100, pH 13, P_{CO2} = 0.69, DF = 100	106.36514	<LOD	<LOD	0.00299	0.00097	<LOD	<LOD	0.27266	0.00201
S:L = 1:100, pH 13, P_{CO2} = 0.69, DF = 100	99.02628	<LOD	<LOD	0.00289	0.00097	<LOD	<LOD	0.28214	0.00081
S:L = 1:10, pH 13, P_{CO2} = 2.07, DF = 100	87.02264	<LOD	<LOD	0.00408	0.00130	<LOD	0.00287	2.66309	0.02462
S:L = 1:10, pH 13, P_{CO2} = 2.07, DF = 100	90.48600	<LOD	<LOD	0.00376	0.00132	<LOD	0.00458	2.59504	0.03986
S:L = 1:100, pH 13, P_{CO2} = 2.07, DF = 100	108.10047	<LOD	<LOD	0.00354	0.00109	<LOD	<LOD	0.26343	0.00292
S:L = 1:100, pH 13, P_{CO2} = 2.07, DF = 100	105.84186	<LOD	<LOD	0.00290	0.00097	<LOD	<LOD	0.25308	0.00276
S:L = 1:10, pH 13, P_{CO2} = 4.14, DF = 100	92.74771	<LOD	<LOD	0.00324	0.00160	<LOD	0.00314	2.53681	0.02308
S:L = 1:10, pH 13, P_{CO2} = 4.14, DF = 100	93.64379	<LOD	<LOD	0.00329	0.00269	<LOD	0.00228	2.57170	0.02358
S:L = 1:100, pH 13, P_{CO2} = 4.14, DF = 100	111.88953	<LOD	<LOD	0.00327	0.00165	<LOD	0.00247	0.27597	0.00451
S:L = 1:100, pH 13, P_{CO2} = 4.14, DF = 100	109.36607	<LOD	<LOD	0.00312	0.00137	<LOD	0.00265	0.26004	0.00415

	Mo 202.031	**Ni 231.604**	**Pb 220.353**	**Se 196.026**	**Sb 206.836**	**Ag 328.068**	**Sn 189.927**	**Sr 407.771**	**Tl 190.801**

S:L = 1:10, pH 13, P_{CO2} = 17.24, DF = 100	0.00804	0.01269	<LOD	0.03290	0.02167	<LOD	<LOD	0.43798	0.03384
S:L = 1:10, pH 13, P_{CO2} = 17.24, DF = 100	0.01519	0.06702	<LOD	0.05093	0.02281	<LOD	<LOD	0.42270	0.03490
S:L = 1:100, pH 13, P_{CO2} = 17.24, DF = 100	0.00327	0.00560	<LOD	0.02239	0.01822	<LOD	<LOD	0.22817	0.03268
S:L = 1:100, pH 13, P_{CO2} = 17.24, DF = 100	0.06196	0.18670	<LOD	0.02149	0.02032	<LOD	<LOD	0.23628	0.03604
S:L = 1:10, pH 13, P_{CO2} = 0.69, DF = 100	0.01055	0.00144	<LOD	0.04568	0.01823	<LOD	<LOD	0.39378	0.02781
S:L = 1:10, pH 13, P_{CO2} = 0.69, DF = 100	0.00738	<LOD	<LOD	0.03750	0.01774	<LOD	<LOD	0.38057	0.02703
S:L = 1:100, pH 13, P_{CO2} = 0.69, DF = 100	0.00371	<LOD	<LOD	0.02237	0.02026	<LOD	<LOD	0.18975	0.02772
S:L = 1:100, pH 13, P_{CO2} = 0.69, DF = 100	0.00103	<LOD	<LOD	0.02854	0.02027	<LOD	<LOD	0.22767	0.02859
S:L = 1:10, pH 13, P_{CO2} = 2.07, DF = 100	0.01385	0.00842	<LOD	0.03201	0.01575	<LOD	<LOD	0.43729	0.02900
S:L = 1:10, pH 13, P_{CO2} = 2.07, DF = 100	0.00723	0.02122	<LOD	0.02883	0.01895	<LOD	<LOD	0.42961	0.02915
S:L = 1:100, pH 13, P_{CO2} = 2.07, DF = 100	0.00156	0.00313	<LOD	0.03350	0.01966	<LOD	<LOD	0.21002	0.03736
S:L = 1:100, pH 13, P_{CO2} = 2.07, DF = 100	<LOD	0.00063	<LOD	0.04215	0.02364	<LOD	<LOD	0.18452	0.03604
S:L = 1:10, pH 13, P_{CO2} = 4.14, DF = 100	0.00254	<LOD	<LOD	0.04459	0.02073	<LOD	<LOD	0.40539	0.03637
S:L = 1:10, pH 13, P_{CO2} = 4.14, DF = 100	0.00319	<LOD	<LOD	0.03937	0.01851	<LOD	<LOD	0.39549	0.03512
S:L = 1:100, pH 13, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	0.03677	0.02111	<LOD	<LOD	0.24033	0.03836
S:L = 1:100, pH 13, P_{CO2} = 4.14, DF = 100	<LOD	<LOD	<LOD	0.03439	0.02463	<LOD	<LOD	0.23210	0.03947

	Ti 334.940	V 290.880	Zn 206.200	Si 251.611	Si	K 766.490	K	Na 589.592	Na
S:L = 1:10, pH 13, P_{CO2} = 17.24, DF = 100	<LOD	0.00776	0.05190	0.45326	0.42848	0.36881	0.64214	209.17868	
S:L = 1:10, pH 13, P_{CO2} = 17.24, DF = 100	<LOD	0.00873	0.05947	0.48743	0.46782	0.36433	0.63114	207.59622	
S:L = 1:100, pH 13, P_{CO2} = 17.24, DF = 100	<LOD	0.00244	0.01421	0.06745	0.06159	0.06891	0.19075	204.76391	
S:L = 1:100, pH 13, P_{CO2} = 17.24, DF = 100	<LOD	<LOD	0.02317	0.06604	0.05828	0.18327	0.37105	202.81216	
S:L = 1:10, pH 13, P_{CO2} = 0.69, DF = 100	<LOD	0.00586	0.02122	0.31212	0.29474	0.34254	0.64807	205.75189	
S:L = 1:10, pH 13, P_{CO2} = 0.69, DF = 100	<LOD	0.00602	0.01208	0.33959	0.32290	0.33043	0.61558	212.53114	
S:L = 1:100, pH 13, P_{CO2} = 0.69, DF = 100	<LOD	0.00320	0.05315	0.05761	0.05840	0.12061	0.21325	204.90680	
S:L = 1:100, pH 13, P_{CO2} = 0.69, DF = 100	<LOD	0.00249	0.00797	0.04623	0.04553	0.12712	0.19270	206.18669	
S:L = 1:10, pH 13, P_{CO2} = 2.07, DF = 100	<LOD	0.00572	0.02549	0.28160	0.26595	0.36991	0.62556	204.04904	
S:L = 1:10, pH 13, P_{CO2} = 2.07, DF = 100	<LOD	0.00652	0.02516	0.24842	0.23695	0.39352	0.65964	203.05108	
S:L = 1:100, pH 13, P_{CO2} = 2.07, DF = 100	<LOD	0.00251	0.01855	0.05581	0.05294	0.13082	0.18931	204.05830	
S:L = 1:100, pH 13, P_{CO2} = 2.07, DF = 100	<LOD	0.00162	0.00932	0.05013	0.05034	0.11861	0.18170	204.48328	
S:L = 1:10, pH 13, P_{CO2} = 4.14, DF = 100	<LOD	0.00639	0.02719	0.28904	0.27490	0.36559	0.58090	203.80541	
S:L = 1:10, pH 13, P_{CO2} = 4.14, DF = 100	<LOD	0.00699	0.02419	0.27852	0.26254	0.37226	0.57372	202.34931	
S:L = 1:100, pH 13, P_{CO2} = 4.14, DF = 100	<LOD	0.00178	0.01166	0.04703	0.04510	0.16014	0.17426	203.71972	
S:L = 1:100, pH 13, P_{CO2} = 4.14, DF = 100	<LOD	0.00275	0.00983	0.04491	0.04853	0.19037	0.17754	201.18214	

X.V Element LOD and LOQ Values for ICP-OES Analyses (Runs 75 – 90)

Blank LOD and LOQ calculations

	Sc 361.383	**Sc**	**Al 396.153**	**As 188.979**	**As 197.197**	**B 249.772**	**B 208.889**	**Ba 233.527**	**Be 313.107**
BLANK	0.96363	1.01126	-0.00001	0.00017	-0.00318	-0.00363	-0.00307	-0.00001	-0.00007
BLANK	0.95777	1.01884	0.00000	-0.00141	0.00269	0.01299	0.01469	-0.00002	-0.00011
BLANK	1.00252	1.04859	0.00041	0.00003	-0.00266	-0.01317	-0.01513	0.00002	-0.00005
BLANK	0.99189	1.05636	0.00006	0.00355	-0.00108	0.02206	0.01910	0.00000	0.00000
BLANK	0.95810	1.02552	0.00053	-0.00048	-0.00014	-0.01414	-0.01503	0.00000	-0.00011
BLANK	0.94242	1.01931	0.00066	-0.00243	-0.00667	-0.01437	-0.01328	0.00003	-0.00005
BLANK	0.96461	1.02297	0.00006	-0.00498	-0.00156	-0.01483	-0.01626	0.00005	-0.00004
BLANK	0.98627	1.04028	0.00760	0.00257	-0.00055	0.02289	0.02141	-0.00001	-0.00002
Avg	0.97090	1.03039	0.00116	-0.00037	-0.00164	-0.00028	-0.00095	0.00001	-0.00006
Standard Deviation	0.02041	0.01606	0.00261	0.00270	0.00270	0.01687	0.01664	0.00002	0.00004
LOD	1.03213	1.07856	0.00901	0.00773	0.00647	0.05033	0.04896	0.00008	0.00006
LOQ	1.17501	1.19096	0.02731	0.02663	0.02541	0.16840	0.16541	0.00025	0.00033

	Ca 317.933	**Cd 228.802**	**Cd 214.440**	**Co 228.616**	**Cr 267.716**	**Cu 327.393**	**Fe 238.204**	**Mg 285.213**	**Mn 257.610**
BLANK	-0.00038	-0.00028	-0.00010	-0.00021	0.00016	-0.00088	-0.00010	0.00007	0.00000
BLANK	0.00016	0.00018	-0.00006	0.00005	0.00008	-0.00094	-0.00007	0.00002	-0.00001
BLANK	0.00007	-0.00025	0.00003	0.00016	-0.00022	-0.00224	-0.00005	-0.00001	-0.00001
BLANK	-0.00199	-0.00010	0.00016	0.00003	-0.00038	0.00000	0.00029	0.00006	0.00002
BLANK	-0.00241	0.00008	-0.00011	-0.00013	-0.00035	-0.00220	0.00086	0.00004	0.00004
BLANK	-0.00158	0.00004	-0.00021	-0.00001	-0.00023	-0.00186	0.00025	0.00006	0.00000
BLANK	-0.00016	-0.00010	-0.00006	-0.00007	-0.00014	-0.00183	0.00002	0.00005	0.00001
BLANK	-0.00160	-0.00015	0.00002	0.00000	-0.00021	-0.00062	0.00031	0.00148	0.00004
Avg	-0.00099	-0.00007	-0.00004	-0.00002	-0.00016	-0.00132	0.00019	0.00022	0.00001
Standard Deviation	0.00102	0.00016	0.00011	0.00011	0.00019	0.00082	0.00032	0.00051	0.00002
LOD	0.00207	0.00041	0.00029	0.00032	0.00041	0.00115	0.00114	0.00175	0.00007

LOQ	0.00919	0.00153	0.00105	0.00111	0.00174	0.00690	0.00338	0.00531	0.00021

	Mo 202.031	**Ni 231.604**	**Pb 220.353**	**Se 196.026**	**Sb 206.836**	**Ag 328.068**	**Sn 189.927**	**Sr 407.771**	**Tl 190.801**
BLANK	-0.00013	0.00013	0.00160	0.00465	-0.00055	0.00003	-0.00149	0.00005	0.00070
BLANK	0.00081	-0.00028	0.00297	-0.00210	0.00112	-0.00006	-0.00063	0.00006	0.00110
BLANK	-0.00046	0.00017	-0.00109	0.00411	-0.00161	0.00016	-0.00168	0.00002	-0.00099
BLANK	0.00181	-0.00011	0.00256	0.00503	-0.00150	0.00011	-0.00063	0.00004	-0.00086
BLANK	-0.00015	-0.00083	0.00027	0.00485	-0.00286	0.00034	-0.00193	0.00006	0.00092
BLANK	-0.00033	-0.00007	0.00063	0.00395	-0.00264	0.00021	-0.00072	0.00007	-0.00020
BLANK	-0.00022	-0.00001	-0.00030	0.00118	-0.00192	-0.00006	-0.00201	0.00007	-0.00062
BLANK	0.00174	0.00010	0.00318	0.00412	-0.00158	0.00019	-0.00036	0.00004	-0.00075
Avg	0.00038	-0.00011	0.00123	0.00322	-0.00144	0.00012	-0.00118	0.00005	-0.00009
Standard Deviation	0.00094	0.00032	0.00159	0.00247	0.00126	0.00014	0.00066	0.00002	0.00086
LOD	0.00320	0.00086	0.00601	0.01062	0.00233	0.00053	0.00081	0.00010	0.00249
LOQ	0.00979	0.00313	0.01715	0.02789	0.01114	0.00151	0.00545	0.00021	0.00852

	Ti 334.940	**V 290.880**	**Zn 206.200**	**Si 251.611**	**Si**	**K 766.490**	**K**	**Na 589.592**	**Na**
BLANK	-0.00007	0.00101	-0.00026	-0.00084	0.00044	0.02774	-0.00011	0.00087	-0.00007
BLANK	-0.00004	0.00027	0.00067	0.00096	0.00160	0.01415	0.00058	-0.00611	-0.00069
BLANK	0.00011	0.00008	-0.00090	-0.00126	-0.00071	-0.01400	-0.00029	0.00489	0.00307
BLANK	0.00022	-0.00082	0.00077	0.00052	-0.00042	-0.02020	-0.00046	-0.00691	-0.00184
BLANK	-0.00005	0.00102	-0.00041	-0.00118	-0.00153	0.01507	0.00450	0.20537	0.11419
BLANK	-0.00003	-0.00019	-0.00030	-0.00138	-0.00119	0.02804	0.00394	0.14080	0.08542
BLANK	-0.00004	-0.00047	-0.00021	-0.00129	-0.00072	0.01565	0.00241	0.10740	0.06288
BLANK	0.00034	0.00006	0.00055	-0.00018	0.00281	-0.02139	0.00026	0.04695	0.03104
Avg	0.00006	0.00012	-0.00001	-0.00058	0.00004	0.00563	0.00135	0.06166	0.03675
Standard Deviation	0.00015	0.00065	0.00060	0.00091	0.00149	0.02083	0.00199	0.08057	0.04545
LOD	0.00051	0.00207	0.00179	0.00214	0.00452	0.06811	0.00731	0.30336	0.17311
LOQ	0.00157	0.00661	0.00598	0.00850	0.01497	0.21389	0.02122	0.86734	0.49129

LOD and LOQ check for DF 200

	Sc 361.383	**Sc**	**Al 396.153**	**As 188.979**	**As 197.197**	**B 249.772**	**B 208.889**	**Ba 233.527**	**Be 313.107**
S:L = 1:10, pH 13.5, P_{CO2} = 0.69, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00008	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 0.69, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00010	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 0.69, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00008	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 0.69, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 2.07, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 2.07, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 2.07, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 2.07, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 4.14, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00009	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 4.14, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 4.14, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 4.14, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 17.24, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00009	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 17.24, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 17.24, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00008
S:L = 1:100, pH 13.5, P_{CO2} = 17.24, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD

	Ca 317.933	Cd 228.802	Cd 214.440	Co 228.616	Cr 267.716	Cu 327.393	Fe 238.204	Mg 285.213	Mn 257.610
S:L = 1:10, pH 13.5, P_{CO2} = 0.69, DF = 200	2.53880	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.06322	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 0.69, DF = 200	1.26476	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.03055	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 0.69, DF = 200	0.01090	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 0.69, DF = 200	0.38431	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00179	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 2.07, DF = 200	1.01006	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.06272	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 2.07, DF = 200	2.66850	<LOD	<LOD	0.00053	<LOD	<LOD	<LOD	0.06427	0.00052
S:L = 1:100, pH 13.5, P_{CO2} = 2.07, DF = 200	0.04907	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00178	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 2.07, DF = 200	0.01067	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 4.14, DF = 200	0.61278	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.05830	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 4.14, DF = 200	0.84772	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.05585	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 4.14, DF = 200	0.09861	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00239	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 4.14, DF = 200	0.09317	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00238	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 17.24, DF = 200	0.11635	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.03339	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 17.24, DF = 200	0.04282	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.03314	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 17.24, DF = 200	0.03186	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00270	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 17.24, DF = 200	0.04368	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00245	<LOD

	Mo 202.031	Ni 231.604	Pb 220.353	Se 196.026	Sb 206.836	Ag 328.068	Sn 189.927	Sr 407.771	Tl 190.801
S:L = 1:10, pH 13.5, P_{CO2} = 0.69, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01055	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 0.69, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	0.00055	<LOD	0.00511	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 0.69, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00047	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 0.69, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00110	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 2.07, DF = 200	<LOD	0.00235	<LOD	<LOD	<LOD	<LOD	<LOD	0.00656	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 2.07, DF = 200	<LOD	0.00957	<LOD	<LOD	<LOD	<LOD	<LOD	0.00943	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 2.07, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00073	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 2.07, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00028	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 4.14, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00857	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 4.14, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00810	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 4.14, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00092	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 4.14, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00099	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 17.24, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00517	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 17.24, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00432	0.00312
S:L = 1:100, pH 13.5, P_{CO2} = 17.24, DF = 200	0.00554	0.00094	<LOD	<LOD	<LOD	<LOD	<LOD	0.00165	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 17.24, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00270	<LOD

	Ti 334.940	V 290.880	Zn 206.200	Si 251.611	Si	K 766.490	K	Na 589.592	Na
S:L = 1:10, pH 13.5, P_{CO2} = 0.69, DF = 200	<LOD	<LOD	<LOD	0.01220	0.01340	<LOD	0.01222	31.71177	
S:L = 1:10, pH 13.5, P_{CO2} = 0.69, DF = 200	<LOD	<LOD	<LOD	0.00446	0.00474	<LOD	<LOD	17.19900	
S:L = 1:100, pH 13.5, P_{CO2} = 0.69, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	28.86657	
S:L = 1:100, pH 13.5, P_{CO2} = 0.69, DF = 200	<LOD	0.00219	<LOD	<LOD	0.00683	<LOD	<LOD	31.91634	
S:L = 1:10, pH 13.5, P_{CO2} = 2.07, DF = 200	<LOD	<LOD	<LOD	0.00826	0.01024	<LOD	0.01108	32.17954	
S:L = 1:10, pH 13.5, P_{CO2} = 2.07, DF = 200	<LOD	<LOD	<LOD	0.00952	0.00921	<LOD	0.01163	31.44043	
S:L = 1:100, pH 13.5, P_{CO2} = 2.07, DF = 200	<LOD	0.00347	<LOD	<LOD	<LOD	<LOD	<LOD	30.03271	
S:L = 1:100, pH 13.5, P_{CO2} = 2.07, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	29.67614	
S:L = 1:10, pH 13.5, P_{CO2} = 4.14, DF = 200	<LOD	<LOD	<LOD	0.00903	0.00966	<LOD	0.01233	31.61458	
S:L = 1:10, pH 13.5, P_{CO2} = 4.14, DF = 200	<LOD	<LOD	<LOD	0.00729	0.00745	<LOD	0.01106	30.00521	
S:L = 1:100, pH 13.5, P_{CO2} = 4.14, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	30.87181	
S:L = 1:100, pH 13.5, P_{CO2} = 4.14, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	31.98855	
S:L = 1:10, pH 13.5, P_{CO2} = 17.24, DF = 200	<LOD	<LOD	<LOD	0.01017	0.00964	<LOD	0.01116	32.22849	
S:L = 1:10, pH 13.5, P_{CO2} = 17.24, DF = 200	<LOD	<LOD	<LOD	0.00830	0.00832	<LOD	0.01110	33.24124	
S:L = 1:100, pH 13.5, P_{CO2} = 17.24, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	31.86897	
S:L = 1:100, pH 13.5, P_{CO2} = 17.24, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	30.93552	

LOD and LOQ check for DF 20

	Sc 361.383	**Sc**	**Al 396.153**	**As 188.979**	**As 197.197**	**B 249.772**	**B 208.889**	**Ba 233.527**	**Be 313.107**
S:L = 1:10, pH 13.5, P_{CO2} = 0.69, DF = 200	<LOD	<LOD	<LOD	<LOD	0.00808	<LOD	<LOD	0.00114	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 0.69, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00089	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 0.69, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00015	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 0.69, DF = 200	<LOD	1.08849	<LOD	<LOD	<LOD	<LOD	<LOD	0.00039	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 2.07, DF = 200	<LOD	1.09585	<LOD	<LOD	<LOD	<LOD	<LOD	0.00019	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 2.07, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00095	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 2.07, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00025	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 2.07, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00016	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 4.14, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	0.05444	<LOD	0.00024	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 4.14, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00021	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 4.14, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00032	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 4.14, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00026	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 17.24, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00013	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 17.24, DF = 200	<LOD	1.08359	<LOD	<LOD	<LOD	<LOD	<LOD	0.00014	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 17.24, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00020	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 17.24, DF = 200	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00022	<LOD

	Ca 317.933	Cd 228.802	Cd 214.440	Co 228.616	Cr 267.716	Cu 327.393	Fe 238.204	Mg 285.213	Mn 257.610
S:L = 1:10, pH 13.5, P_{CO2} = 0.69, DF = 200	21.97697	<LOD	<LOD	0.00133	0.00062	<LOD	<LOD	0.68725	0.00025
S:L = 1:10, pH 13.5, P_{CO2} = 0.69, DF = 200	20.20825	<LOD	<LOD	0.00112	<LOD	<LOD	<LOD	0.61782	0.00009
S:L = 1:100, pH 13.5, P_{CO2} = 0.69, DF = 200	0.14039	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01395	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 0.69, DF = 200	3.53562	<LOD	<LOD	0.00040	<LOD	<LOD	<LOD	0.01872	0.00012
S:L = 1:10, pH 13.5, P_{CO2} = 2.07, DF = 200	7.09982	<LOD	<LOD	0.00037	<LOD	<LOD	<LOD	0.62986	0.00024
S:L = 1:10, pH 13.5, P_{CO2} = 2.07, DF = 200	21.88877	<LOD	<LOD	0.00188	0.00044	<LOD	0.00306	0.65370	0.00504
S:L = 1:100, pH 13.5, P_{CO2} = 2.07, DF = 200	0.50452	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.02047	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 2.07, DF = 200	0.12305	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00783	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 4.14, DF = 200	5.99992	<LOD	<LOD	0.00052	<LOD	<LOD	<LOD	0.66130	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 4.14, DF = 200	8.58197	<LOD	<LOD	0.00057	<LOD	<LOD	<LOD	0.65787	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 4.14, DF = 200	0.96956	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.02561	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 4.14, DF = 200	0.87754	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.02440	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 17.24, DF = 200	1.09812	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.35583	<LOD
S:L = 1:10, pH 13.5, P_{CO2} = 17.24, DF = 200	0.38031	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.31624	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 17.24, DF = 200	0.33157	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.02699	<LOD
S:L = 1:100, pH 13.5, P_{CO2} = 17.24, DF = 200	0.47332	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.02586	<LOD

	Mo 202.031	**Ni 231.604**	**Pb 220.353**	**Se 196.026**	**Sb 206.836**	**Ag 328.068**	**Sn 189.927**	**Sr 407.771**	**Tl 190.801**
S:L = 1:10, pH 13.5, P_{CO2} = 0.69, DF = 200	<LOD	<LOD	<LOD	0.01516	0.00518	<LOD	<LOD	0.09998	0.00870
S:L = 1:10, pH 13.5, P_{CO2} = 0.69, DF = 200	<LOD	<LOD	<LOD	0.01556	0.00458	<LOD	<LOD	0.08791	0.00576
S:L = 1:100, pH 13.5, P_{CO2} = 0.69, DF = 200	<LOD	<LOD	<LOD	0.02354	<LOD	<LOD	0.00512	0.00518	0.00990
S:L = 1:100, pH 13.5, P_{CO2} = 0.69, DF = 200	<LOD	<LOD	<LOD	0.02326	<LOD	<LOD	<LOD	0.01019	0.01037
S:L = 1:10, pH 13.5, P_{CO2} = 2.07, DF = 200	0.00759	0.01958	<LOD	0.02027	<LOD	<LOD	<LOD	0.05528	0.00701
S:L = 1:10, pH 13.5, P_{CO2} = 2.07, DF = 200	0.01665	0.08602	<LOD	0.02132	0.00646	<LOD	<LOD	0.08505	0.01525
S:L = 1:100, pH 13.5, P_{CO2} = 2.07, DF = 200	<LOD	<LOD	<LOD	0.02837	0.00239	<LOD	0.00838	0.00770	0.01580
S:L = 1:100, pH 13.5, P_{CO2} = 2.07, DF = 200	<LOD	<LOD	<LOD	0.03642	<LOD	<LOD	0.01360	0.00354	0.02022
S:L = 1:10, pH 13.5, P_{CO2} = 4.14, DF = 200	<LOD	<LOD	<LOD	0.02902	0.00463	<LOD	<LOD	0.08583	0.01058
S:L = 1:10, pH 13.5, P_{CO2} = 4.14, DF = 200	<LOD	<LOD	<LOD	0.02433	0.00471	<LOD	<LOD	0.08326	0.00990
S:L = 1:100, pH 13.5, P_{CO2} = 4.14, DF = 200	<LOD	<LOD	<LOD	0.02740	<LOD	<LOD	0.00369	0.00964	0.01185
S:L = 1:100, pH 13.5, P_{CO2} = 4.14, DF = 200	<LOD	<LOD	<LOD	0.02341	<LOD	<LOD	0.00559	0.00986	0.01160
S:L = 1:10, pH 13.5, P_{CO2} = 17.24, DF = 200	0.01800	0.00254	<LOD	0.03586	<LOD	<LOD	0.00829	0.04921	0.01617
S:L = 1:10, pH 13.5, P_{CO2} = 17.24, DF = 200	0.01265	0.00238	<LOD	0.04434	0.00239	<LOD	0.01170	0.03790	0.01840
S:L = 1:100, pH 13.5, P_{CO2} = 17.24, DF = 200	0.05542	0.01264	<LOD	0.02600	<LOD	<LOD	0.00808	0.01662	0.01438
S:L = 1:100, pH 13.5, P_{CO2} = 17.24, DF = 200	0.00879	0.00100	<LOD	0.02651	<LOD	<LOD	0.00702	0.02774	0.01605

	Ti 334.940	V 290.880	Zn 206.200	Si 251.611	Si	K 766.490	K	Na 589.592
S:L = 1:10, pH 13.5, P_{CO2} = 0.69, DF = 200	<LOD	0.00787	<LOD	0.12583	0.11489	<LOD	0.18639	176.92757
S:L = 1:10, pH 13.5, P_{CO2} = 0.69, DF = 200	<LOD	0.00724	<LOD	0.11760	0.10181	<LOD	0.18102	166.83416
S:L = 1:100, pH 13.5, P_{CO2} = 0.69, DF = 200	<LOD	0.00244	<LOD	0.02925	0.02584	<LOD	0.09796	180.90208
S:L = 1:100, pH 13.5, P_{CO2} = 0.69, DF = 200	<LOD	0.00334	<LOD	0.02801	0.02271	<LOD	0.09118	174.82928
S:L = 1:10, pH 13.5, P_{CO2} = 2.07, DF = 200	<LOD	0.00416	<LOD	0.09849	0.08532	<LOD	0.18825	171.16998
S:L = 1:10, pH 13.5, P_{CO2} = 2.07, DF = 200	<LOD	0.00502	0.00306	0.10590	0.09537	0.07646	0.18659	170.16412
S:L = 1:100, pH 13.5, P_{CO2} = 2.07, DF = 200	<LOD	0.00275	<LOD	0.03000	0.03190	<LOD	0.09799	183.63299
S:L = 1:100, pH 13.5, P_{CO2} = 2.07, DF = 200	<LOD	0.00223	<LOD	0.01563	0.01319	<LOD	0.09079	178.40496
S:L = 1:10, pH 13.5, P_{CO2} = 4.14, DF = 200	<LOD	0.00475	<LOD	0.12122	0.10805	0.07862	0.22752	182.43960
S:L = 1:10, pH 13.5, P_{CO2} = 4.14, DF = 200	<LOD	0.00451	<LOD	0.10235	0.09011	0.07184	0.21445	178.25491
S:L = 1:100, pH 13.5, P_{CO2} = 4.14, DF = 200	<LOD	0.00296	<LOD	0.02309	0.02141	<LOD	0.10530	181.24857
S:L = 1:100, pH 13.5, P_{CO2} = 4.14, DF = 200	<LOD	0.00382	<LOD	0.01872	0.02019	<LOD	0.09324	180.94975
S:L = 1:10, pH 13.5, P_{CO2} = 17.24, DF = 200	<LOD	0.00212	<LOD	0.11079	0.09802	<LOD	0.18886	177.49616
S:L = 1:10, pH 13.5, P_{CO2} = 17.24, DF = 200	<LOD	0.00352	<LOD	0.09498	0.08652	<LOD	0.16980	172.02700
S:L = 1:100, pH 13.5, P_{CO2} = 17.24, DF = 200	<LOD	<LOD	<LOD	0.01773	0.01814	<LOD	0.09174	181.32513
S:L = 1:100, pH 13.5, P_{CO2} = 17.24, DF = 200	<LOD	<LOD	<LOD	0.01949	0.02160	<LOD	0.09753	180.65014

X.VI Element LOD and LOQ for ICP-OES Analyses (Runs 100 – 114)

Blank LOD and LOQ calculations

	Sc 361.383	**Sc**	**Al 396.153**	**As 188.979**	**As 197.197**	**B 249.772**	**B 208.889**	**Ba 233.527**	**Be 313.107**
BLANK	0.984546	0.988649	-0.00019	-5.92E-05	-0.00662	-0.0038	-0.0042	5.13E-05	2.53E-06
BLANK	0.983351	1.003356	-0.00017	0.000899	-0.00155	0.017866	0.018801	-7.05E-05	3.27E-06
BLANK	0.949765	0.947942	0.000106	0.001865	-0.00338	-0.00697	-0.0058	2.23E-05	9.95E-06
BLANK	0.955863	0.970787	-0.00033	0.000402	-0.00085	-0.01214	-0.01032	1.29E-06	-0.00013
BLANK	0.955785	0.978657	-0.00019	0.0026	-0.00194	-0.01211	-0.00975	-7.65E-05	-3.30E-05
BLANK	0.968049	0.981292	0.000175	0.002406	-0.0036	-0.01259	-0.01205	-5.69E-05	1.16E-05
BLANK	0.948154	0.969093	-2.14E-05	0.002425	-0.00454	-0.01291	-0.0116	-3.86E-05	-1.34E-05
Avg	0.963645	0.977111	-8.9E-05	0.001505	-0.00321	-0.00609	-0.00499	-2.4E-05	-2.1E-05
Standard Deviation	0.015273	0.017306	0.000181	0.001081	0.001981	0.011116	0.010893	4.94E-05	4.89E-05
LOD	1.009463	1.029028	0.000455	0.004749	0.002733	0.027256	0.02769	0.000124	0.000126
LOQ	1.116372	1.150166	0.001723	0.012319	0.016599	0.10507	0.103941	0.00047	0.000468

	Ca 317.933	**Cd 228.802**	**Cd 214.440**	**Co 228.616**	**Cr 267.716**	**Cu 327.393**	**Fe 238.204**	**Mg 285.213**	**Mn 257.610**
BLANK	-5.77E-05	0.000117	-7.84E-05	-0.00036	0.000191	0.000536	-9.07E-05	3.26E-05	-9.52E-06
BLANK	0.000575	0.000177	-7.53E-05	-0.0002	-0.00037	0.000873	-8.33E-05	0.000234	-1.88E-05
BLANK	-0.00054	0.00025	-0.00016	-7.19E-05	-0.00056	0.000504	-0.00022	7.89E-05	-1.10E-05
BLANK	0.000815	0.000202	-0.00022	-0.00017	-0.00031	-0.00091	-0.00012	0.000174	-3.75E-05
BLANK	-0.0007	-1.52E-05	-9.59E-05	-0.00011	-0.00041	-0.00048	-0.00026	-2.24E-05	-2.56E-05
BLANK	0.000663	-4.21E-05	-0.00013	-0.00017	-0.00038	-0.00058	-0.00012	0.00026	-1.60E-05
BLANK	0.000125	-3.35E-05	-0.00022	-5.04E-05	-0.00034	-0.00072	-0.00016	0.000316	1.25E-05
Avg	0.000126	9.37E-05	-0.00014	-0.00016	-0.00031	-0.00011	-0.00015	0.000153	-1.5E-05
Standard Deviation	0.000595	0.000123	6.4E-05	0.000103	0.000235	0.000723	6.75E-05	0.000126	1.55E-05
LOD	0.001912	0.000462	5.17E-05	0.000148	0.000394	0.002057	5.11E-05	0.000532	3.13E-05
LOQ	0.006081	0.00132	0.0005	0.000871	0.002043	0.007117	0.000524	0.001417	0.000139

	Mo 202.031	Ni 231.604	Pb 220.353	Se 196.026	Sb 206.836	Ag 328.068	Sn 189.927	Sr 407.771	Tl 190.801
BLANK	-0.00034	-0.0003	-0.00091	-0.00129	-0.00053	-9.16E-05	0.000622	-3.94E-05	-0.00178
BLANK	0.000508	-0.00058	-0.00033	0.002027	0.001013	0.00018	0.001597	-2.24E-05	-0.00361
BLANK	-4.62E-05	-7.84E-06	-0.0027	-0.00264	0.001668	-4.23E-05	0.00162	-1.31E-05	-0.00201
BLANK	-0.00021	-0.00038	-0.00232	-0.00629	-0.0007	0.000137	0.000845	2.50E-05	-0.00527
BLANK	-8.62E-05	-0.00019	-0.00296	-0.00632	-0.0005	0.000159	0.001145	9.82E-06	-0.00309
BLANK	-0.00022	-0.00023	-0.00201	-0.00084	-0.0011	2.43E-05	0.00026	-3.03E-06	-0.00547
BLANK	-0.00033	-0.0004	-0.00293	-0.00557	-0.00156	-9.04E-06	0.002598	-1.39E-05	-0.00748
Avg	-0.0001	-0.0003	-0.00202	-0.00299	-0.00024	5.11E-05	0.001241	-8.2E-06	-0.0041
Standard Deviation	0.000293	0.000181	0.001028	0.003201	0.001157	0.000107	0.000777	2.12E-05	0.002067
LOD	0.000773	0.000247	0.001063	0.006613	0.003229	0.000373	0.003572	5.53E-05	0.002101
LOQ	0.002821	0.001517	0.008259	0.029017	0.011332	0.001124	0.009011	0.000203	0.016572

	Ti 334.940	V 290.880	Zn 206.200	Si 251.611	Si	K 766.490	K	Na 589.592	Na
BLANK	3.79E-05	-0.00149	-0.00035	6.86E-05	-0.00137	-0.01492	-0.00029	-0.00026	0.000199
BLANK	0.000121	-0.0023	0.000581	0.001614	0.0003	-0.02386	-1.17E-05	0.000497	0.000108
BLANK	2.77E-05	-0.00112	-0.00041	0.001252	0.000444	0.027611	0.000585	0.015928	0.00778
BLANK	1.33E-05	0.001406	-0.00072	-0.00045	-0.00192	0.022418	0.000482	0.007508	0.004987
BLANK	-5.26E-07	-0.00184	-0.00075	-0.00105	-0.00207	0.013035	0.00065	0.009643	0.006753
BLANK	2.28E-05	-0.0029	0.000121	-0.00175	-0.00184	0.005263	0.002528	0.117793	0.063576
BLANK	-6.46E-05	-0.00238	1.83E-05	-0.00133	-0.00253	0.025462	0.005028	0.290503	0.151336
Avg	2.25E-05	-0.00152	-0.00022	-0.00023	-0.00128	0.007859	0.001281	0.063087	0.033534
Standard Deviation	5.5E-05	0.00142	0.000483	0.001286	0.001182	0.020291	0.001883	0.108636	0.056574
LOD	0.000188	0.00274	0.001234	0.003624	0.002262	0.068732	0.006929	0.388995	0.203257
LOQ	0.000573	0.012677	0.004618	0.012626	0.010535	0.210771	0.020106	1.149447	0.599277

LOD and LOQ check for DF = 100

	Sc 361.383	**Sc**	**Al 396.153**	**As 188.979**	**As 197.197**	**B 249.772**	**B 208.889**	**Ba 233.527**	**Be 313.107**
S:L = 1:10, time = 15, P_{CO2} = 0.69, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.000214	<LOD
S:L = 1:10, time = 15, P_{CO2} = 0.69, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.000138	<LOD
S:L = 1:100, time = 15, P_{CO2} = 0.69, pH 13, DF = 100	<LOD	<LOD	0.000929	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, time = 15, P_{CO2} = 0.69, pH 13, DF = 100	<LOD	<LOD	0.003446	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:10, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.000131	<LOD
S:L = 1:10, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.000196	<LOD
S:L = 1:100, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	0.001278	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	0.00071	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:10, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	<LOD	<LOD	0.002201	<LOD	<LOD	<LOD	<LOD	0.000278	<LOD
S:L = 1:10, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.000174	<LOD
S:L = 1:100, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:10, time = 15, P_{CO2} = 17.024, pH 13, DF = 100	<LOD	<LOD	0.002193	<LOD	<LOD	<LOD	<LOD	0.00027	<LOD
S:L = 1:10, time = 15, P_{CO2} = 17.024, pH 13, DF = 100	<LOD	<LOD	0.001695	<LOD	<LOD	<LOD	<LOD	0.000366	<LOD
S:L = 1:100, time = 15, P_{CO2} = 17.024, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.000158	<LOD

	Ca 317.933	Cd 228.802	Cd 214.440	Co 228.616	Cr 267.716	Cu 327.393	Fe 238.204	Mg 285.213	Mn 257.610
S:L = 1:10, time = 15, P_{CO2} = 0.69, pH 13, DF = 100	5.414551	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.065431	<LOD
S:L = 1:10, time = 15, P_{CO2} = 0.69, pH 13, DF = 100	5.352523	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.060583	<LOD
S:L = 1:100, time = 15, P_{CO2} = 0.69, pH 13, DF = 100	2.576246	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, time = 15, P_{CO2} = 0.69, pH 13, DF = 100	4.205272	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.000818	<LOD
S:L = 1:10, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	5.808393	<LOD	<LOD	0.000304	<LOD	<LOD	<LOD	0.063655	3.74E-05
S:L = 1:10, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	5.816958	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.063837	<LOD
S:L = 1:100, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	1.282668	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.003405	<LOD
S:L = 1:100, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	0.850673	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.001589	<LOD
S:L = 1:10, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	6.762302	<LOD	<LOD	0.000159	<LOD	<LOD	<LOD	0.069283	7.21E-05
S:L = 1:10, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	4.170468	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.04016	<LOD
S:L = 1:100, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	5.166064	<LOD	<LOD	0.000298	<LOD	<LOD	<LOD	0.004719	<LOD
S:L = 1:100, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	5.902286	<LOD	<LOD	0.000219	<LOD	<LOD	<LOD	0.005136	<LOD
S:L = 1:10, time = 15, P_{CO2} = 17.024, pH 13, DF = 100	8.912558	<LOD	<LOD	0.000676	<LOD	<LOD	<LOD	0.066545	0.000585
S:L = 1:10, time = 15, P_{CO2} = 17.024, pH 13, DF = 100	9.343308	<LOD	<LOD	0.000691	<LOD	<LOD	<LOD	0.069841	0.000139
S:L = 1:100, time = 15, P_{CO2} = 17.024, pH 13, DF = 100	9.336207	<LOD	<LOD	0.000367	<LOD	<LOD	<LOD	0.00899	4.55E-05

	Mo 202.031	Ni 231.604	Pb 220.353	Se 196.026	Sb 206.836	Ag 328.068	Sn 189.927	Sr 407.771	Tl 190.801
S:L = 1:10, time = 15, P_{CO2} = 0.69, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.013772	<LOD
S:L = 1:10, time = 15, P_{CO2} = 0.69, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.013894	<LOD
S:L = 1:100, time = 15, P_{CO2} = 0.69, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.005608	<LOD
S:L = 1:100, time = 15, P_{CO2} = 0.69, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.008523	<LOD
S:L = 1:10, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.014032	<LOD
S:L = 1:10, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.013932	<LOD
S:L = 1:100, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.002786	<LOD
S:L = 1:100, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00241	<LOD
S:L = 1:10, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	0.000811	<LOD	<LOD	<LOD	0.003271	<LOD	<LOD	0.015829	<LOD
S:L = 1:10, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.009361	<LOD
S:L = 1:100, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	0.003853	<LOD	<LOD	0.008287	<LOD
S:L = 1:100, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.009599	<LOD
S:L = 1:10, time = 15, P_{CO2} = 17.024, pH 13, DF = 100	0.010093	0.033662	<LOD	<LOD	<LOD	<LOD	<LOD	0.016121	<LOD
S:L = 1:10, time = 15, P_{CO2} = 17.024, pH 13, DF = 100	<LOD	0.001573	<LOD	<LOD	<LOD	<LOD	<LOD	0.017242	<LOD
S:L = 1:100, time = 15, P_{CO2} = 17.024, pH 13, DF = 100	0.000926	0.00321	<LOD	<LOD	<LOD	<LOD	<LOD	0.011671	<LOD

	Ti 334.940	V 290.880	Zn 206.200	Si 251.611	Si	K 766.490	K	Na 589.592	Na
S:L = 1:10, time = 15, P_{CO2} = 0.69, pH 13, DF = 100	<LOD	<LOD	<LOD	0.005598	0.004195	<LOD	0.013137	21.68433	
S:L = 1:10, time = 15, P_{CO2} = 0.69, pH 13, DF = 100	<LOD	<LOD	<LOD	0.005104	0.005806	<LOD	0.014197	21.65597	
S:L = 1:100, time = 15, P_{CO2} = 0.69, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	21.47119	14.6371
S:L = 1:100, time = 15, P_{CO2} = 0.69, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	22.197	15.07398
S:L = 1:10, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	0.005498	0.005278	<LOD	0.012929	21.27761	14.54867
S:L = 1:10, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	0.005542	0.005811	<LOD	0.0126	20.50726	14.41094
S:L = 1:100, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	21.60652	
S:L = 1:100, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	21.03996	14.50975
S:L = 1:10, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	<LOD	<LOD	0.001481	0.00667	0.004875	<LOD	0.015682	21.5427	
S:L = 1:10, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.007092	13.73233	9.968606
S:L = 1:100, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	21.71989	15.10795
S:L = 1:100, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.007524	21.50849	15.10729
S:L = 1:10, time = 15, P_{CO2} = 17.024, pH 13, DF = 100	<LOD	<LOD	0.002006	0.006344	0.003119	<LOD	0.012468	19.94872	14.15936
S:L = 1:10, time = 15, P_{CO2} = 17.024, pH 13, DF = 100	<LOD	<LOD	<LOD	0.005049	0.003746	<LOD	0.012415	20.9089	
S:L = 1:100, time = 15, P_{CO2} = 17.024, pH 13, DF = 100	<LOD	<LOD	0.005477	<LOD	<LOD	<LOD	<LOD	21.01933	

LOD and LOQ check for DF = 5

		Sc 361.383	**Sc**	**Al 396.153**	**As 188.979**	**As 197.197**	**B 249.772**	**B 208.889**	**Ba 233.527**	**Be 313.107**
S:L = 1:10, time = 15, P_{CO2} = 0.69, pH 13, DF = 5	JR 19 100A DF5	<LOD	<LOD	<LOD	<LOD	<LOD	0.10799	0.10365	0.00327	<LOD
S:L = 1:10, time = 15, P_{CO2} = 0.69, pH 13, DF = 5	JR 19 101A DF5	<LOD	<LOD	<LOD	<LOD	0.01937	0.10867	0.10796	0.00319	<LOD
S:L = 1:100, time = 15, P_{CO2} = 0.69, pH 13, DF = 5	JR 19 102A DF5	<LOD	<LOD	0.03352	<LOD	0.01092	<LOD	<LOD	0.00087	<LOD
S:L = 1:100, time = 15, P_{CO2} = 0.69, pH 13, DF = 5	JR 19 103A DF5	<LOD	<LOD	0.03603	<LOD	0.01406	<LOD	<LOD	0.00108	<LOD
S:L = 1:10, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	JR 19 104A DF5	<LOD	<LOD	0.01454	<LOD	0.00736	0.12420	0.11930	0.00400	<LOD
S:L = 1:10, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	JR 19 105A DF5	<LOD	<LOD	0.02896	<LOD	<LOD	0.11810	0.11347	0.00428	<LOD
S:L = 1:100, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	JR 19 106A DF5	<LOD	<LOD	0.02726	<LOD	<LOD	<LOD	<LOD	0.00067	<LOD
S:L = 1:100, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	JR 19 107A DF5	<LOD	<LOD	0.02836	<LOD	<LOD	<LOD	<LOD	0.00044	<LOD
S:L = 1:10, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	JR 19 108A DF5	<LOD	<LOD	0.04014	<LOD	0.00750	0.11594	0.11317	0.00464	<LOD
S:L = 1:10, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	JR 19 109A DF5	<LOD	<LOD	0.03817	<LOD	<LOD	0.11543	0.11323	0.00484	<LOD
S:L = 1:100, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	JR 19 110A DF5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00168	<LOD
S:L = 1:100, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	JR 19 111A DF5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00174	<LOD
S:L = 1:10, time = 15, P_{CO2} = 17.024, pH 13, DF = 5	JR 19 112A DF5	<LOD	<LOD	0.08680	<LOD	<LOD	0.18569	0.17291	0.00648	<LOD
S:L = 1:10, time = 15, P_{CO2} = 17.024, pH 13, DF = 5	JR 19 113A DF5	<LOD	<LOD	0.07433	<LOD	<LOD	0.11808	0.11015	0.00650	<LOD
S:L = 1:100, time = 15, P_{CO2} = 17.024, pH 13, DF = 5	JR 19 114A DF5	<LOD	<LOD	0.00152	<LOD	<LOD	<LOD	<LOD	0.00342	<LOD

	Ca 317.933	Cd 228.802	Cd 214.440	Co 228.616	Cr 267.716	Cu 327.393	Fe 238.204	Mg 285.213	Mn 257.610
S:L = 1:10, time = 15, P_{CO2} = 0.69, pH 13, DF = 5	83.01711	<LOD	<LOD	0.00350	0.00068	<LOD	0.00032	1.37816	0.00046
S:L = 1:10, time = 15, P_{CO2} = 0.69, pH 13, DF = 5	83.04958	<LOD	<LOD	0.00323	0.00044	<LOD	0.00027	1.32243	0.00046
S:L = 1:100, time = 15, P_{CO2} = 0.69, pH 13, DF = 5	43.55562	<LOD	<LOD	0.00212	<LOD	<LOD	0.00073	0.00370	0.00006
S:L = 1:100, time = 15, P_{CO2} = 0.69, pH 13, DF = 5	64.72756	<LOD	<LOD	0.00275	<LOD	<LOD	0.00048	0.00399	0.00010
S:L = 1:10, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	89.57608	<LOD	<LOD	0.00352	0.00105	<LOD	0.00069	1.41406	0.00106
S:L = 1:10, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	93.52584	<LOD	<LOD	0.00353	0.00102	<LOD	0.00048	1.41371	0.00119
S:L = 1:100, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	24.26170	<LOD	<LOD	0.00137	<LOD	<LOD	0.00048	0.07362	0.00009
S:L = 1:100, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	17.14920	<LOD	<LOD	0.00069	<LOD	<LOD	<LOD	0.03901	<LOD
S:L = 1:10, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	100.85301	<LOD	<LOD	0.00398	0.00100	<LOD	<LOD	1.52825	0.00166
S:L = 1:10, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	96.39941	<LOD	<LOD	0.00366	0.00092	<LOD	0.00025	1.49479	0.00150
S:L = 1:100, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	83.21997	<LOD	<LOD	0.00303	0.00059	<LOD	0.00131	0.09846	0.00015
S:L = 1:100, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	86.85278	<LOD	<LOD	0.00371	0.00043	<LOD	0.00132	0.10393	0.00018
S:L = 1:10, time = 15, P_{CO2} = 17.024, pH 13, DF = 5	127.35731	<LOD	0.00078	0.00605	0.00211	<LOD	0.00277	1.51019	0.01238
S:L = 1:10, time = 15, P_{CO2} = 17.024, pH 13, DF = 5	128.72065	<LOD	<LOD	0.00456	0.00148	<LOD	0.00237	1.58406	0.00326
S:L = 1:100, time = 15, P_{CO2} = 17.024, pH 13, DF = 5	131.48242	<LOD	<LOD	0.00464	0.00144	<LOD	0.00206	0.18351	0.00121

	Mo 202.031	Ni 231.604	Pb 220.353	Se 196.026	Sb 206.836	Ag 328.068	Sn 189.927	Sr 407.771	Tl 190.801
S:L = 1:10, time = 15, P_{CO2} = 0.69, pH 13, DF = 5	0.00693	<LOD	<LOD	0.01881	0.01725	<LOD	<LOD	0.26493	0.02022
S:L = 1:10, time = 15, P_{CO2} = 0.69, pH 13, DF = 5	0.00506	0.00458	<LOD	0.01493	0.01750	<LOD	<LOD	0.27074	0.01862
S:L = 1:100, time = 15, P_{CO2} = 0.69, pH 13, DF = 5	0.00173	<LOD	<LOD	<LOD	0.00975	<LOD	<LOD	0.10962	0.00703
S:L = 1:100, time = 15, P_{CO2} = 0.69, pH 13, DF = 5	0.00119	<LOD	<LOD	<LOD	0.01261	<LOD	<LOD	0.16178	0.00976
S:L = 1:10, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	0.00455	<LOD	<LOD	0.01737	0.01990	<LOD	<LOD	0.27594	0.01776
S:L = 1:10, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	0.00222	<LOD	<LOD	0.04208	0.02290	<LOD	<LOD	0.28487	0.03755
S:L = 1:100, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	0.00154	<LOD	<LOD	0.00809	0.00577	<LOD	<LOD	0.05697	0.00812
S:L = 1:100, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	0.00351	<LOD	<LOD	<LOD	0.00593	<LOD	<LOD	0.05144	0.00307
S:L = 1:10, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	0.00595	<LOD	<LOD	0.02927	0.02006	<LOD	<LOD	0.30610	0.03177
S:L = 1:10, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	0.00231	<LOD	<LOD	0.01883	0.02234	<LOD	<LOD	0.29718	0.02625
S:L = 1:100, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	0.00205	<LOD	<LOD	0.02041	0.01681	<LOD	<LOD	0.16554	0.02783
S:L = 1:100, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	<LOD	0.00107	<LOD	0.01458	0.01732	<LOD	<LOD	0.17335	0.03080
S:L = 1:10, time = 15, P_{CO2} = 17.024, pH 13, DF = 5	0.22384	0.64532	<LOD	0.04323	0.01950	<LOD	<LOD	0.31926	0.03675
S:L = 1:10, time = 15, P_{CO2} = 17.024, pH 13, DF = 5	0.01707	0.04286	<LOD	0.04037	0.02313	<LOD	<LOD	0.33545	0.03370
S:L = 1:100, time = 15, P_{CO2} = 17.024, pH 13, DF = 5	0.02927	0.08011	<LOD	0.04376	0.02501	<LOD	<LOD	0.23270	0.05622

	Ti 334.940	V 290.880	Zn 206.200	Si 251.611	Si	K 766.490	K	Na 589.592	Na
S:L = 1:10, time = 15, P_{CO2} = 0.69, pH 13, DF = 5	<LOD	0.00893	0.00628	0.12099	0.11417	0.24084	0.40038	205.68539	
S:L = 1:10, time = 15, P_{CO2} = 0.69, pH 13, DF = 5	<LOD	0.00833	0.00551	0.12849	0.12075	0.24703	0.44594	207.26191	
S:L = 1:100, time = 15, P_{CO2} = 0.69, pH 13, DF = 5	<LOD	0.00305	0.00387	0.01503	0.01404	0.10971	0.14031	205.99493	
S:L = 1:100, time = 15, P_{CO2} = 0.69, pH 13, DF = 5	<LOD	0.00407	0.00407	0.01257	0.01236	0.09603	0.13117	207.68850	
S:L = 1:10, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	0.00778	0.01107	0.14256	0.13474	0.22975	0.42582	206.60407	
S:L = 1:10, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	0.00740	0.01160	0.13933	0.13402	0.23241	0.41501	205.27182	
S:L = 1:100, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	0.00398	0.00209	0.01956	0.02103	0.12451	0.15809	209.47186	
S:L = 1:100, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	0.00916	0.00216	0.01648	0.01681	0.16051	0.13392	213.54947	
S:L = 1:10, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	<LOD	0.00713	0.01510	0.12033	0.11220	0.29926	0.49480	205.51806	
S:L = 1:10, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	<LOD	0.01010	0.01307	0.11241	0.10752	0.27381	0.43989	204.83512	
S:L = 1:100, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	<LOD	0.00587	0.00419	0.01939	0.02095	0.15272	0.15358	211.35570	
S:L = 1:100, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	<LOD	0.00488	0.00439	0.02746	0.02338	0.14889	0.21996	200.81331	
S:L = 1:10, time = 15, P_{CO2} = 17.024, pH 13, DF = 5	<LOD	<LOD	0.04657	0.14054	0.13555	0.25570	0.40909	197.94557	
S:L = 1:10, time = 15, P_{CO2} = 17.024, pH 13, DF = 5	<LOD	0.00299	0.02343	0.12254	0.11733	0.25455	0.43180	203.42517	
S:L = 1:100, time = 15, P_{CO2} = 17.024, pH 13, DF = 5	<LOD	0.00575	0.10967	0.02500	0.02399	0.14999	0.13926	205.91827	

LOD and LOQ check for unreacted gypsum digestion for DF = 30 and DF = 5

	Sc 361.383	**Sc**	**Al 396.153**	**As 188.979**	**As 197.197**	**B 249.772**	**B 208.889**	**Ba 233.527**	**Be 313.107**
Unreacted GYPSUM1 DF30	<LOD	1.047944	1.053152	<LOD	0.009282	0.038865	0.032311	0.020654	<LOD
Unreacted GYPSUM1 DF5	<LOD	<LOD	6.179669	<LOD	0.038732	0.172044	0.136578	0.122927	0.000202
Unreacted GYPSUM2 DF30	<LOD	<LOD	0.174553	<LOD	<LOD	<LOD	<LOD	0.003792	<LOD
Unreacted GYPSUM2 DF5	<LOD	<LOD	1.13963	<LOD	0.009892	0.044938	0.037889	0.023314	<LOD

	Ca 317.933	**Cd 228.802**	**Cd 214.440**	**Co 228.616**	**Cr 267.716**	**Cu 327.393**	**Fe 238.204**	**Mg 285.213**	**Mn 257.610**
Unreacted GYPSUM1 DF30	25.87755	0.000462	<LOD	0.002396	0.015384	0.004301	1.020755	0.783429	0.019703
Unreacted GYPSUM1 DF5	116.6581	0.002281	<LOD	0.008536	0.092753	0.064112	5.578487	4.422976	0.115718
Unreacted GYPSUM2 DF30	26.96136	<LOD	<LOD	0.001466	0.002494	<LOD	0.149745	0.120662	0.002475
Unreacted GYPSUM2 DF5	127.105	0.001103	<LOD	0.004157	0.015008	0.031684	0.899707	0.746991	0.013861

	Mo 202.031	**Ni 231.604**	**Pb 220.353**	**Se 196.026**	**Sb 206.836**	**Ag 328.068**	**Sn 189.927**	**Sr 407.771**	**Tl 190.801**
Unreacted GYPSUM1 DF30	0.003385	<LOD	<LOD	0.013478	0.009326	<LOD	<LOD	0.116175	0.004053
Unreacted GYPSUM1 DF5	0.016855	0.00717	<LOD	0.087331	0.026705	<LOD	<LOD	0.715033	0.019952
Unreacted GYPSUM2 DF30	0.000783	<LOD	<LOD	<LOD	0.008413	<LOD	<LOD	0.043534	0.005243
Unreacted GYPSUM2 DF5	0.003129	<LOD	<LOD	0.016784	0.027742	<LOD	<LOD	0.277999	0.02004

	Ti 334.940	V 290.880	Zn 206.200	Si 251.611	Si	K 766.490	K	Na 589.592	Na
Unreacted GYPSUM1 DF30	0.026155	0.01053	0.020294	0.191615	0.183699	0.177704	0.201249	<LOD	<LOD
Unreacted GYPSUM1 DF5	0.160825	0.042972	0.106552	1.189349	1.262468	1.510325	1.497934	<LOD	0.467995
Unreacted GYPSUM2 DF30	0.006512	0.003755	0.003693	0.08546	0.084282	<LOD	0.03203	<LOD	<LOD
Unreacted GYPSUM2 DF5	0.045656	0.010863	0.017355	0.66037	0.714403	0.291578	0.257241	<LOD	<LOD

X.VII Element LOD and LOQ for ICP-OES Analyses (Runs 115 – 132)

Blank LOD and LOQ calculation

	Sc 361.383	**Sc**	**Al 396.153**	**As 188.979**	**As 197.197**	**B 249.772**	**B 208.889**	**Ba 233.527**	**Be 313.107**
BLANK	0.987588	1.030567	0.000197	0.000295	-0.00078	-0.00451	-0.0034	2.54E-05	-6.64E-05
BLANK	0.987591	1.027993	3.45E-05	0.000213	-0.00196	0.008639	0.008959	4.69E-05	4.52E-06
BLANK	0.988416	1.012909	-0.00195	0.000399	-0.00016	-0.01355	-0.01392	-7.83E-05	0.000123
BLANK	0.976011	1.031995	-3.18E-05	-0.00195	-0.00526	-0.01373	-0.01271	-4.15E-06	-0.00022
BLANK	0.993113	1.027289	-0.00151	0.002598	-0.00308	0.020807	0.019016	1.53E-05	-4.16E-06
BLANK	0.974965	1.008632	-0.00167	0.00096	-0.00319	-0.01374	-0.01475	-9.99E-05	9.64E-05
BLANK	0.974193	1.017694	0.000237	-0.00102	-0.0061	-0.01396	-0.01321	4.02E-05	-0.00016
BLANK	0.940519	0.960418	-0.00215	-0.0005	0.000295	0.026032	0.024959	-6.67E-05	-7.42E-05
BLANK	0.949648	0.984946	-0.00263	-0.00196	-0.00428	-0.01464	-0.01481	-0.00013	-9.09E-06
BLANK	0.954882	0.992147	-0.00154	-0.00253	-0.00237	-0.01464	-0.01453	-0.00012	-0.00011
Avg	0.972693	1.009459	-0.0011	-0.00035	-0.00269	-0.00333	-0.00344	-3.7E-05	-4.2E-05
Standard Deviation	0.018288	0.023572	0.001093	0.001567	0.002129	0.015914	0.015405	6.88E-05	0.000107
LOD	1.027555	1.080176	0.002178	0.00435	0.003699	0.044411	0.042776	0.00017	0.000278
LOQ	1.155568	1.245181	0.009833	0.015315	0.0186	0.155808	0.150612	0.000651	0.001024

	Ca 317.933	**Cd 228.802**	**Cd 214.440**	**Co 228.616**	**Cr 267.716**	**Cu 327.393**	**Fe 238.204**	**Mg 285.213**	**Mn 257.610**
BLANK	0.000168	7.59E-05	-0.00013	-8.92E-05	-8.29E-05	-0.0009	5.22E-05	1.98E-05	-1.90E-05
BLANK	0.000273	2.35E-05	-0.00011	-0.00029	-0.00017	4.67E-05	4.66E-05	0.000162	-9.16E-06
BLANK	-0.00242	7.16E-05	-3.01E-05	-0.00022	-3.84E-05	0.000203	0.005905	-0.0003	2.58E-05
BLANK	-0.0004	-2.22E-05	-0.00016	-0.00017	-0.0003	-0.00126	-4.93E-05	2.82E-05	-1.85E-05
BLANK	-0.00274	0.000106	6.28E-05	-0.00014	9.51E-05	-0.00058	0.005085	-0.00024	2.17E-05
BLANK	-0.00246	-0.00017	-0.00025	3.90E-05	-0.00015	-0.00079	0.007115	-0.00019	2.69E-05
BLANK	0.000374	-0.00031	-0.00031	-7.38E-05	1.85E-05	-0.00166	0.0001	8.87E-05	-1.54E-05
BLANK	-0.00341	5.04E-05	-0.00025	-2.70E-05	0.000144	-0.00096	0.102573	-0.00039	0.000711
BLANK	-0.00359	-1.73E-07	-0.00028	-0.00011	-5.17E-05	-0.00044	0.013742	-0.00031	8.63E-05
BLANK	-0.00119	-0.00014	-0.0004	-0.00012	5.71E-05	-0.00186	0.002083	-0.00026	-5.34E-06

Avg	-0.00154	-3.1E-05	-0.00018	-0.00012	-4.8E-05	-0.00082	0.013665	-0.00014	8.04E-05
Standard Deviation	0.001565	0.000134	0.000138	9.38E-05	0.000135	0.000666	0.031549	0.000195	0.000224
LOD	0.003156	0.000369	0.000229	0.000161	0.000356	0.001178	0.108314	0.000445	0.000752
LOQ	0.014109	0.001304	0.001194	0.000818	0.001299	0.005841	0.32916	0.001809	0.002319

	Mo 202.031	**Ni 231.604**	**Pb 220.353**	**Se 196.026**	**Sb 206.836**	**Ag 328.068**	**Sn 189.927**	**Sr 407.771**	**Tl 190.801**
BLANK	-0.00097	9.95E-05	0.001267	0.002416	0.00132	-0.00019	-0.00023	9.54E-06	0.000765
BLANK	0.001019	4.98E-07	0.001156	-0.00246	0.002691	0.000196	-0.0013	-1.50E-05	0.003587
BLANK	-0.00206	-0.00041	0.000873	-0.0031	0.000568	-0.00024	-0.00018	-4.79E-05	0.001741
BLANK	-0.00196	-0.00035	-0.00026	-0.0042	0.002006	-0.00013	-0.00149	-1.56E-05	0.002327
BLANK	0.002826	9.62E-05	0.001138	-8.57E-05	0.00188	0.000397	-0.00085	-1.62E-05	0.003901
BLANK	-0.002	-0.00016	0.001427	-0.00448	-0.00089	8.42E-05	-0.00153	-4.88E-05	0.00284
BLANK	-0.00212	-6.53E-05	0.00107	0.000147	0.001359	-8.68E-05	7.77E-06	-2.37E-05	0.00198
BLANK	0.003574	-0.00027	0.001369	-0.00125	-0.00052	-0.00015	-0.00141	-1.37E-05	0.002186
BLANK	-0.00209	-0.00038	0.000736	-0.0038	0.000874	-0.00018	-0.00087	-3.34E-05	0.002001
BLANK	-0.00224	0.000206	-0.00059	-0.00473	0.001355	-8.75E-05	-0.00139	-3.18E-05	0.002705
Avg	-0.0006	-0.00012	0.000819	-0.00215	0.001064	-3.8E-05	-0.00092	-2.4E-05	0.002403
Standard Deviation	0.002238	0.000222	0.000691	0.002386	0.001108	0.000202	0.000597	1.76E-05	0.00091
LOD	0.006113	0.000543	0.002893	0.005003	0.004387	0.000568	0.000867	2.91E-05	0.005132
LOQ	0.021781	0.002094	0.007731	0.021703	0.012142	0.001983	0.005047	0.000152	0.011499

	Ti 334.940	**V 290.880**	**Zn 206.200**	**Si 251.611**	**Si**	**K 766.490**	**K**	**Na 589.592**	**Na**
BLANK	8.52E-06	0.000953	-2.56E-05	-0.00055	0.001364	-0.01563	-0.00012	0.002938	-0.0002
BLANK	0.000249	-0.00035	0.000131	0.000591	0.010783	-0.00736	8.58E-05	-0.00289	-0.00053
BLANK	-1.52E-05	-0.00282	-0.00076	-0.00192	0.000344	-0.00065	0.000443	0.008162	0.003369
BLANK	1.37E-05	0.002465	-0.00036	-0.00107	-0.00164	-0.00615	0.000286	0.000651	0.002388
BLANK	0.000181	-0.00109	0.000191	0.001763	0.00355	-0.01421	-0.00042	-0.00259	-0.00064
BLANK	-2.31E-05	-0.00229	0.001057	-0.00169	-0.00031	0.001739	0.001702	0.101808	0.061243
BLANK	-6.55E-06	0.002767	0.000356	-0.00196	-0.00154	-0.00557	0.001189	0.079281	0.045035
BLANK	-1.70E-05	0.000111	-1.27E-05	0.003322	0.008252	0.052248	0.000702	0.016132	0.006578
BLANK	-0.00013	-0.00059	-0.00023	-0.00221	-0.00023	0.035962	0.00298	0.199668	0.113284

BLANK	-0.00014	0.000821	-6.65E-05	-0.00207	0.000208	0.034923	0.002284	0.167891	0.090358
Avg	1.24E-05	-2.6E-06	2.77E-05	-0.00058	0.002078	0.007529	0.000914	0.057106	0.032087
Standard Deviation	0.00012	0.001832	0.000478	0.00189	0.00423	0.024149	0.001107	0.076336	0.042871
LOD	0.000372	0.005494	0.001462	0.00509	0.014768	0.079977	0.004234	0.286115	0.160702
LOQ	0.001212	0.018318	0.004808	0.018319	0.044377	0.249021	0.011981	0.820469	0.460802

LOD and LOQ check for DF = 100

	Sc 361.383	**Sc**	**Al 396.153**	**As 188.979**	**As 197.197**	**B 249.772**	**B 208.889**	**Ba 233.527**	**Be 313.107**
S:L = 1:100, time = 15, P_{CO2} = 17.24, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00025	<LOD
S:L = 1:10, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00031	<LOD
S:L = 1:10, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00023	<LOD
S:L = 1:100, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:40, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:40, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:40, time = 15, P_{CO2} = 17.24, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:40, time = 15, P_{CO2} = 17.24, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:80, time = 15, P_{CO2} = 17.24, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:80, time = 15, P_{CO2} = 17.24, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:80, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:80, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD

S:L = 1:80, time = 15, P_{CO2} = .69, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:80, time = 15, P_{CO2} = .69, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:80, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:80, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD

	Ca 317.933	**Cd 228.802**	**Cd 214.440**	**Co 228.616**	**Cr 267.716**	**Cu 327.393**	**Fe 238.204**	**Mg 285.213**	**Mn 257.610**
S:L = 1:100, time = 15, P_{CO2} = 17.24, pH 13, DF = 100	9.48375	<LOD	<LOD	0.00059	<LOD	<LOD	<LOD	0.00987	<LOD
S:L = 1:10, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	8.24468	<LOD	<LOD	0.00079	<LOD	<LOD	<LOD	0.08270	<LOD
S:L = 1:10, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	8.36358	<LOD	<LOD	0.00051	<LOD	<LOD	<LOD	0.08841	<LOD
S:L = 1:100, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	7.18295	<LOD	<LOD	0.00026	<LOD	<LOD	<LOD	0.00349	<LOD
S:L = 1:100, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	7.75442	<LOD	<LOD	0.00050	<LOD	<LOD	<LOD	0.00754	<LOD
S:L = 1:40, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	8.09827	<LOD	<LOD	0.00058	<LOD	<LOD	<LOD	0.02116	<LOD
S:L = 1:40, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	7.21092	<LOD	<LOD	0.00054	<LOD	<LOD	<LOD	0.01794	<LOD
S:L = 1:40, time = 15, P_{CO2} = 17.24, pH 13, DF = 100	4.54587	<LOD	<LOD	0.00043	<LOD	<LOD	<LOD	0.01976	<LOD
S:L = 1:40, time = 15, P_{CO2} = 17.24, pH 13, DF = 100	3.58910	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01920	<LOD
S:L = 1:80, time = 15, P_{CO2} = 17.24, pH 13, DF = 100	5.70787	<LOD	<LOD	0.00018	<LOD	<LOD	<LOD	0.00973	<LOD
S:L = 1:80, time = 15, P_{CO2} = 17.24, pH 13, DF = 100	8.13174	<LOD	<LOD	0.00054	<LOD	<LOD	<LOD	0.00987	<LOD
S:L = 1:80, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	5.69545	<LOD	<LOD	0.00033	<LOD	<LOD	<LOD	0.00939	<LOD
S:L = 1:80, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	6.89075	<LOD	<LOD	0.00037	<LOD	<LOD	<LOD	0.00929	<LOD
S:L = 1:80, time = 15, P_{CO2} = .69, pH 13, DF = 100	2.16466	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD

S:L = 1:80, time = 15, P_{CO2} = .69, pH 13, DF = 100	1.05056	<LOD	<LOD	0.00016	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:80, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	3.06689	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00475	<LOD
S:L = 1:80, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	6.46683	<LOD	<LOD	0.00024	<LOD	<LOD	<LOD	0.00747	<LOD

	Mo 202.031	**Ni 231.604**	**Pb 220.353**	**Se 196.026**	**Sb 206.836**	**Ag 328.068**	**Sn 189.927**	**Sr 407.771**	**Tl 190.801**
S:L = 1:100, time = 15, P_{CO2} = 17.24, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01148	<LOD
S:L = 1:10, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01672	0.00811
S:L = 1:10, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01703	0.00739
S:L = 1:100, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00960	0.00545
S:L = 1:100, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01057	<LOD
S:L = 1:40, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01323	<LOD
S:L = 1:40, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	0.00504	<LOD	<LOD	0.01191	<LOD
S:L = 1:40, time = 15, P_{CO2} = 17.24, pH 13, DF = 100	<LOD	0.00409	<LOD	<LOD	<LOD	<LOD	<LOD	0.00919	<LOD
S:L = 1:40, time = 15, P_{CO2} = 17.24, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00771	<LOD
S:L = 1:80, time = 15, P_{CO2} = 17.24, pH 13, DF = 100	<LOD	0.00057	<LOD	<LOD	<LOD	<LOD	<LOD	0.00906	0.00699
S:L = 1:80, time = 15, P_{CO2} = 17.24, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01043	0.00869
S:L = 1:80, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00958	0.00684
S:L = 1:80, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01037	<LOD
S:L = 1:80, time = 15, P_{CO2} = .69, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00453	<LOD
S:L = 1:80, time = 15, P_{CO2} = .69, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00273	<LOD

S:L = 1:80, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00537	<LOD
S:L = 1:80, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00993	<LOD

	Ti 334.940	**V 290.880**	**Zn 206.200**	**Si 251.611**	**Si**	**K 766.490**	**K**	**Na 589.592**	**Na**
S:L = 1:100, time = 15, P_{CO2} = 17.24, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00426	21.01894	14.47425
S:L = 1:10, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	<LOD	<LOD	<LOD	0.00540	<LOD	<LOD	0.01467	20.79477	14.30064
S:L = 1:10, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01368	21.01804	14.59069
S:L = 1:100, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	19.09923	13.43746
S:L = 1:100, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	20.05008	14.00769
S:L = 1:40, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00614	21.10707	14.65419
S:L = 1:40, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00605	19.49950	13.47623
S:L = 1:40, time = 15, P_{CO2} = 17.24, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00519	20.77120	14.35351
S:L = 1:40, time = 15, P_{CO2} = 17.24, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00460	19.44751	13.24472
S:L = 1:80, time = 15, P_{CO2} = 17.24, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00451	20.91605	14.37372
S:L = 1:80, time = 15, P_{CO2} = 17.24, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	19.06916	13.29848
S:L = 1:80, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00458	21.39156	14.49262
S:L = 1:80, time = 15, P_{CO2} = 6.89, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	20.75070	14.49635
S:L = 1:80, time = 15, P_{CO2} = .69, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	21.12128	14.21269
S:L = 1:80, time = 15, P_{CO2} = .69, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	21.43005	14.63377
S:L = 1:80, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00449	21.46274	14.33128

S:L = 1:80, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	21.00847	14.37291

LOD and LOQ check for DF = 5

	Sc 361.383	**Sc**	**Al 396.153**	**As 188.979**	**As 197.197**	**B 249.772**	**B 208.889**	**Ba 233.527**	**Be 313.107**
S:L = 1:100, time = 15, P_{CO2} = 17.24, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00342	<LOD
S:L = 1:10, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	<LOD	<LOD	0.05178	<LOD	<LOD	0.12788	0.11988	0.00524	<LOD
S:L = 1:10, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	<LOD	<LOD	0.04689	<LOD	<LOD	0.13401	0.12753	0.00580	<LOD
S:L = 1:100, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00253	<LOD
S:L = 1:100, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00227	<LOD
S:L = 1:40, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00261	<LOD
S:L = 1:40, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	0.00495	<LOD	<LOD	0.00275	<LOD
S:L = 1:40, time = 15, P_{CO2} = 17.24, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00163	<LOD
S:L = 1:40, time = 15, P_{CO2} = 17.24, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00131	<LOD
S:L = 1:80, time = 15, P_{CO2} = 17.24, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00070	<LOD
S:L = 1:80, time = 15, P_{CO2} = 17.24, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00310	<LOD
S:L = 1:80, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00046	<LOD
S:L = 1:80, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00146	<LOD
S:L = 1:80, time = 15, P_{CO2} = .69, pH 13, DF = 5	<LOD	<LOD	0.03041	<LOD	<LOD	<LOD	<LOD	0.00046	<LOD
S:L = 1:80, time = 15, P_{CO2} = .69, pH 13, DF = 5	<LOD	<LOD	0.04035	<LOD	<LOD	<LOD	<LOD	0.00024	<LOD
S:L = 1:80, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00086	<LOD
S:L = 1:80, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00180	<LOD

	Ca 317.933	Cd 228.802	Cd 214.440	Co 228.616	Cr 267.716	Cu 327.393	Fe 238.204	Mg 285.213	Mn 257.610
S:L = 1:100, time = 15, P_{CO2} = 17.24, pH 13, DF = 5	127.79012	<LOD	<LOD	0.00409	0.00178	<LOD	<LOD	0.22168	<LOD
S:L = 1:10, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	112.68527	<LOD	<LOD	0.00380	0.00181	<LOD	<LOD	1.82545	0.00153
S:L = 1:10, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	112.60136	<LOD	<LOD	0.00387	0.00156	<LOD	<LOD	1.95025	0.00134
S:L = 1:100, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	116.28949	<LOD	<LOD	0.00365	0.00137	<LOD	<LOD	0.09012	<LOD
S:L = 1:100, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	110.21446	<LOD	<LOD	0.00406	0.00107	<LOD	<LOD	0.17314	<LOD
S:L = 1:40, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	118.51597	<LOD	<LOD	0.00351	0.00146	<LOD	<LOD	0.47429	<LOD
S:L = 1:40, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	113.30940	<LOD	<LOD	0.00393	0.00126	<LOD	<LOD	0.44363	<LOD
S:L = 1:40, time = 15, P_{CO2} = 17.24, pH 13, DF = 5	79.99232	<LOD	<LOD	0.00318	0.00122	<LOD	<LOD	0.44126	<LOD
S:L = 1:40, time = 15, P_{CO2} = 17.24, pH 13, DF = 5	74.15117	<LOD	<LOD	0.00288	0.00093	<LOD	<LOD	0.46447	<LOD
S:L = 1:80, time = 15, P_{CO2} = 17.24, pH 13, DF = 5	89.07021	<LOD	<LOD	0.00319	0.00071	<LOD	<LOD	0.21874	<LOD
S:L = 1:80, time = 15, P_{CO2} = 17.24, pH 13, DF = 5	121.54002	<LOD	<LOD	0.00374	0.00141	<LOD	<LOD	0.23684	<LOD
S:L = 1:80, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	87.32247	<LOD	<LOD	0.00308	0.00103	<LOD	<LOD	0.20986	<LOD
S:L = 1:80, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	98.73145	<LOD	<LOD	0.00348	0.00074	<LOD	<LOD	0.20192	<LOD
S:L = 1:80, time = 15, P_{CO2} = .69, pH 13, DF = 5	37.73993	<LOD	<LOD	0.00143	0.00071	<LOD	<LOD	0.00480	<LOD
S:L = 1:80, time = 15, P_{CO2} = .69, pH 13, DF = 5	19.61700	0.00042	<LOD	0.00099	<LOD	<LOD	<LOD	0.00586	<LOD
S:L = 1:80, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	50.40116	<LOD	<LOD	0.00218	0.00097	<LOD	<LOD	0.10807	<LOD
S:L = 1:80, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	98.25862	<LOD	<LOD	0.00325	0.00116	<LOD	<LOD	0.16854	<LOD

	Mo 202.031	Ni 231.604	Pb 220.353	Se 196.026	Sb 206.836	Ag 328.068	Sn 189.927	Sr 407.771	Tl 190.801
S:L = 1:100, time = 15, P_{CO2} = 17.24, pH 13, DF = 5	<LOD	0.00301	<LOD	0.02463	0.02657	<LOD	<LOD	0.23299	0.04468
S:L = 1:10, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	<LOD	0.00221	<LOD	0.03043	0.02405	<LOD	<LOD	0.31848	0.04759
S:L = 1:10, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	<LOD	<LOD	<LOD	0.03554	0.02849	<LOD	<LOD	0.32634	0.05070
S:L = 1:100, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	<LOD	0.00476	<LOD	0.02224	0.02602	<LOD	<LOD	0.21401	0.05110
S:L = 1:100, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	<LOD	<LOD	<LOD	0.01734	0.02476	<LOD	<LOD	0.21782	0.04640
S:L = 1:40, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	<LOD	0.00122	<LOD	0.01083	0.02422	<LOD	<LOD	0.27064	0.03620
S:L = 1:40, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	<LOD	<LOD	<LOD	0.01126	0.02300	<LOD	<LOD	0.26140	0.03817
S:L = 1:40, time = 15, P_{CO2} = 17.24, pH 13, DF = 5	0.03393	0.08250	<LOD	0.03894	0.02386	<LOD	<LOD	0.19572	0.05306
S:L = 1:40, time = 15, P_{CO2} = 17.24, pH 13, DF = 5	0.01338	0.01335	<LOD	0.02245	0.02151	<LOD	<LOD	0.18177	0.04082
S:L = 1:80, time = 15, P_{CO2} = 17.24, pH 13, DF = 5	0.00860	0.02576	<LOD	0.02784	0.02587	<LOD	<LOD	0.18482	0.05017
S:L = 1:80, time = 15, P_{CO2} = 17.24, pH 13, DF = 5	<LOD	0.00344	<LOD	0.05203	0.03101	<LOD	<LOD	0.22261	0.08258
S:L = 1:80, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	<LOD	<LOD	<LOD	0.02258	0.02156	<LOD	<LOD	0.19123	0.04367
S:L = 1:80, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	<LOD	<LOD	<LOD	0.03142	0.02837	<LOD	<LOD	0.20512	0.05815
S:L = 1:80, time = 15, P_{CO2} = .69, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	0.01180	<LOD	<LOD	0.09288	0.01740
S:L = 1:80, time = 15, P_{CO2} = .69, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	0.00643	<LOD	<LOD	0.05588	0.01119
S:L = 1:80, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	0.01735	<LOD	<LOD	0.10912	0.01903
S:L = 1:80, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	<LOD	<LOD	<LOD	0.02526	0.02696	<LOD	<LOD	0.20326	0.05312

	Ti 334.940	V 290.880	Zn 206.200	Si 251.611	Si	K 766.490	K	Na 589.592	Na
S:L = 1:100, time = 15, P_{CO2} = 17.24, pH 13, DF = 5	<LOD	0.00709	0.00730	0.03311	0.03569	0.08826	0.13031	217.05970	
S:L = 1:10, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	<LOD	<LOD	0.01612	0.11779	0.11298	0.28216	0.49163	207.74589	
S:L = 1:10, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	<LOD	0.00628	0.01609	0.11244	0.10696	0.26296	0.45633	209.79109	
S:L = 1:100, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	<LOD	0.01068	0.00636	0.01977	0.02647	0.13687	0.14491	217.46703	
S:L = 1:100, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	<LOD	0.00991	0.00629	0.01910	0.02125	0.09189	0.14206	213.12747	
S:L = 1:40, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	<LOD	0.00568	0.00762	0.03257	0.03951	0.18986	0.20751	220.06994	
S:L = 1:40, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	<LOD	0.00704	0.00737	0.03246	0.03747	0.17380	0.21955	218.37748	
S:L = 1:40, time = 15, P_{CO2} = 17.24, pH 13, DF = 5	<LOD	<LOD	0.00408	0.03361	0.03742	0.13177	0.17693	217.23633	
S:L = 1:40, time = 15, P_{CO2} = 17.24, pH 13, DF = 5	<LOD	0.00941	0.00415	0.03061	0.03372	0.14724	0.18121	215.04770	
S:L = 1:80, time = 15, P_{CO2} = 17.24, pH 13, DF = 5	<LOD	0.00917	0.00367	0.02161	0.02717	0.14069	0.15459	217.79088	
S:L = 1:80, time = 15, P_{CO2} = 17.24, pH 13, DF = 5	<LOD	0.00662	0.00653	0.02103	0.02297	<LOD	0.15343	209.99247	
S:L = 1:80, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	<LOD	0.01059	0.00379	0.02025	0.02541	0.14403	0.14530	219.15124	
S:L = 1:80, time = 15, P_{CO2} = 6.89, pH 13, DF = 5	<LOD	0.01191	0.00455	0.02007	0.02203	0.12145	0.12938	210.51144	
S:L = 1:80, time = 15, P_{CO2} = .69, pH 13, DF = 5	<LOD	0.00815	0.00749	0.01359	0.01669	0.15354	0.14568	219.02348	
S:L = 1:80, time = 15, P_{CO2} = .69, pH 13, DF = 5	<LOD	0.01096	0.00314	0.01792	0.02262	0.18963	0.14968	221.32137	
S:L = 1:80, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	0.01254	0.00308	0.01970	0.02699	0.24309	0.16597	223.28270	
S:L = 1:80, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	<LOD	0.01553	0.00400	0.02196	0.03251	0.24301	0.12866	221.62644	

X.VII Element LOD and LOQ for ICP-OES Analyses (Runs 133 – 150)

Blank LOD and LOQ calculation

	Sc 361.383	**Sc**	**Al 396.153**	**As 188.979**	**As 197.197**	**B 249.772**	**B 208.889**	**Ba 233.527**	**Be 313.107**
BLANK	0.98731	0.99415	-0.00004	0.00149	-0.00680	-0.00569	-0.00420	-0.00003	0.00016
BLANK	0.99730	0.98836	0.00031	0.00277	-0.00253	0.00738	0.00734	0.00003	-0.00003
BLANK	0.98499	0.98244	-0.00214	-0.00188	-0.00006	-0.01701	-0.01706	-0.00001	-0.00005
BLANK	0.97438	0.96989	0.00026	0.00005	0.00230	-0.01701	-0.01517	-0.00006	-0.00006
BLANK	0.99535	0.98268	-0.00166	-0.00109	0.00331	0.01875	0.01841	0.00003	-0.00006
BLANK	0.98030	0.98895	-0.00170	0.00059	-0.00488	-0.01837	-0.01745	-0.00006	-0.00005
BLANK	0.98484	0.98195	0.00095	0.00004	0.00063	-0.01846	-0.01852	0.00001	-0.00006
BLANK	0.99038	0.98431	-0.00175	0.00080	0.00158	0.01870	0.01867	-0.00004	0.00005
BLANK	0.96026	0.97542	-0.00236	-0.00229	-0.00850	-0.01862	-0.01741	-0.00002	-0.00010
BLANK	0.97695	0.99276	0.00138	-0.00193	0.00083	-0.01879	-0.01741	-0.00001	-0.00002
Avg	0.98321	0.98409	-0.00068	-0.00015	-0.00141	-0.00691	-0.00628	-0.00001	-0.00002
Standard Deviation	0.01092	0.00749	0.00139	0.00165	0.00406	0.01587	0.01542	0.00003	0.00008
LOD	1.01595	1.00655	0.00348	0.00479	0.01077	0.04070	0.03997	0.00009	0.00021
LOQ	1.09236	1.05895	0.01317	0.01631	0.03921	0.15179	0.14790	0.00033	0.00074

	Ca 317.933	**Cd 228.802**	**Cd 214.440**	**Co 228.616**	**Cr 267.716**	**Cu 327.393**	**Fe 238.204**	**Mg 285.213**	**Mn 257.610**
BLANK	-0.00004	-0.00008	-0.00004	-0.00001	0.00016	0.00084	0.00003	0.00008	-0.00004
BLANK	0.00058	-0.00006	-0.00009	0.00007	0.00008	0.00015	0.00012	-0.00005	-0.00002
BLANK	-0.00678	-0.00028	-0.00033	-0.00027	-0.00030	0.00021	0.00096	-0.00040	-0.00002
BLANK	0.00085	-0.00018	-0.00017	-0.00024	0.00002	-0.00007	-0.00005	-0.00001	-0.00002
BLANK	-0.00654	-0.00001	-0.00022	-0.00010	-0.00003	-0.00057	0.00032	-0.00039	-0.00002
BLANK	-0.00640	0.00000	-0.00017	-0.00003	0.00007	-0.00054	0.00012	-0.00034	-0.00002
BLANK	0.00161	-0.00015	-0.00004	0.00011	-0.00003	-0.00048	0.00013	0.00014	-0.00003
BLANK	-0.00679	-0.00008	-0.00008	0.00012	-0.00014	0.00058	0.00023	-0.00031	0.00000
BLANK	-0.00710	-0.00001	-0.00010	-0.00007	0.00006	-0.00013	0.00001	-0.00043	-0.00002
BLANK	0.00331	-0.00028	-0.00027	-0.00002	0.00013	0.00002	-0.00003	0.00027	-0.00001

Avg	-0.00273	-0.00011	-0.00015	-0.00004	0.00000	0.00000	0.00018	-0.00014	-0.00002
Standard Deviation	0.00430	0.00011	0.00010	0.00013	0.00014	0.00047	0.00030	0.00026	0.00001
LOD	0.01017	0.00020	0.00014	0.00036	0.00041	0.00141	0.00108	0.00063	0.00001
LOQ	0.04026	0.00094	0.00082	0.00130	0.00136	0.00468	0.00316	0.00242	0.00008

BLANK	**Mo 202.031**	**Ni 231.604**	**Pb 220.353**	**Se 196.026**	**Sb 206.836**	**Ag 328.068**	**Sn 189.927**	**Sr 407.771**	**Tl 190.801**
BLANK	-0.00006	-0.00029	-0.00080	0.00086	0.00274	-0.00031	0.00080	0.00002	0.00029
BLANK	0.00184	-0.00008	-0.00186	0.00047	0.00017	-0.00013	0.00020	0.00000	0.00234
BLANK	-0.00156	-0.00019	-0.00089	-0.00204	0.00033	-0.00012	-0.00171	-0.00003	0.00095
BLANK	-0.00127	-0.00094	-0.00121	0.00115	0.00132	-0.00025	-0.00080	0.00006	-0.00091
BLANK	0.00433	-0.00084	-0.00077	-0.00076	0.00241	-0.00019	-0.00041	-0.00001	0.00050
BLANK	-0.00158	-0.00058	-0.00278	-0.00257	0.00277	-0.00008	-0.00086	-0.00004	0.00127
BLANK	-0.00112	-0.00046	0.00003	-0.00394	0.00150	-0.00022	-0.00128	0.00001	-0.00062
BLANK	0.00429	-0.00057	-0.00140	-0.00058	0.00126	1.57270	-0.00064	-0.00006	0.00036
BLANK	-0.00128	-0.00076	-0.00206	-0.00379	0.00336	-0.00036	-0.00007	-0.00004	-0.00045
	-0.00134	-0.00062	-0.00177	0.00161	0.00306	-0.00025	-0.00044	0.00003	-0.00003
Avg									
Standard Deviation	0.00023	-0.00053	-0.00135	-0.00096	0.00189	0.15708	-0.00052	-0.00001	0.00037
LOD	0.00239	0.00028	0.00080	0.00204	0.00113	0.49740	0.00072	0.00004	0.00097
LOQ	0.00738	0.00031	0.00105	0.00515	0.00529	1.64927	0.00165	0.00010	0.00329
BLANK	0.02408	0.00228	0.00664	0.01940	0.01322	5.13106	0.00671	0.00035	0.01009

	Ti 334.940	**V 290.880**	**Zn 206.200**	**Si 251.611**	**Si**	**K 766.490**	**K**	**Na 589.592**	**Na**
BLANK	-0.00004	-0.00141	0.00003	-0.00011	-0.00171	-0.00362	0.00065	-0.00205	0.00046
BLANK	0.00007	-0.00023	0.00024	0.00014	0.00180	0.01305	0.00005	-0.00523	-0.00173
BLANK	-0.00004	-0.00068	-0.00049	-0.00123	0.00021	0.00804	0.00070	-0.00208	0.00136
BLANK	-0.00010	-0.00153	-0.00035	-0.00115	-0.00058	0.03781	0.00067	0.00171	0.00173
BLANK	0.00009	-0.00022	0.00030	0.00137	0.00298	0.01160	0.00005	-0.00524	-0.00215
BLANK	-0.00003	0.00006	-0.00003	-0.00195	-0.00182	0.01423	0.00258	0.10987	0.06344
BLANK	0.00005	-0.00049	-0.00022	-0.00180	0.00086	0.01187	0.00183	0.09328	0.05112
BLANK	0.00007	-0.00036	0.00027	0.00065	0.00152	0.01477	0.00009	0.01162	0.00438
BLANK	-0.00008	-0.00062	-0.00034	-0.00148	-0.00032	0.04762	0.00490	0.23517	0.13685

BLANK	-0.00001	-0.00079	0.00000	-0.00168	-0.00147	0.01290	0.00367	0.18814	0.11147
Avg	0.00000	-0.00063	-0.00006	-0.00072	0.00015	0.01683	0.00152	0.06252	0.03669
Standard Deviation	0.00007	0.00051	0.00028	0.00115	0.00163	0.01482	0.00169	0.08981	0.05202
LOD	0.00020	0.00090	0.00078	0.00274	0.00503	0.06128	0.00660	0.33194	0.19277
LOQ	0.00066	0.00447	0.00275	0.01081	0.01642	0.16499	0.01845	0.96060	0.55694

LOD and LOQ check for DF = 100

	Sc 361.383	**Sc**	**Al 396.153**	**As 188.979**	**As 197.197**	**B 249.772**	**B 208.889**	**Ba 233.527**	**Be 313.107**
S:L = 1:80, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00010	<LOD
S:L = 1:80, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:40, time = 15, P_{CO2} = 0.69, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:40, time = 15, P_{CO2} = 0.69, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:40, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00011	<LOD
S:L = 1:40, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:40, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:40, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:80, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:80, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD

S:L = 1:40, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:40, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:10, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00019	<LOD
S:L = 1:10, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00014	<LOD
S:L = 1:100, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD

	Ca 317.933	**Cd 228.802**	**Cd 214.440**	**Co 228.616**	**Cr 267.716**	**Cu 327.393**	**Fe 238.204**	**Mg 285.213**	**Mn 257.610**
S:L = 1:80, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	6.46067	<LOD	<LOD	0.00043	<LOD	<LOD	<LOD	0.00785	<LOD
S:L = 1:80, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	5.21752	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00668	<LOD
S:L = 1:40, time = 15, P_{CO2} = 0.69, pH 13, DF = 100	4.62231	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:40, time = 15, P_{CO2} = 0.69, pH 13, DF = 100	4.46865	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:40, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	5.16362	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01926	<LOD
S:L = 1:40, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	4.62581	<LOD	<LOD	0.00038	<LOD	<LOD	<LOD	0.01680	<LOD
S:L = 1:40, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	5.87151	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.02159	0.00001
S:L = 1:40, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	6.30141	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01783	<LOD
S:L = 1:100, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	0.26348	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	0.24636	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:80, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	0.02109	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:80, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	0.05458	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:40, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	4.06889	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00986	<LOD

S:L = 1:40, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	3.81481	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00483	<LOD
S:L = 1:10, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	6.62094	<LOD	<LOD	0.00045	<LOD	<LOD	<LOD	0.06672	<LOD
S:L = 1:10, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	6.79128	<LOD	<LOD	0.00038	<LOD	<LOD	<LOD	0.07838	0.00001
S:L = 1:100, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	4.72497	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00440	<LOD

	Mo 202.031	**Ni 231.604**	**Pb 220.353**	**Se 196.026**	**Sb 206.836**	**Ag 328.068**	**Sn 189.927**	**Sr 407.771**	**Tl 190.801**
S:L = 1:80, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	0.00634	<LOD	<LOD	0.00994	<LOD
S:L = 1:80, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00846	<LOD
S:L = 1:40, time = 15, P_{CO2} = 0.69, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01464	<LOD
S:L = 1:40, time = 15, P_{CO2} = 0.69, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01458	<LOD
S:L = 1:40, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00806	<LOD
S:L = 1:40, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00868	<LOD
S:L = 1:40, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01062	<LOD
S:L = 1:40, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01152	<LOD
S:L = 1:100, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00026	<LOD
S:L = 1:100, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00024	<LOD
S:L = 1:80, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:80, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:40, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00673	<LOD
S:L = 1:40, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00687	<LOD

S:L = 1:10, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	0.00595	<LOD	<LOD	0.01421	0.00435
S:L = 1:10, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01479	<LOD
S:L = 1:100, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00709	<LOD

	Ti 334.940	**V 290.880**	**Zn 206.200**	**Si 251.611**	**Si**	**K 766.490**	**K**	**Na 589.592**	**Na**
S:L = 1:80, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	21.14141	
S:L = 1:80, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	21.40069	
S:L = 1:40, time = 15, P_{CO2} = 0.69, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00763	20.54432	
S:L = 1:40, time = 15, P_{CO2} = 0.69, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	20.86370	
S:L = 1:40, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	21.58214	
S:L = 1:40, time = 15, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00681	19.78726	
S:L = 1:40, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00766	20.32626	
S:L = 1:40, time = 15, P_{CO2} = 4.134, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	21.10081	
S:L = 1:100, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	19.41317	13.95811
S:L = 1:100, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	20.21155	14.46129
S:L = 1:80, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	21.40598	
S:L = 1:80, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00701	21.00800	
S:L = 1:40, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	21.06081	
S:L = 1:40, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	21.11021	
S:L = 1:10, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	0.00296	<LOD	<LOD	0.01490	20.31577	

S:L = 1:10, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	0.00348	<LOD	<LOD	0.01346	21.28998	
S:L = 1:100, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	19.18724	

LOD and LOQ check for DF = 5

	Sc 361.383	**Sc**	**Al 396.153**	**As 188.979**	**As 197.197**	**B 249.772**	**B 208.889**	**Ba 233.527**	**Be 313.107**
S:L = 1:80, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00166	<LOD
S:L = 1:80, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	0.01362	<LOD	<LOD	0.00151	<LOD
S:L = 1:40, time = 15, P_{CO2} = 0.69, pH 13, DF = 5	<LOD	<LOD	0.02683	<LOD	<LOD	<LOD	<LOD	0.00147	<LOD
S:L = 1:40, time = 15, P_{CO2} = 0.69, pH 13, DF = 5	<LOD	<LOD	0.03285	<LOD	0.01340	<LOD	<LOD	0.00125	<LOD
S:L = 1:40, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	0.02125	<LOD	<LOD	0.00140	<LOD
S:L = 1:40, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	0.01595	0.04474	<LOD	0.00132	<LOD
S:L = 1:40, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00146	<LOD
S:L = 1:40, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	0.01309	<LOD	<LOD	0.00149	<LOD
S:L = 1:100, time = 10, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	0.00408	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:100, time = 10, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:80, time = 10, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	0.01141	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:80, time = 10, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	0.01003	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:40, time = 10, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	0.04040	<LOD	0.01658	<LOD	<LOD	0.00069	<LOD
S:L = 1:40, time = 10, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	0.04521	<LOD	<LOD	<LOD	<LOD	0.00068	<LOD
S:L = 1:10, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	1.02827	<LOD	<LOD	<LOD	0.10047	0.08860	0.00326	<LOD
S:L = 1:10, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	1.01144	<LOD	<LOD	<LOD	0.11051	0.10179	0.00328	<LOD

S:L = 1:100, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00163	<LOD

	Ca 317.933	**Cd 228.802**	**Cd 214.440**	**Co 228.616**	**Cr 267.716**	**Cu 327.393**	**Fe 238.204**	**Mg 285.213**	**Mn 257.610**
S:L = 1:80, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	98.13217	<LOD	<LOD	0.00311	0.00114	<LOD	0.00158	0.18066	0.00020
S:L = 1:80, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	81.95568	<LOD	<LOD	0.00286	0.00098	<LOD	0.00174	0.14936	0.00022
S:L = 1:40, time = 15, P_{CO2} = 0.69, pH 13, DF = 5	75.58408	<LOD	<LOD	0.00294	0.00074	<LOD	<LOD	0.00376	0.00015
S:L = 1:40, time = 15, P_{CO2} = 0.69, pH 13, DF = 5	72.74449	<LOD	<LOD	0.00259	0.00106	<LOD	<LOD	0.00584	0.00011
S:L = 1:40, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	75.33364	<LOD	<LOD	0.00272	0.00092	<LOD	<LOD	0.43683	0.00018
S:L = 1:40, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	80.91580	<LOD	<LOD	0.00296	0.00093	<LOD	<LOD	0.40741	0.00018
S:L = 1:40, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	89.35096	<LOD	<LOD	0.00338	0.00118	<LOD	<LOD	0.48217	0.00024
S:L = 1:40, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	97.61188	<LOD	<LOD	0.00319	0.00115	<LOD	<LOD	0.40582	0.00022
S:L = 1:100, time = 10, P_{CO2} = 2.07, pH 13, DF = 5	5.65719	0.00149	0.00125	0.00044	0.00048	<LOD	<LOD	0.00275	<LOD
S:L = 1:100, time = 10, P_{CO2} = 2.07, pH 13, DF = 5	5.32472	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00623	0.00002
S:L = 1:80, time = 10, P_{CO2} = 2.07, pH 13, DF = 5	0.53566	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00463	<LOD
S:L = 1:80, time = 10, P_{CO2} = 2.07, pH 13, DF = 5	1.09490	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00799	0.00003
S:L = 1:40, time = 10, P_{CO2} = 2.07, pH 13, DF = 5	65.75729	<LOD	<LOD	0.00257	0.00100	<LOD	<LOD	0.21134	0.00013
S:L = 1:40, time = 10, P_{CO2} = 2.07, pH 13, DF = 5	62.25665	<LOD	<LOD	0.00228	0.00082	<LOD	<LOD	0.11314	0.00018
S:L = 1:10, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	93.54129	<LOD	<LOD	0.00299	0.00142	<LOD	<LOD	1.48791	0.00064
S:L = 1:10, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	95.10164	<LOD	<LOD	0.00294	0.00130	<LOD	<LOD	1.75896	0.00056
S:L = 1:100, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	78.36332	<LOD	<LOD	0.00231	0.00079	<LOD	<LOD	0.10361	0.00018

	Mo 202.031	**Ni 231.604**	**Pb 220.353**	**Se 196.026**	**Sb 206.836**	**Ag 328.068**	**Sn 189.927**	**Sr 407.771**	**Tl 190.801**
S:L = 1:80, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	<LOD	<LOD	<LOD	0.02300	0.02479	<LOD	<LOD	0.20297	0.03039
S:L = 1:80, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	0.01050	0.01897	<LOD	<LOD	0.16776	0.02210
S:L = 1:40, time = 15, P_{CO2} = 0.69, pH 13, DF = 5	<LOD	<LOD	<LOD	0.00665	0.01934	<LOD	<LOD	0.30003	0.01918
S:L = 1:40, time = 15, P_{CO2} = 0.69, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	0.01682	<LOD	<LOD	0.30213	0.01686
S:L = 1:40, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	0.01871	<LOD	<LOD	0.15301	0.01877
S:L = 1:40, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	0.00750	0.01968	<LOD	<LOD	0.18814	0.01992
S:L = 1:40, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	<LOD	<LOD	<LOD	0.01730	0.02242	<LOD	<LOD	0.21124	0.02643
S:L = 1:40, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	<LOD	<LOD	<LOD	0.01953	0.02012	<LOD	<LOD	0.23397	0.02541
S:L = 1:100, time = 10, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00737	<LOD
S:L = 1:100, time = 10, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00631	0.00332
S:L = 1:80, time = 10, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00299	<LOD
S:L = 1:80, time = 10, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	0.00773	<LOD	<LOD	<LOD	0.00297	0.00685
S:L = 1:40, time = 10, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	0.01942	<LOD	<LOD	0.13737	0.01755
S:L = 1:40, time = 10, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	0.01709	<LOD	<LOD	0.13777	0.01408
S:L = 1:10, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	0.03007	0.02377	<LOD	<LOD	0.27254	0.03577
S:L = 1:10, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	0.03109	0.02332	<LOD	<LOD	0.28588	0.02980
S:L = 1:100, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	0.01331	0.01904	<LOD	<LOD	0.14876	0.02280

	Ti 334.940	V 290.880	Zn 206.200	Si 251.611	Si	K 766.490	K	Na 589.592	Na
S:L = 1:80, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	<LOD	0.00639	0.00380	0.02412	0.02661	0.12367	0.14977	219.26706	
S:L = 1:80, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	0.00603	0.00356	0.02005	0.02199	0.13372	0.16487	216.47181	
S:L = 1:40, time = 15, P_{CO2} = 0.69, pH 13, DF = 5	<LOD	0.00458	0.00362	0.01099	0.01129	0.16979	0.27633	214.28273	
S:L = 1:40, time = 15, P_{CO2} = 0.69, pH 13, DF = 5	<LOD	0.00438	0.00292	0.01258	0.01635	0.17505	0.21020	220.11957	
S:L = 1:40, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	0.00470	0.00310	0.03395	0.03108	0.11739	0.21274	211.25561	
S:L = 1:40, time = 15, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	0.00569	0.00368	0.04252	0.04570	0.15545	0.22901	218.69782	
S:L = 1:40, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	<LOD	0.00675	0.00394	0.04095	0.03860	0.14237	0.28047	210.11094	
S:L = 1:40, time = 15, P_{CO2} = 4.134, pH 13, DF = 5	<LOD	0.00496	0.00325	0.02975	0.03284	0.17642	0.21845	216.95444	
S:L = 1:100, time = 10, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	0.00194	0.00093	0.00332	<LOD	0.11904	0.16053	210.78213	
S:L = 1:100, time = 10, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	0.00328	<LOD	0.14040	0.16888	214.94180	
S:L = 1:80, time = 10, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	0.00166	<LOD	0.00495	0.00694	0.13929	0.15499	214.60450	
S:L = 1:80, time = 10, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	0.00346	<LOD	0.00351	<LOD	0.19091	0.25483	207.18426	
S:L = 1:40, time = 10, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	0.00515	0.00240	0.02601	0.02694	0.15742	0.20664	217.44125	
S:L = 1:40, time = 10, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	0.00764	0.00254	0.02912	0.03058	0.16460	0.22385	217.04492	
S:L = 1:10, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	0.00815	0.00798	0.07592	0.07030	0.31122	0.54411	203.05367	
S:L = 1:10, time = 10, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	0.00884	0.00800	0.07849	0.07155	0.26100	0.48503	209.27704	
S:L = 1:100, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	0.00583	0.00277	0.01591	0.01982	0.14713	0.15254	207.18341	

X.VII Element LOD and LOQ for ICP-OES Analyses (Runs 151 – 161)

Blank LOD and LOQ calculation

	Sc 361.383	**Sc**	**Al 396.153**	**As 188.979**	**As 197.197**	**B 249.772**	**B 208.889**	**Ba 233.527**	**Be 313.107**
BLANK	0.99222	1.02690	-0.00016	-0.00064	-0.00282	-0.00472	-0.00496	0.00006	0.00006
BLANK	0.99662	1.01440	0.00038	0.00046	-0.00019	0.00894	0.00993	0.00005	0.00010
BLANK	1.00223	1.00630	0.00039	-0.00021	-0.00324	-0.01345	-0.01386	0.00001	0.00008
BLANK	0.99922	1.01652	0.00012	0.00107	-0.00180	-0.01352	-0.01539	0.00003	0.00013
BLANK	0.98767	1.00664	0.00006	0.00082	-0.00340	0.02150	0.02054	0.00006	0.00010
BLANK	0.90241	0.92152	-0.00086	-0.00230	0.00047	-0.01458	-0.01117	0.00012	-0.00003
BLANK	0.90027	0.89599	-0.00011	-0.00345	-0.00360	-0.01485	-0.01132	0.00034	-0.00004
Avg	0.96866	0.98404	-0.00003	-0.00061	-0.00208	-0.00438	-0.00375	0.00010	0.00006
Standard Deviation	0.04624	0.05241	0.00042	0.00169	0.00164	0.01430	0.01372	0.00011	0.00007
LOD	1.10737	1.14127	0.00125	0.00445	0.00283	0.03852	0.03740	0.00044	0.00026
LOQ	1.43101	1.50816	0.00422	0.01627	0.01431	0.13862	0.13341	0.00124	0.00074

	Ca 317.933	**Cd 228.802**	**Cd 214.440**	**Co 228.616**	**Cr 267.716**	**Cu 327.393**	**Fe 238.204**	**Mg 285.213**	**Mn 257.610**
BLANK	0.00006	0.00008	-0.00016	-0.00009	-0.00031	-0.00009	0.00004	0.00006	-0.00002
BLANK	-0.00118	0.00020	-0.00007	0.00012	-0.00006	0.00045	-0.00022	-0.00007	-0.00001
BLANK	-0.00138	0.00001	-0.00011	-0.00004	0.00001	-0.00025	-0.00031	-0.00009	-0.00003
BLANK	0.00013	0.00006	-0.00012	0.00019	-0.00033	-0.00019	-0.00004	0.00004	-0.00002
BLANK	-0.00053	0.00003	0.00003	0.00018	0.00000	0.00016	-0.00001	-0.00008	-0.00002
BLANK	-0.00067	0.00040	-0.00018	-0.00018	-0.00022	-0.00028	-0.00019	-0.00016	-0.00004
BLANK	0.00250	0.00036	-0.00021	0.00009	-0.00007	-0.00060	0.00010	0.00021	-0.00002
Avg	-0.00015	0.00016	-0.00012	0.00004	-0.00014	-0.00011	-0.00009	-0.00001	-0.00002
Standard Deviation	0.00130	0.00016	0.00008	0.00014	0.00014	0.00034	0.00015	0.00012	0.00001
LOD	0.00375	0.00064	0.00013	0.00047	0.00029	0.00090	0.00036	0.00036	0.00001
LOQ	0.01286	0.00177	0.00070	0.00148	0.00131	0.00328	0.00142	0.00124	0.00009

	Mo 202.031	Ni 231.604	Pb 220.353	Se 196.026	Sb 206.836	Ag 328.068	Sn 189.927	Sr 407.771	Tl 190.801
BLANK	-0.00077	-0.00008	0.00073	-0.00066	0.00083	-0.00044	0.00011	0.00002	-0.00031
BLANK	0.00370	-0.00008	0.00090	-0.00134	-0.00112	-0.00044	0.00111	0.00001	-0.00180
BLANK	-0.00135	-0.00072	-0.00077	-0.00405	-0.00256	-0.00041	-0.00004	0.00001	-0.00157
BLANK	-0.00193	0.00002	0.00157	-0.00391	-0.00394	-0.00033	-0.00095	0.00003	-0.00172
BLANK	0.00363	-0.00035	0.00032	-0.00352	-0.00142	-0.00013	-0.00031	0.00002	-0.00139
BLANK	-0.00154	-0.00103	-0.00034	-0.00775	-0.00097	-0.00056	0.00023	0.00009	-0.00184
BLANK	-0.00170	-0.00021	0.00143	-0.00602	-0.00254	-0.00052	0.00065	0.00011	-0.00203
Avg	0.00001	-0.00035	0.00055	-0.00389	-0.00167	-0.00040	0.00011	0.00004	-0.00152
Standard Deviation	0.00253	0.00039	0.00087	0.00247	0.00152	0.00014	0.00066	0.00004	0.00057
LOD	0.00759	0.00081	0.00316	0.00351	0.00288	0.00003	0.00209	0.00017	0.00019
LOQ	0.02528	0.00353	0.00926	0.02080	0.01350	0.00102	0.00671	0.00047	0.00420

	Ti 334.940	V 290.880	Zn 206.200	Si 251.611	Si	K 766.490	K	Na 589.592	Na
BLANK	0.00000	-0.00082	-0.00004	0.00015	0.00031	-0.00307	0.00029	-0.00449	0.00062
BLANK	0.00007	-0.00241	0.00087	0.00249	0.00407	0.00871	0.00025	-0.00637	-0.00293
BLANK	0.00002	-0.00104	-0.00041	-0.00118	0.00022	0.00287	0.00047	0.00429	0.00586
BLANK	0.00002	-0.00307	-0.00062	-0.00075	-0.00126	0.00410	0.00030	0.00620	0.00485
BLANK	0.00016	-0.00202	0.00011	0.00121	0.00614	0.00766	-0.00012	-0.00956	-0.00357
BLANK	-0.00026	-0.00044	-0.00055	0.00065	0.00784	0.12155	0.00678	0.20057	0.12135
BLANK	-0.00005	0.00009	-0.00013	0.00067	0.00637	0.13584	0.00623	0.17654	0.10352
Avg	-0.00001	-0.00139	-0.00011	0.00046	0.00338	0.03967	0.00203	0.05245	0.03282
Standard Deviation	0.00013	0.00114	0.00051	0.00122	0.00360	0.06108	0.00307	0.09340	0.05475
LOD	0.00038	0.00203	0.00142	0.00414	0.01419	0.22289	0.01123	0.33266	0.19706
LOQ	0.00129	0.01002	0.00500	0.01271	0.03939	0.65043	0.03271	0.98648	0.58029

LOD and LOQ check for DF = 100

	Sc 361.383	**Sc**	**Al 396.153**	**As 188.979**	**As 197.197**	**B 249.772**	**B 208.889**	**Ba 233.527**	**Be 313.107**
S:L = 1:100, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	0.00387	<LOD	<LOD	<LOD	<LOD
S:L = 1:80, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:80, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:40, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:40, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:10, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:10, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	0.00358	<LOD	<LOD	<LOD	<LOD
S:L = 1:80, time = 90+, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:80, time = 90+, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:40, time = 90+, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
S:L = 1:40, time = 90+, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	0.00143	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD

	Ca 317.933	**Cd 228.802**	**Cd 214.440**	**Co 228.616**	**Cr 267.716**	**Cu 327.393**	**Fe 238.204**	**Mg 285.213**	**Mn 257.610**
S:L = 1:100, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	5.15115	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00511	<LOD
S:L = 1:80, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	6.49146	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00741	<LOD
S:L = 1:80, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	6.06583	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00704	0.00001
S:L = 1:40, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	5.86402	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01679	<LOD
S:L = 1:40, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	5.66309	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.02072	<LOD

S:L = 1:10, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	6.06017	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.07250	0.00003
S:L = 1:10, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	6.55752	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.07972	0.00005
S:L = 1:80, time = 90+, P_{CO2} = 2.07, pH 13, DF = 100	7.48832	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00956	0.00004
S:L = 1:80, time = 90+, P_{CO2} = 2.07, pH 13, DF = 100	8.00260	<LOD	<LOD	0.00073	<LOD	<LOD	<LOD	0.00982	<LOD
S:L = 1:40, time = 90+, P_{CO2} = 2.07, pH 13, DF = 100	6.08248	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.02246	0.00002
S:L = 1:40, time = 90+, P_{CO2} = 2.07, pH 13, DF = 100	5.91695	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01992	0.00004

	Mo 202.031	**Ni 231.604**	**Pb 220.353**	**Se 196.026**	**Sb 206.836**	**Ag 328.068**	**Sn 189.927**	**Sr 407.771**	**Tl 190.801**
S:L = 1:100, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00796	<LOD
S:L = 1:80, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00974	0.00126
S:L = 1:80, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00915	0.00142
S:L = 1:40, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00895	0.00138
S:L = 1:40, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00925	0.00287
S:L = 1:10, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01410	<LOD
S:L = 1:10, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01524	0.00241
S:L = 1:80, time = 90+, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	0.00722	<LOD	<LOD	<LOD	0.00934	0.00108
S:L = 1:80, time = 90+, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00965	0.00220
S:L = 1:40, time = 90+, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01305	0.00123
S:L = 1:40, time = 90+, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.01195	0.00096

	Ti 334.940	V 290.880	Zn 206.200	Si 251.611	Si	K 766.490	K	Na 589.592	Na
S:L = 1:100, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	20.57225	
S:L = 1:80, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	21.58038	
S:L = 1:80, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	20.31597	14.28571
S:L = 1:40, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	19.41830	13.39936
S:L = 1:40, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	21.45203	14.56690
S:L = 1:10, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	0.00463	<LOD	<LOD	0.02429	20.08269	14.12906
S:L = 1:10, time = 20, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	0.00476	<LOD	<LOD	0.01351	21.38961	
S:L = 1:80, time = 90+, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	20.18257	14.11391
S:L = 1:80, time = 90+, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	20.95592	14.41728
S:L = 1:40, time = 90+, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	20.55126	14.61112
S:L = 1:40, time = 90+, P_{CO2} = 2.07, pH 13, DF = 100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	20.79013	14.44164

LOD and LOQ check for DF = 5

	Sc 361.383	Sc	Al 396.153	As 188.979	As 197.197	B 249.772	B 208.889	Ba 233.527	Be 313.107
S:L = 1:100, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	0.00410	<LOD	<LOD	0.00167	<LOD
S:L = 1:80, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	0.00362	<LOD	<LOD	0.00170	<LOD
S:L = 1:80, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	0.00844	<LOD	<LOD	0.00164	<LOD
S:L = 1:40, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	0.00495	<LOD	<LOD	0.00222	<LOD

S:L = 1:40, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	0.00835	<LOD	<LOD	0.00283	<LOD
S:L = 1:10, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	0.04156	<LOD	0.01068	0.12096	0.11491	0.00472	<LOD
S:L = 1:10, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	0.03676	<LOD	0.00950	0.11446	0.10555	0.00456	<LOD
S:L = 1:80, time = 90+, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	0.03302	<LOD	<LOD	<LOD	<LOD	0.00449	<LOD
S:L = 1:80, time = 90+, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	0.02689	<LOD	<LOD	<LOD	<LOD	0.00458	<LOD
S:L = 1:40, time = 90+, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	0.02919	<LOD	<LOD	<LOD	<LOD	0.00533	<LOD
S:L = 1:40, time = 90+, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	0.04693	<LOD	<LOD	<LOD	<LOD	0.00545	<LOD

	Ca 317.933	**Cd 228.802**	**Cd 214.440**	**Co 228.616**	**Cr 267.716**	**Cu 327.393**	**Fe 238.204**	**Mg 285.213**	**Mn 257.610**
S:L = 1:100, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	80.63034	<LOD	<LOD	0.00261	0.00102	<LOD	<LOD	0.11501	0.00016
S:L = 1:80, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	87.85535	<LOD	<LOD	0.00266	0.00094	<LOD	<LOD	0.15300	0.00018
S:L = 1:80, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	84.82880	<LOD	<LOD	0.00262	0.00106	<LOD	<LOD	0.15578	0.00018
S:L = 1:40, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	85.54691	<LOD	<LOD	0.00272	0.00103	<LOD	0.00050	0.36969	0.00022
S:L = 1:40, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	83.42245	<LOD	<LOD	0.00286	0.00116	<LOD	0.00125	0.45878	0.00036
S:L = 1:10, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	86.06714	<LOD	<LOD	0.00310	0.00152	<LOD	0.00075	1.68470	0.00112
S:L = 1:10, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	83.29061	<LOD	<LOD	0.00272	0.00120	<LOD	0.00082	1.67921	0.00104
S:L = 1:80, time = 90+, P_{CO2} = 2.07, pH 13, DF = 5	105.02157	<LOD	<LOD	0.00294	0.00128	<LOD	0.00038	0.21195	0.00075
S:L = 1:80, time = 90+, P_{CO2} = 2.07, pH 13, DF = 5	105.82286	<LOD	<LOD	0.00341	0.00125	<LOD	<LOD	0.21288	0.00059
S:L = 1:40, time = 90+, P_{CO2} = 2.07, pH 13, DF = 5	90.39008	<LOD	<LOD	0.00290	0.00128	<LOD	<LOD	0.48747	0.00105
S:L = 1:40, time = 90+, P_{CO2} = 2.07, pH 13, DF = 5	81.42160	<LOD	<LOD	0.00275	0.00150	<LOD	0.00048	0.41698	0.00117

	Mo 202.031	Ni 231.604	Pb 220.353	Se 196.026	Sb 206.836	Ag 328.068	Sn 189.927	Sr 407.771	Tl 190.801
S:L = 1:100, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	0.01065	0.01591	<LOD	<LOD	0.16587	0.02404
S:L = 1:80, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	<LOD	0.01779	<LOD	<LOD	0.18274	0.02361
S:L = 1:80, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	0.00601	0.01773	<LOD	<LOD	0.17791	0.02276
S:L = 1:40, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	0.01448	0.01599	<LOD	<LOD	0.17969	0.02721
S:L = 1:40, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	0.00807	0.01689	<LOD	<LOD	0.18515	0.02113
S:L = 1:10, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	0.02060	0.02047	<LOD	<LOD	0.28139	0.02920
S:L = 1:10, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	0.01809	0.01603	<LOD	<LOD	0.27546	0.02503
S:L = 1:80, time = 90+, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	0.02285	0.01933	<LOD	<LOD	0.19167	0.03801
S:L = 1:80, time = 90+, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	0.03203	0.02113	<LOD	<LOD	0.19539	0.04124
S:L = 1:40, time = 90+, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	0.03327	0.02300	<LOD	<LOD	0.26736	0.04340
S:L = 1:40, time = 90+, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	<LOD	<LOD	0.02714	0.01879	<LOD	<LOD	0.23238	0.04209

	Ti 334.940	V 290.880	Zn 206.200	Si 251.611	Si	K 766.490	K	Na 589.592	Na
S:L = 1:100, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	0.00534	0.00304	0.01751	0.02110	<LOD	0.12593	207.36948	
S:L = 1:80, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	0.00811	0.00329	0.01921	0.02308	<LOD	0.13135	200.80301	
S:L = 1:80, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	0.00594	0.00336	0.02107	0.01908	<LOD	0.16022	197.02929	
S:L = 1:40, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	0.00569	0.00353	0.03043	0.03363	<LOD	0.23907	194.78814	
S:L = 1:40, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	0.00827	0.00444	0.04041	0.04629	<LOD	0.19482	207.16161	
S:L = 1:10, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	0.00994	0.01113	0.10202	0.09564	0.27446	0.44576	197.45447	

S:L = 1:10, time = 20, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	0.00818	0.01050	0.09464	0.08899	0.24980	0.42293	193.29190	
S:L = 1:80, time = 90+, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	0.00560	0.00512	0.03546	0.04182	<LOD	0.16549	203.25023	
S:L = 1:80, time = 90+, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	0.00692	0.00475	0.03371	0.03660	<LOD	0.15636	204.11643	
S:L = 1:40, time = 90+, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	0.00902	0.00602	0.05798	0.06863	0.27327	0.20463	207.93422	
S:L = 1:40, time = 90+, P_{CO2} = 2.07, pH 13, DF = 5	<LOD	0.00750	0.00595	0.05206	0.05736	0.22656	0.24008	200.07387	

LOD and LOQ check for 0.1 molal NaOH, DF = 100 and DF = 5

	Sc 361.383	**Sc**	**Al 396.153**	**As 188.979**	**As 197.197**	**B 249.772**	**B 208.889**	**Ba 233.527**	**Be 313.107**
NAOH PH13 DF100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
NAOH PH13 DF5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00177	<LOD

	Ca 317.933	**Cd 228.802**	**Cd 214.440**	**Co 228.616**	**Cr 267.716**	**Cu 327.393**	**Fe 238.204**	**Mg 285.213**	**Mn 257.610**
NAOH PH13 DF100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
NAOH PH13 DF5	<LOD	0.00153	0.00116	<LOD	<LOD	<LOD	0.00182	<LOD	<LOD

	Mo 202.031	**Ni 231.604**	**Pb 220.353**	**Se 196.026**	**Sb 206.836**	**Ag 328.068**	**Sn 189.927**	**Sr 407.771**	**Tl 190.801**
NAOH PH13 DF100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
NAOH PH13 DF5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.00079	0.00241

	Ti 334.940	V 290.880	Zn 206.200	Si 251.611	Si	K 766.490	K	Na 589.592	Na
NAOH PH13 DF100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	21.53800	
NAOH PH13 DF5	<LOD	<LOD	0.00261	<LOD	<LOD	<LOD	0.06324	206.47705	