Strontium

Figure 1: Strontianite ($SrCO_3$)

The element Strontium (Sr) occurs in Strontianite ($SrCO_3$) and Celestite $SrSO_4$. There exists a solid solution series between Barite (BaSO4) and Celestite (SrSO4), and Sr can replace Ca in both gypsum and anhydrite. Strontium also exists in solid solution series substituting for Ca in Aragonite (CaCO3).

Figure 2: Celestite ($SrSO_4$)

Strontium has little commercial use or direct mining. It is however a useful pathfinder element in mineral exploration for mineral deposits. As a lithophile element, it occurs with Ca and Ba in mineral substitutions. It can be an indicator for carbonatite rocks. Anomalies are noted in halos around porphyry copper deposits. Ratios of Rb/Sr are useful where Rb is enriched and Sr depleted in some hydrothermal alteration zones. In the secondary environment, Ca, Ba and Sr form halos together reflecting mineralization.

Strontianite has colorless-white-gray crystals, occurring in matrix or with columnar habit, shows concoidal fracture, fluoresces blue-white in UV light, with white streak. Celestite looks very similar to barite, forming blue crystals best distinguished by red flame test (Barite flame is green).

Strontium in carbonate and oxide forms is easily soluble (aqua regia digestions and either ICP-AES or ICP-MS determination, ME-MS41). Strontium occurring as a substitution in silicate minerals (K-feldspar) may require a stronger 4-acid digestion for complete dissolution (ME-MS61). The solid solution minerals with barite are insoluble and largely untouched by acid dissolution, in which case a fusion or XRF instrumental total analysis is required for determination. The whole rock lithogeochemistry package includes SrO from 0.01 – 100%. A pressed pellet-XRF method provides Sr from 2 ppm – 1%.

In soil, sediment and regolith samples, Sr may be weakly bound within the sample matrix in colloid, oxide, hydroxide, organic or as a carbonate phase. Super-trace Sr in these materials can be analyzed using the super-trace aqua regia multi-element geochemical method (ME-MS41L, range 0.2 ppm – 1%), or using one of the available selective leaches such as Ionic leach (ME-MS23, Sr detection limit 1 ppb), or oxide specific leaches (ME-MS05, 06, Sr detection limit 50 ppb).

The mobility of Sr in the secondary environment is higher at low pH conditions (Figure 3). In high pH solutions, Sr may be mobile as a sulphate or carbonate complex. Some fault systems in high pH environments have pronounced low level Sr anomalies along the length of the fault, which may be zoned with Ba.

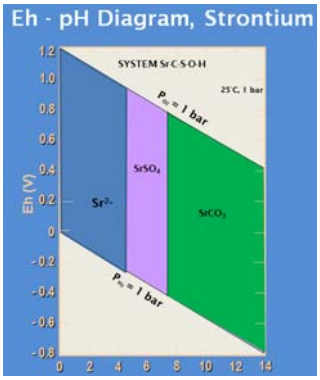

Figure 3: Redox Diagram for Sr, 25C, 1Bar (Brookins, p 167).

Strontium (Sr) Analytical Methods, ALS Minerals

Method Type	Description	Range	ALS Code
Instrumental Total	Sr Pressed Pellet XRF determination.	2 ppm - 1%	Sr-XRF05
Multi-element Geochemical	Multi-element aqua regia digestion, 51 elements determined by Combined ICP-AES and ICP-MS.	0.2 ppm - 1%	ME-MS41
	Multi-element aqua regia digestion, 34 elements determined by ICP-AES.	5 ppm - 5%	ME-ICP41a
	Multi-element 4 acid near total digestion, 48 elements determined by Combined ICP-AES and ICP-MS.	0.2 ppm - 1%	ME-MS61
	Multi-element 4 acid near total digestion, 33 elements determined by ICP-AES.	10 ppm -10%	ME-ICP61a
	Lithium borate fusion, XRF or ICP determination as part of the Whole Rock Lithogeochemistry package.	0.01 - 100% SrO	ME-XRF06 ME-ICP06
Super-trace Soil/Regolith Multi-element	'Super-trace' aqua regia digestion, 51 elements determined by Combined ICP-AES and ICP-MS.	0.2 ppm - 1%	ME-MS41L
	Ionic Leach' selective leach to pH 8.5, 60 elements and Pb isotopes determined by ICP-MS.	1 ppb - 1000ppm	ME-MS23
	'Mn-oxide' selective leach Hyroxylamine-HCl, 63 elements and final leach pH determined by ICP-MS.	50ppb - 1000ppm	ME-MS05
	'Fe-oxide' selective leach Hyroxylamine-HCl, 63 elements and final leach pH determined by ICP-MS.	50ppb - 1000ppm	ME-MS06