

## Development of a sample preparation procedure for Sr isotope analysis in cement and clinker samples

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*In order to identify the geographical origin of ordinary Portland cement (OPC) commonly used in concrete structures, its major constituent – OPC clinker – has to be investigated. Clinker is mainly produced from local materials in a rotary kiln at ~1450 °C from two main types of raw materials: calcareous material, typically limestone or chalk, and to a lesser degree argillaceous material, such as clay or shale. Each of these materials contains strontium, an element whose isotopes provide information on the geographical origin and which therefore is highly valuable for provenancing studies. Consequently, clinkers can be considered as specific and unique materials regarding their isotopic signature, particularly the <sup>87</sup>Sr/<sup>86</sup>Sr isotopic fingerprint. Besides clinker, whose mass percentage in OPC is about 95 %, about 5 % of cement is gypsum, anhydrite, limestone or other additives. Since those materials also contain strontium, it is very important to gain information on their influence on the final <sup>87</sup>Sr/<sup>86</sup>Sr isotopic ratio of cement. Therefore, the development of a suitable sample preparation procedure, which ideally removes the additives and in first approximation returns the <sup>87</sup>Sr/<sup>86</sup>Sr isotopic fingerprint of the clinker only is of primary importance. In this research, different approaches have been tested with the aim of finding the most appropriate sample preparation procedure. The selection of the most suitable sample preparation procedure is realized by comparing the <sup>87</sup>Sr/<sup>86</sup>Sr isotope ratios of differently prepared OPC samples with those of the corresponding clinker samples. The final goal is to develop a procedure for preparing Portland cement in such way that its <sup>87</sup>Sr/<sup>86</sup>Sr ratio gives the closest value to the <sup>87</sup>Sr/<sup>86</sup>Sr ratio of the corresponding clinker.*