

Full time PhD position, duration 3 years, starting time: Sept-Oct 2026

Experimental approach and geochemical modeling of EAF slag reactivity

PhD description. This project takes a multidisciplinary approach to evaluating the chemical reactivity and the environmental impact of slag produced in electric arc furnaces (EAF). Slag is a glassy material formed at high temperatures during the reduction of iron ore or the recycling of steel. Similar to volcanic glass, it consists of an amorphous silicate solid containing some crystalline phases (such as calcium silicates and aluminosilicates, spinels, etc.). Slags also contain mineral phases of varying reactivity that can compromise the durability of low-carbon concrete or lead to the release of metal elements (e.g., V, Cr, Mo...) into the environment.

We propose to combine leaching experiments in the laboratory with advanced characterization techniques of both the solid and aqueous phases (i.e., X-ray micro-tomography, X-ray fluorescence microscopy, electron microprobe, Raman microscopy, and ICP-MS) to understand the processes by which the chemical elements are released. Other micro characterization techniques may be used, e.g. synchrotron X-ray absorption spectroscopy or Mössbauer spectroscopy. The results obtained will be used to geochemical modelling of the kinetic rates of slag alteration and to discuss their environmental impact.

We are looking for a highly motivated student with a background in geochemistry, chemistry, material science or engineering and previous experience in the laboratory. The admission requirements are those of the SDU2E doctoral school at University of Toulouse, France (<https://sdu2e.obs-mip.fr/>).

Supervisor: Dr Catherine Noiriel, University of Toulouse

Workplace : Laboratory Géosciences Environnement Toulouse 14, avenue Edouard Belin 31400 Toulouse, France (<https://www.get.omp.eu/>)

Salary conditions: doctoral scholarship

Eligibility is a two-step process, including a pre-selection phase based on written application and an oral presentation in front of the commission appointed by the doctoral school. To apply for the pre-selection, please send first an email before May,3, including a CV and a motivation letter to Dr Catherine Noiriel: catherine.noiriel@utoulouse.fr.