

The contribution of geochemistry to circular economy: Promises and challenges

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Gordon Brown and George Calas introduced their Geochemical Perspective by pointing out that interactions between surfaces and ions and molecules present in water are key to understand the composition of Natural Waters and to assess and mitigate our anthropogenic perturbations (Brown and Calas, 2013).

Radioactive waste generation is one of the most critical perturbations introduced by mankind in planet Earth, mainly because of the radionuclide content of the waste generated by nuclear energy production as well as the medical uses of radioactivity.

A proper management of the radioactive waste is of paramount importance in this context and it requires a critical and fundamental understanding of the key processes controlling the release and transfer of radionuclides from the waste to the biosphere.

Nuclear waste repositories are the summation of a large number of surfaces which will be exposed to the interaction with the contacting groundwaters. These surfaces include the waste itself (either spent nuclear fuel or vitrified high level waste), the container, the clay buffer component, as well as enormous amounts of cement which will be poured in the system. Finally, water-rock interactions and microbial processes will be fundamental to