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# Tc immobilization on gamma alumina: a study of the reductant presence and absence

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Technetium isotope <sup>99</sup>Tc is a fission product of environmental concern, due to its high mobility and its elevated lifetime (2.13×10<sup>5</sup> years). Among their possible oxidation states, Tc(VII) and Tc(IV) are the most stable ones. On one hand, Tc(VII) occurs under oxidizing redox conditions, being pertechnetate (TcO<sub>4</sub><sup>-</sup>) the main species, which is considered an inert and mobile anion that hardly interacts with minerals. On the other hand, Tc(IV) is present under reducing conditions and it is mainly found as solid, TcO<sub>2</sub>, since it has a very low solubility product. Studies dealing with Tc immobilization in groundwater normally consider the use of reductants or mineral containing reductant moieties to favor the transformation of Tc(VII) to Tc(IV) with the aim of decreasing its migration in water fluxes.
Nano particular gamma alumina is a well suited sorbent for anions because of the high values of surface to volume ratio, specific surface area and point of zero charge. Indeed, we have already observed the efficient sorption capacity of gamma alumina against Se(IV) anions [1]. Thus, per se, alumina is a promising candidate to sorb Tc(VII). Nevertheless, for Tc(VII) low sorption is expected. However, previous studies have reported the higher Tc retention when the mineral is in contact with a reductant [2,3]. Thus, we will study the reduction of Tc(VII) to Tc(IV) on nano particular gamma alumina in presence of Fe<sup>2+</sup>.
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**Primary authors:** Dr MAYORDOMO , Natalia (Helmholtz-Zentrum Dresden-Rossendorf); Dr MÜLLER, Katharina (Helmholtz-Zentrum Dresden-Rossendorf)

**Presenter:** Dr MAYORDOMO , Natalia (Helmholtz-Zentrum Dresden-Rossendorf)

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