

## **The role of colloids in the behavior of the uranium isotopes in acidic waters of Río Tinto (Spain)**

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The waters in Tinto River show low values of pH (<3) along its course, as a result of acid mine drainage (AMD) processes. These AMD conditions generate preferential leaching of <sup>234</sup>U compared to <sup>238</sup>U from country rock forming minerals.

The presence of colloids in these water is related to the precipitation of Fe(III) and Al oxyhydroxides and hydroxysulfates when pH is raised (water mixing or dilution). In acid rock drainage waters As and Pb are strongly associated with the colloids. In the near-neutral bulk mine waters, trace elements such as As, Pb, Cu and the rare earth elements are adsorbed. In the pH range of 4–6 also U(VI) is strongly partitioned into colloids.

In order to evaluate the U fractionation and its origin in surface waters in Tinto River, <sup>234</sup>U/<sup>238</sup>U activity ratios (AR<sub>234/238</sub>) and uranium concentration [U] were measured in 12 locations along the river affected by AMD. Tangential ultrafiltration techniques using 5000 dalton membranes was performed in 4 of the samples in order to assess the role of colloids on the fate and transport of uranium isotopes in acid mine drainage environments.