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Evidence of radiolytic oxidation of ^{241}Am in $Na^+/Cl^-/HCO_3^-/CO_3^{2-}$ media

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This paper examines Americium behaviour in Cl^- media at room temperature in connection with environmental and waste disposal programs. Most published values on U, Np, Pu and Am complexation in chloride media have been determined using extraction methods. Spectrophotometric techniques are not sensitive enough to prove actinide complexation by chloride, which is confirmed in this paper for Am(III). $Am(OH)_3(s)$, $AmOHCO_3(s)$, $Am_2(CO_3)_3(s)$ or $NaAm(CO_3)_2(s)$ solid phases can control Am solubility, depending on the chemical conditions of the aqueous phase (usually P_{CO_2}). ^{241}Am solubility is here found to be higher in 4 M NaCl media than in 0.1 M NaCl (up to 3 orders of magnitude). Addition of a reducing agent (metallic iron) lowers the solubility. After a week, solubilities are similar in 0.1 and 4 M NaCl. These results are consistent with Am(III) radiolytic oxidation to Am(V), due to α radiations. Little evidence of Cl^- or mixed Cl^--CO_3^{2-} complexes is found in these conditions. In Na^+-OH^--Cl^- media ^{241}Am oxidation had also been proposed. Slow kinetics of precipitation could induce experimental uncertainties.