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Am(III)/Nd(III) INTERACTIONS WITH BORATE: EXPERIMENTAL INVESTIGATIONS OF $Nd(OH)_3$(micro cr) SOLUBILITY IN MIXTURES of NaCl AND $MgCl_2$ IN EQUILIBRIUM WITH BORAX [A]

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In previous studies on Am(III)/Nd(III) interactions with borate, the borate concentrations were kept at a relatively low level, up to ~0.16 mol•kg^{-1} as the highest. Such concentrations of borate are not saturated, in terms of borate, with borate-bearing phases such as borax ($Na_2B_4O_7$•$10H_2O$) and tincalconite ($Na_2B_4O_7$•$5H_2O$) that could be present in geological repositories. Therefore, the impact of Am(III)/Nd(III) interactions with borate is not fully understood. For instance, tincalconite has been observed as a corrosion product for boroslicate glass for HLW under the repository conditions in China.

In this study, we investigate the Nd(III) interactions with borate in equilibrium with borax in the mixtures of NaCl and $MgCl_2$ at 25°C, saturated with borax. In our experiments, the solubility-controlling phase for Nd(III) is $Nd(OH)_3$(micro cr). In synthesis of $Nd(OH)_3$(micro cr), we followed the procedure from literature. High purity Nd_2O_3 was loaded into Paar® reaction vessels with deaerated DI water. $Nd(OH)_3$(micro cr) formed when the high purity Nd_2O_3 reacted with the deaerated DI water at 200°C in Paar® reaction vessels for a period of two weeks.

Our results indicate that high borate concentrations (~0.5 mol•kg^{-1}) have an obvious effect on Nd(III), enhancing the solubility of $Nd(OH)_3$(micro cr).

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