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Dissolution Behavior of Lead Borate Glass under Simulated Geological Disposal Conditions

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Lead borate glass vitrified at a low temperature is regarded as one of the promising immobilization materials of Iodine-129 which will be removed from a spent AgI filter generated from reprocessing plants and may cause significant effect onto long term safety of geological disposal. Immersion tests in various solutions have been conducted to understand glass dissolution behaviors in possible geological disposal conditions. Boron dissolved with the highest rate in all types of the solutions and was regarded as an index element to represent the glass dissolution rate. On the other hand, lead dissolved with a far slower rate. Chemical species and the possible precipitating minerals of lead were examined by a geochemical calculation code for typical underground water. Altered glass surfaces were investigated by SEM, TEM and XRD. XRD analysis showed that the main constituent phase of the altered layer was hydrocerussite, $\text{Pb}_3(\text{CO}_3)_2(\text{OH})_2$ that was predicted by the geochemical simulation as well

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