

Deliquescence Behavior of Salts Deposited Inside the Drifts of a Potential High-Level Waste Repository

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Inorganic salts present in dusts that deposit inside underground facilities, such as the potential high-level waste geologic repository at Yucca Mountain, Nevada, may absorb moisture from humid air and form brines potentially corrosive to metallic engineered barriers and ground support materials. In this study, deliquescence measurements were conducted on inorganic salts that may deposit inside the drifts of the potential Yucca Mountain repository. Dust samples were taken from inside the Exploratory Studies Facility (ESF) at Yucca Mountain to characterize the mineralogic composition and inorganic salt content, and to measure the mutual deliquescence relative humidity (MDRH) of the salts present in the dust. X-ray diffraction analysis showed the dust samples are predominantly quartz, with albite, anorthite, and calcite also present. Initial chemical analysis showed that the soluble fraction is less than 10% of the total mass of the dust sample, with Ca^{2+} , Na^+ , K^+ , SO_4^{2-} , Cl^- , and NO_3^- as the major ions. The salt fraction was determined to be too low to measure the MDRH. Thus, the deliquescence measurements were conducted on simulated salt mixtures prepared from reagent-grade chemicals. The MDRH of the salt mixtures was determined using an electrical conductivity method described in Yang et al. (in press).

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References

Yang, L., Pabalan, R., and Juckett, M. (in press) Deliquescence relative humidity measurements using an electrical conductivity method. *Journal of Solution Chemistry*.