

been investigated by using thermogravimetric and fourier-transform infrared techniques (including diffuse reflectance). The major vibrational bands and thermal stability of the carbonate, sulfate, silicate, water and nitrate species are tabulated and discussed in comparison to uncontaminated Portland cement. The solubility and volatility of mercury in cement and the effect of metal nitrate concentration on the silicate condensation process is discussed. Although results suggest that retardation of cement setting by Zn and Pb salts occurs by limiting hydration, the chemistry of the two processes is distinctly different.

SURFACE INVESTIGATIONS OF THE BINDINGS OF METALS IN CONCRETE

DAVID L. COCKE and HYLTON McWINNEY

Department of Chemistry, Texas A&M University, College Station, TX 77843-3285 (U.S.A.)

and

J. DALE ORTEGO

Department of Chemistry, Lamar University, P.O. Box 10053, Beaumont, TX 77710 (U.S.A.)

Abstract

The chemical nature of solidified hazardous waste is an important consideration for modeling the stability and the design of appropriate systems. This study uses X-ray photoelectron spectroscopy, XPS, ion scattering spectroscopy, (ISS) and electron microscopy (qualitative and analytical) to examine the chemical nature of metal ion doped Portland cement. Chromium, lead, cadmium, mercury and zinc systems have been examined as to the morphology of the cement and the nature of the binding of these metals. These surface studies are beginning to delineate the mutual effects of the pollutants and the containment system. A model for the retardation of cement settings by lead has been developed and the chemical nature of Hg in cement has been determined. These developments are presented along with similar observations and results on the other metals.
