Durability of cement-based solidified wastes against different acid attack was investigated. The cement-based solidified wastes containing synthetic lead and chromium hydroxides at 0, 10, 20 and 30 wt.% were exposed to 0.5N acetic, nitric and sulfuric acid solutions. The percentage weight change of the cement-based solidified wastes after exposure to acids for different duration was determined and the physical appearance was inspected. Experimental results showed that sample weight loss increased with longer exposure durations in acetic and nitric acids, but at a descending rate. An increasing weight loss was also observed from samples with high concentration of lead and chromium hydroxides. Exposure to sulfuric acid resulted in the deposition of insoluble gypsum on the surface of the solidified wastes and as a result a gain in weight was found. In addition, resistance of the cement-based solidified waste matrices against acid attack was in the following order: sulfuric > acetic > nitric acid.