

Effect of composition and temperature in mines waste based cements

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Lakhouat is a deserted lead and zinc ore mine on the Northern Tunisia. Its exploitation established huge tailing deposits constituting nowadays a real threat due to erosion and infiltration of heavy elements in soil, plants and water. The ore deposits are mainly composed of calcite, phyllosilicates, dolomite, quartz, galena and gypsum, chemical analysis revealed the presence of high concentrations of metals up to 28040 ppm (Pb) and 94420 ppm (Zn). The concentrations of Cu, Pb, As, Zn, Ba and Sr in soils neighboring the dumps are high especially the closest to the releases and have exceeded the maximum allowable tolerance in non-contaminated soils.

In order to preserve the environment from the harmful effects of these discharges, sulfobeltic cements were produced using Lakhouat Zn-Pb mines tailings. Preliminary results show the formation of main phase dicalcium silicate (C₂S) and ye'elimite (C₄A₃S) as determined by X-ray diffraction. The optimum compressive strength value of the mortars (24.34 MPa) are obtained for clinkers with higher amounts of C₄A₃S and lower firing temperature (1340 °C). Pb and Zn levels in the obtained concrete decrease to 75 and 80% due to the presence of Ettringite observed by Scanning electron microscope (SEM).