

Hazardous Toxic Elements Mobility in Burned Oil Shale (BOS) Ash: The Means for Short and Long Term Solidification

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Jordan has huge organic-rich oil shale resources. The exploitation of this resource is eminent and it will be used mainly for generating electrical power by direct combustion. This process will produce huge ash tailings that contains high concentrations of leachable toxic elements (e.g. Cr^{+6} , V^{+5} , As^{+3} , Cd^{+2} etc.). This ash are friable, and eventually interacted with rainwater, which will form leachate rich in toxic elements that might reach soil, plants and surface and groundwater resources, thus causing hazardous pollution. Therefore, as a preventive measures, the current study analyzed the mobility of toxic elements in the ash of burned oil shale (BOS), in particular the Cr^{+6} , and aimed to solidify them, through mixing them with other natural materials such as Phosphogypsum (PG) and Red soil (RS). And monitoring the changes in mineralogical, chemical and engineering properties with time upto 12 months period. The aging results reveals that Ash with RS mixture showed less leachability of toxic elements at pH range (5-9) than other mixtures. Moreover, Ash+RS mixture showed increase in compressive strength (CS) and decrease in permeability (PE) values than other mixtures. Besides, the Ettringite and Portlandite phases were increasingly appears in this mixture with time, which explains the increase of CS together with decrease of PE. Ash alone mixture comes in the second rank; and lastly is the Ash+PG mixture. Therefore, mixing the produces ash with RS (3:1 ratio) under water saturation conditions will attain the maximum long term solidification of the harmful toxic elements.