Sodium Oxalate Salt Cake Degradation when Exposed to Natural Factors in the Disposal Area

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Abstract

In the course of processing tropical bauxites into smelter grade alumina, organic impurities accumulate in Bayer liquors, eventually degrading to sodium oxalate ($Na_2C_2O_4$). As a rule, in each Bayer cycle there is an imbalance between the oxalate formation rate and its further degradation to sodium carbonate (Na_2CO_3), resulting in oxalate accumulation. Since oxalate negatively affects the grain size of product alumina, refineries control oxalate concentration by removing it from their liquor. Sodium oxalate has a high hazard class so its disposal is expensive. Other useful components (notably Na_2CO_3), are disposed along with salt cake. To reduce alkali losses and environmental risks, some refineries convert sodium oxalate with lime to calcium oxalate (Na_2CO_3), recycling sodium to the Bayer process. Other methods are implemented, such as bacterial degradation of oxalate, but these methods are also expensive, and some do not entirely eliminate the risks. This paper presents a study on the impact of natural factors, including solar radiation and catalytic iron compounds in residue on the rate of sodium oxalate degradation to sodium carbonate in a disposal area. An economically feasible process for managing salt cake disposal is suggested that provides for alkali return to Bayer process and the reduction in the salt cake's hazard class.

Keywords: sodium oxalate; degradation; soda; solar radiation; bauxite residue; disposal area.