

Abstract

TREATMENT OF COKE OVEN EFFLUENT BY STEELMAKING SLAG AND ITS IMPLICATION ON CEMENTACIOUS PROPERTIES.

Submitted by: **Yogesh Nathuji Dhoble**

Supervised by: **Professor Sirajuddin Ahmed**

Department of Civil Engineering, Faculty of Engineering and Technology, Jamia Millia Islamia, New Delhi-110025

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Iron and steel plays a critical role in the development of human civilization. Iron and Steel is used in areas of agriculture, manufacturing, construction, generation and distribution of power, and even in the household. The steel industry is one among such industries where water is extensively used. As a result, it also increases the wastewater generation at different levels. Effluent from the coke oven is of typical nature and contains many toxic elements such as cyanide, ammonia and phenol, which require proper treatment before it is released into the environment. Oil & grease, ammonia, cyanide, thiocyanate, phenol, benzene, xylene, toluene, other aromatic volatile components, and poly-nuclear aromatic compounds are found in coke oven effluent and need treatment. Steel slag is a waste material generated in Basic Oxygen Furnace and is denser, harder, heavier and less vesicular in nature. The grains of the slag are sharp edged, partly dense, and partly porous. Steel slag is a well graded. The aim of the research is to study is to use steel slag for the treatment of coke oven effluent before it is used in cement industry. Batch studies, column studies are done on the synthetic effluent. Synthetic effluent consists of phenol, ammonia and thiocyanate either in combination or alone. Removal of Phenol, Ammonia and Thiocyanate upto 96%, 74% and 82 % is achieved respectively. It was also observed that coexistence of phenol, ammonia and thiocyanate would lower the percentage

adsorption of all toxicants under consideration. Column studies on the phenol, ammonia and thiocyanate in an aqueous solution observed that breakthrough time and the total time required to exhaust the steel slag took shorter time due to the presence of other pollutants in the mix. In further studies, Coke oven effluent is treated with the steel slag. At elevated temperatures steel slag removes most of the organic pollutants from coke oven effluent. From the leaching studies it is found that metal leaching increases for the slag treated with the coke oven effluent but is within the permissible limits. It is also found that the returns on the metal recovery is very less and is found to be very uneconomical. Lastly, studies are done on to check the effect of treatment on the cementitious properties of the steel slag. The studies show that adsorbed slag provides better compressive strength as compared to untreated slag. Reduction of Lime saturation factor of the slag after adsorption favors the reduction in free lime. Overall, it can be concluded that no adverse effect on the cementitious properties has been observed. Hence, the steelmaking slag can be used for the treatment of the coke oven effluent.