SULFIDE REMOVAL FROM PETROCHEMICAL WASTEWATER USING CATALYTIC WET AIR OXIDATION (CWAO) METHOD

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ABSTRACT

The presence of sulfide in wastewater is by the result of biological, physical and chemical processes which mostly takes place in the submerged portion of the sewage collection networks. The rate of sulfide generation depends on several factors including pH, temperature, concentration of organic materials and nutrients, sulfate concentrations, collection system parameters and performance, and the oxidation reduction potential (ORP). Dissolved sulfide could affect biological processes in wastewater treatment plants. Other problems by hydrogen sulfide emission were corrosion of sewer concrete pipes, release of obnoxious odors to the atmosphere, toxicity to sewer workers or human health, water supply and environment pollution, and economic effects. In this research, the main objective was to remove the sulfide content that present in the petrochemical process plant using Catalytic Wet Air Oxidation (CWAO) method.This research was done initially by collecting the wastewater form petrochemical plant. It was followed by the developement of the experimental system in the laboratory to run the preliminary study and the data obtained was use in screening study to detemine the best condition of sulfide removal. The best condition suggested then was optimized using Central Composite Design (CCD) method as a response surface methodology. Three independent factors such as temperature, residence time and catalyst loading that affect the degradation of sulfide are investigated using the 23 factorial analysis. Some of the independent factors were shown to have significant effect on sulfide removals (%). After removing the nonsignificant variables from the model, response surface method was used to obtain the optimum conditions and optimized using central composite design. 13 experiments with 2 factors were designed. These factors (or variables) were: the temperature and the residence time. A full-quadratic polynomial equation between the percentage of sulfide removal (as the response) and the studied parameters are established. The optimum ranges of variables were: 42.5^{o}C for the temperature and 12.5 minutes for the residence time.

Keywords: CWAO; sulfide removal; factorial design; central composite design