

**THE EFFECT OF RADICAL SCAVENGING ACTIVITY ON
CONGO RED DYE DEGRADATION PROCESS USING UV
LAMP AND Al_2O_3 AS CATALYST**

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ABSTRACT

THE EFFECT OF RADICAL SCAVENGING ACTIVITY ON CONGO RED DYE DEGRADATION PROCESS USING UV LAMP AND Al_2O_3 AS CATALYST

Synthetic organic dyes are used in the textile, paper, plastic, food, and other industries. About half of these dyes are azo compounds, such as methyl orange (MO), Congo red (CR), and direct black 38 (DB38), which contain chromophore ($-\text{N}=\text{N}-$) in their molecular structures. However, effluents containing azo dyes are discharged into lakes, rivers, or ground waters during the dyeing process and contain many health hazards such as mutagenic and carcinogenic. These dyes can lead to very serious environmental problems, due to their good stability under ambient conditions. Therefore, scientists have focused on eliminating azo dyes from wastewater to satisfy stringent environmental regulations. Up to now, various treatment methods such as physical methods and chemical methods have been used to remove azo dyes. However, these methods cannot completely destroy contaminants and only transfer dyes from the solution to the adsorbent. As such, the dyes are transformed into their carcinogenic, mutagenic, or toxic intermediates, which cause secondary pollution. Thus, inexpensive and environment-friendly processes for the complete conversion of pollutants must be developed. In this study, the effectiveness of Al_2O_3 has been studied and investigated. The initial concentration of Congo Red dye in the reaction was 10^{-4} M. The effects of UV irradiation, pH and the addition of different concentration of salt, Na_2CO_3 were studied. The results indicated that dye degradation become more efficient in pH 3.0 which is acidic compared to pH 7.0 which is neutral solution. The degradation percentage for pH 3.0 is up to 96.12% while only 87.98% for pH 7.0. The presence of different concentration of salt gave huge effect to the dye degradation efficiency. Increasing the salt concentration to 10^{-1} M in pH 3.0 dye solution, the percent of degradation is 42.19% while the increasing of salt concentration to 10^{-1} M in pH 7.0 dye solution, the percent degradation is only 15.48% .