THE EFFECT OF RADICAL SCAVENGING ACTIVITY ON ORANGE G DYE DEGRADATION PROCESS USING FENTON'S REAGENT

FARAH IZZATI BINTI FARUSH KHAN

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Farah Izzati binti Farush Khan

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ABSTRACT

THE EFFECT OF RADICAL SCAVENGING ACTIVITY ON ORANGE G DYE DEGRADATION PROCESS USING FENTON'S REAGENT

Wastewater is exhausted in large volume every year due to the processes of textile industries such as dyeing and finishing processes. Nowadays, more than 50% of dyes used in textile industry are Azo-based dyes. Inorganic salts improve the coloration of the dye, which enhances the pollution load of wastewater from textile industries. Degradation of the reactive textile dye Orange Gelb (OG) was studied using Fenton's Reagent of Advanced Oxidation Processes (AOPs). A laboratory set-up was designed to evaluate the effectiveness of Fenton's Reagent process. The initial concentration of OG in the reaction was 10^{-4}M. The effects of irradiation time and the addition of different types and concentrations of inorganic salts (NaCl, $NaHCO_3$, $NaNO_3$ and Na_2CO_3) on the degree of degradation efficiency were studied. The results indicated that photo-Fenton's process is more effective than Fenton's process without UV irradiation in dye degradation process. Photo-Fenton's process degrades the dye up to 86%, whereas Fenton's process without UV irradiation only degrades the dye up to 72%. On increasing the Na_2CO_3 and $NaHCO_3$ salts concentration to 1 M, the percentage decolorization decreased to 24% and 18% respectively. The presence of $NaNO_3$ salt barely affects the degradation efficiency of the dye. On increasing the salt concentration to 1M into the dye solution, the percentage decolorization only decreased to 80%. On the addition of 1 M NaCl salt, the degradation efficiency decreased to 74% and by the addition of 10^{-4} M NaCl salt, the degradation efficiency increased to 88%, 6% higher than the degradation efficiency of photo-Fenton's process, due to the formation of hypochlorite ion from the chloride ions. Additionally, it was found that all salts in this experiment could inhibit the efficiency of OG degradation and the degree of their scavenging effects can be ranked from low to high in an order $NaNO_3 < NaCl < Na_2CO_3 < NaHCO_3$.