SOLAR PHOTOCATALYTIC DEGRADATION OF FOOD DYE (TARTRAZINE) USING ZINC OXIDE CATALYST

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ABSTRACT

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Food dyes are used in food processing industries as coloring and additive so that the food can be stored for a long time. The effluent discharged from the industries has become a serious issue as it can cause water pollution, harm aquatic life, nature and also human beings. Solar photocatalytic degradation was widely used to degrade most of the dyes in wastewater due to its high effectiveness. The objectives of this study are to investigate the effectiveness of degradation of Tartrazine using the photocatalytic process by using ZnO as photocatalyst and sunlight as the irradiation source. Other than that, this study is conducted to compare the percentage degradation of Tartrazine at different conditions which are amount of photocatalyst, pH of dye solution, exposure time and presence and absence of sunlight and photocatalyst. The degradation of Tartrazine was analyzed by using UV-Vis spectrophotometer. Firstly, to determine the optimum weight of ZnO, ZnO was added at different weights which were 0 mg, 10 mg, 20 mg, 30 mg, 40 mg and 50 mg. Then, the optimum pH of dye solution was determined by using different pH which were pH 6, pH 7, pH 8, pH 9, pH 10 and pH 11. From the absorbance obtained from UV-Vis spectrophotometer, the concentration of dye in the solution was calculated. Then, the percentage of degradation can be calculated by using the concentration of dye. The amount of photocatalyst ZnO must be added at the optimum weight which was 20 mg so that more hydroxyl radical produced. The optimum pH for the Tartrazine solution was pH 6. The percentage of degradation of Tartrazine decreased as the pH of the solution was increased. For the degradation with ZnO catalyst and with solar radiation, the optimum time obtained was lowest which was 1 hour. This condition also was the most effective condition compared to other condition because the percentage of degradation was the highest (93.91±0.57)%. The other conditions used were presence of catalyst absence of sunlight, absence of catalyst presence of sunlight and absence of both catalyst and sunlight. Both catalyst and solar radiation were needed to achieve highest efficiency of photocatalytic process because both helped in the formation of hydroxyl radical.

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