

Sonocatalytic Treatment of Baker's Yeast Wastewater by Using SnO₂/TiO₂ Composite

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Abstract : Baker's yeast industry uses molasses as a raw material. Molasses wastewater contains high molecular weight polymers called melanoidins. Melanoidins are obtained after the reactions between the amino acids and carbonyl groups in molasses. The molasses wastewater has high biochemical and chemical oxygen demand and dark brown color. If it is discharged to receiving bodies without any treatment, it prevents light penetration and dissolved oxygen level of the surface water decreases. Melanoidin compounds are toxic effect to the microorganism in water and there is a resistance to microbial degradation. Before discharging molasses wastewater, adequate treatment is necessary. In addition to changing environmental regulations, properties of treated wastewater must be improved. Advanced oxidation processes can be used to improve existing properties of wastewater. Sonochemical oxidation is one of the alternative methods. Sonochemical oxidation employs the use of ultrasound resulting in cavitation phenomena. In this study, decolorization and chemical oxygen demand removal (COD) of baker's yeast effluent was investigated by using ultrasound. Baker's yeast effluent was supplied from a factory which is located in the north of Turkey. An ultrasonic homogenizer was used for this study. Its operating frequency is 20kHz. SnO₂/TiO₂ catalyst has been used as sonocatalyst. The effects of the composite preparation method, mixing time while composite prepared, the molar ratio of SnO₂/TiO₂, the calcination temperature, and time, the catalyst amount were investigated on the treatment of baker's yeast effluent. According to the results, the prepared composite SnO₂/TiO₂ by using ultrasonic probe gave a better result than prepared composite by using an ultrasonic bath. Prepared composite by using an ultrasonic probe with a 4:1 molar ratio treated at 800°C for 60min gave a better result. By using this composite, optimum catalyst amount was 0.2g/l. At these conditions 26.6% decolorization was obtained. There was no COD removal at the studied conditions.

Keywords : baker's yeast effluent, COD, decolorization, sonocatalyst, ultrasonic irradiation

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