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EFFECTS OF OZONATION ON THE ULTRAFILTRATION OF MEAT INDUSTRY WASTEWATER

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Abstract

Water is currently becoming a strategically important material, and the importance of water and wastewater treatment technologies is therefore increasing. Wastewater from the food industry has many special features originating from its high organic matter content. Meat industry wastewater additionally has a high fat content. We investigated the effects of ultrafiltration and ozonation, individually and in combination, for the treatment of meat industrial wastewater. Ozone gas was generated from oxygen with an Ozomatic Modular 4 ozone generator (Wedeco Ltd., Germany), and filtration was carried out with a micellar-enhanced ultrafiltration (MEUF) apparatus, through a flat membrane with a surface area of 40 cm². The experimental data revealed that pre-ozonation of the wastewater affected ultrafiltration. The flux was higher and persisted longer than in the case of non-ozonated samples. The chemical oxygen demand was decreased by ozonation treatment. The duration of ozonation and the subsequent ultrafiltration exhibited a very interesting relationship. The most important effect of ozonation was observed on membrane fouling. The fouling mechanism was modelled, and the rate constants of flux decline (k_1) and deposit removal from the membrane (k_2) were calculated. The effect of the Reynolds number was also shown. The aim of our work was to study the industrial effects of combined cleaning techniques, i.e. ozonation on meat processing wastewater. The optimum ozonation time was 2 to 10 min before ultrafiltration with a PES membrane with a cut-off of 5 kDa.

Key words: fouling, modelling, ozonation, ultrafiltration

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