

ELECTROCHEMICAL TREATMENT OF WHEY WASTEWATER

ABSTRACT

In the agri-food sector, dairy industry requires large volumes of water. As a result, it produces a huge amount of wastewater, which is characterized by a high organic matter. It is well known that dairy effluents are difficult to biodegrade and show a tendency to form colloidal suspensions. The latter can damage the natural water flows in the case of inadequate handling such as when are discharged into rivers and lakes leading to eutrophication (excess nutrients of phosphorus and nitrogenous compounds). Thus, electrocoagulation (EC) was applied to whey wastewater using aluminum electrodes in order to reduce the high Chemical Oxygen Demand (COD) content, as well as the respective chlorine concentration (Cl^-). Further reduction of the whey pollutant load is expected to occur after using a sequential electrochemical methodology, that of electrooxidation (EO). The Thermal Desorption-Gas Chromatography-Mass Spectrometry (TD-GC-MS) method was also used to monitor the Volatile Compounds (VOCs) released from the whey wastewater, before and after the electrochemical treatment. In particular, it was observed that aldehydes and acids, which derived largely from fat oxidation, were more affected. More specifically, hexanal and heptanal, which contribute to a grass aroma, as well as nonanal to a floral aroma, were increased after the EC. In contrast, acetic acid with a strong aroma of vinegar, was significantly reduced. The presence of acetic acid in whey is due to the metabolism of carbohydrates during the product maturation (halloumi), as well as the formation of fatty acids. Further experiments, need to be performed to fully understand the environmental effects of the combined process (EC- EO).