



## **Investigation of Lactic Acid Production from Whey Permeate (cheese manufacturing wastes) Using Fermentation**

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Whey is a wastewater obtained in the industrial production of cheese. At our country, most of the whey is obtained from ultrafiltrated (UF) cheese industry. Nowadays, most of the whey is processed by ultrafiltration (UF) to obtain a whey protein concentrate (WPC). The permeate stream contains a great amount of lactose and mineral salts. It shows a very high chemical oxygen demand (COD) value and therefore environmental problems related to whey are not solved. Whey-UF permeate can be used as fertilizer, to feed animals or dried to be added to food products. However, due to the high content and purity of lactose, it could be further processed to obtain lactose or compounds with high added value produced from lactose, such as lactic acid. Lactic acid can be manufactured either by chemical synthesis or by fermentative processes. In recent years, the amount of lactic acid obtained by biotechnological methods has increased. An integrated process for food grade lactic acid production from whey permeates is evaluated in this work. This process consists the following steps: fermentation, ultrafiltration, ion exchange, reverse osmosis and final concentration by vacuum evaporation. The proposed process has been demonstrated to be economically viable. The annual cost is estimated to be 1.25 US\$/kg for 50% (w/w) lactic acid. The highest contribution to the total investment cost corresponds to the concentration step, representing 40% of the total cost, whereas the fermentation step requires the highest operating cost (47% of the total operating cost). The results of this investigation can be used by dairy industry experts, whey product producers and environmental protectors

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