

Recovery of lactic acid from fermentation broth using precipitation and reactive distillation

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Precipitation and reactive distillation were employed to recover lactic acid from fermentation broth. Lime was initially added to fermentation broth in order to convert soluble lactic acid to insoluble calcium lactate form. Because of high solubility of calcium lactate, ethanol was added to the fermentation broth to enhance precipitation. In ideal solution of organic acids, precipitation experiment was performed with varying amount of ethanol. Same experiments were carried out for fermentation broth with calcium lactate of high concentration.

Precipitation process was followed by reactive distillation. Reactive distillation starts with the conversion of carboxylate salts made in previous precipitation process into their corresponding acids. Carboxylate salts(e.g., calcium lactate) were mixed with carbon dioxide(CO₂), triethylamine((C₂H₅)₃N) to precipitate as calcium carbonate(CaCO₃). The remaining liquid was distilled at 150°C for 1hr. Triethylamine and water were recovered from the top of the distiller, while lactic acid and several organic acids were remained in feeding bottle. The yield of recovered lactic acid was 67.5% with the purity of 98.7%. The main impurities were other organic acids.

References

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