SARATOON YIAMSOMBAT : CONCENTRATING BUTANOL FERMENTATION BROTH BY REVERSE OSMOSIS. THESIS ADVISOR : ASSO.PROF.CHIRAKARN MUANGNAPOH, D.Ing.,152 PP.

Reverse osmosis was applied to solve the problem of dilute solvent concentration in butanol-acetone fermentations. In the continuous butanol-acetone fermentation, a cross-flow ultrafilter was used to separate and recycle cells in a fermentation of Clostridium acetobutylicum ATCC 824. After that, by reverse osmosis, the fermentation permeate was dewatered for increasing the solvent product concentration. The polyamide membrane with 0.88 $m^2$ surface area, spiral wound module, was used at the optimum applied pressure and recirculation flow rate of 50 $kg/cm^2$ and 3.0 L/min, respectively. It was found that we can increase the butanol concentration from 6.0 g/L to 18.9 g/L at butanol rejection 87 % (recovery 74 % volume basis) and butanol recovery 92.7 %. Electrical energy consumption for increasing butanol concentration from 6.0 to 18.9 g/L by reverse osmosis was 0.15 kw.h/L.product (0.17 kw.h/L.product-$m^2$.membrane area). Comparing with simple fractional distillation at the same butanol recovery, butanol concentration was increased from 6.0 to 67 g/L with electrical energy consumption of 3.2 kw.h/L.product. Therefore, it was seen that by comparing the electrical energy consumption of these two systems, 95.3 % energy saving was obtainable.