



<b>Thesis</b>	Performance Analysis of Two-stage Ethanol Distillation in Bubble Pump Distiller
<b>Author</b>	Mr. Panit Jittayasothon
<b>Degree</b>	Master of Engineering (Energy Engineering)
<b>Thesis Advisor</b>	Prof. Dr. Tanongkiat Kiatsiriroat

### ABSTRACT

This research work is to study performance of bubble pump distiller including the number of distillation stage for increasing ethanol concentration. Experimental studies were carried out with two distillers having heat transfer areas of 8.35 and 3.2 m<sup>2</sup>. The considered parameters were initial concentration and level of solution in the distillers. It could be found that with higher initial concentration, higher solution level and higher heat transfer area, higher distillation rate and higher concentration were obtained. However, when the solution level was over 35 % the performance seemed to be lower. Form the experimental data, the correlations to predict the mass rate and the output concentration were  $m_d = 40.328X_i^{0.12486}(H/H_t)^{0.74167}(UA/UA_{ref})^{0.76742}$ ,

$X_d = 1.6831X_i^{0.5283}(H/H_t)^{0.34046}(UA/UA_{ref})^{-0.08947}$ . The simulated results agreed well with the experimental data within  $\pm 12$  % variation. With these correlations, a two-stage distiller had been designed of which the areas of the first and the second were similar to those of the experiments. The output of the second stage was 10.81 l/hr with 80 % v/v concentration. The cost of the yield was 2.62 baht/lite.

All rights reserved