

Ethyl Acetate Kinetics

May 2, 2006

TO: Engineering Development Branch

FROM: Engineering Division

SUBJECT: Ethyl Acetate Kinetics

In our design study for the new reactor for the Ethyl-Acetate/Sodium Hydroxide Plant, we have discovered that our supplies of **solid** sodium hydroxide contains the impurity **KCl**. We need you to determine how up to 4 weight percent of this impurity in the feed stream affects the kinetics of the reaction. Please determine the kinetic parameters (rate constant, reaction order, activation energy) for the reaction with and without this impurity.

We already have a stirred-tank reactor (volume = 80 cubic meters) on hand which was salvaged from the old polymers plant. Would you please determine if this tank would be an adequate reactor to achieve a 96 percent conversion of our ethyl-acetate under the following conditions:

Reaction temperature = 28 degrees centigrade

Et Ac feed-stream flowrate = 5300 moles Et Ac per day

Et Ac feed-stream concentration = 0.023 molar Et Ac

NaOH feed-stream flowrate = 7950 moles NaOH per day

NaOH feed-stream concentration = 0.046 M NaOH

Please comment on whether we should consider methods of removing the impurities from the sodium hydroxide stream.

Useful Reference:

Laidler, K.J. and Chen, D., Trans. Far. Soc., **54**, 1026, (1958).