Batch Distillation

Winter 2007

TO: Engineering Development Branch

FROM: Engineering Division

SUBJECT: Batch Distillation

The specialty chemical division has begun production of deuterated methanol (CH_3OD) at 4 kg/day. Unfortunately the final step in the synthesis requires the addition of one volume ethanol for every volume CH_3OD produced. Can we use the **small batch distillation column** to recover the CH_3OD in better than 97 wt% purity? If so, how much can be recovered at this concentration? Do you have any recommended modifications to the column to improve its operation. Be creative and consider all options. This CH_3OD is worth $700/kg at 99% purity and only $200/kg at 97% purity.

The specialty chemical division indicated that they could use recycled EtOH containing some residual CH_3OD in the final step of their synthesis, i.e., you may want to consider recycling the bottoms so that none of the CH_3OD is lost. Does the theoretical equation for batch distillation apply to this column?

Suggested References:

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McCabe, Smith and Harriott, *Unit Operations of Chemical Engineering,* McGraw Hill, New York, (1985).

King, C.J., *Separation Processes*, 2nd Edition, McGraw-Hill Book Company, New York, NY (1980)

Perry, R.H., and Chilton, C.H., *Chemical Engineers' Handbook*, 5th Edition, McGraw-Hill Book Company, New York, NY (1973)

Treybal, Robert E., *Mass-Transfer Operations*, 3rd Edition, p.p. 202-211, McGraw-Hill Book Company, New York, NY (1980)