Nor-Par a.s

The Phthalic Anhydride Process

DESCRIPTION:

One of the routes to make Phthalic Anhydride (PA) is to oxygenate o-Xylene with air in a catalytic process.

Extensive laboratory/computational work has been carried out to develop actual kinetic model for the reactor. Then the data were input to CHEMCAD's Kinetic Reactor model as the Extended Kinetic Equation. Heat transfer was also included into the model.

As we were not permitted by the technology owner to publish data, the Training Book example involves simpler model for a similar process.

Reactive absorption has been employed to model a scrubber converting anhydrides into respective carboxylic acids.

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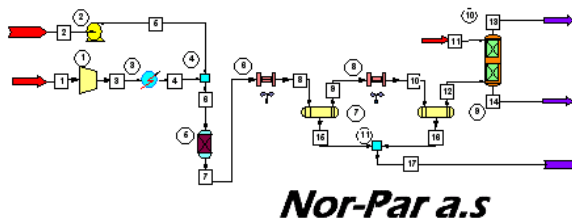
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                 Compressor Summary

Equip. No.                      1
       Name
Type of Compressor:             2
Pressure out   bar          1.6000
Efficiency                  0.7500
Actual power   kW         603.0629
Cp/Cv                       1.3989
Ideal Cp/Cv                 1.3975
Calc Pout  bar              1.6000
Theoretical power  kW     442.3389
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                 Scds Rigorous Distillation Summary

Equip. No.                        10
        Name
No. of stages                      2
1st feed stage                     1
2nd feed stage                     2
Top pressure   bar            1.0132
Reactive distillation ?            Y
Reflux mole  kmol/hr       1558.7957
Reflux mass  kg/hr        30063.6094


Reaction Stoichiometrics and Parameters for unit no. 10

No. of liquid reactions = 2
No. of vapor reactions  = 0
Mole unit: 2   Act. E unit : 3  Vol. unit : 2
Time unit: 2   Press. unit : 0  Temp unit : 0


Tray reaction volumes

     Stg      Liq rxn vol      Vapor rxn vol
      1      2.0000e+001       0.0000e+000
      2      2.0000e+001       0.0000e+000


Reaction  1   Type =   0   Phase =   0
A =   1.0000e+001  E =   0.0000e+000  Para3 =   0.0000e+000

Comp    Stoich.    Exp.factor   Adsorb Fac.   Adsorb E      Adsorb Exp.
  2   -1.00e+000  0.0000e+000  0.0000e+000  0.0000e+000  0.0000e+000
 10   -1.00e+000  0.0000e+000  0.0000e+000  0.0000e+000  0.0000e+000
 11    1.00e+000  0.0000e+000  0.0000e+000  0.0000e+000  0.0000e+000


Reaction  2   Type =   0   Phase =   0
A =   1.0000e+001  E =   0.0000e+000  Para3 =   0.0000e+000

Comp    Stoich.    Exp.factor   Adsorb Fac.   Adsorb E      Adsorb Exp.
  3   -1.00e+000  0.0000e+000  0.0000e+000  0.0000e+000  0.0000e+000
 10   -1.00e+000  0.0000e+000  0.0000e+000  0.0000e+000  0.0000e+000
 12    1.00e+000  0.0000e+000  0.0000e+000  0.0000e+000  0.0000e+000
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