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APPENDIX

APPENDIX A

INPUT SOURCE CODE FOR ASPEN

TITLE 'TOC'

IN-UNITS MET PRESSURE='kg/sqcm' TEMPERATURE=C DELTA-T=C &
PDROP='kg/sqcm'

DEF-STREAMS CONVEN ALL

DATABANKS PURE93 / AQUEOUS / SOLIDS / INORGANIC / &
NOASPENPCD

PROP-SOURCES PURE93 / AQUEOUS / SOLIDS / INORGANIC

COMPONENTS

H2 H2 H2 /

CO CO CO /

CH4 CH4 CH4 /

C2H6 C2H6 C2H6 /

C2H4 C2H4 C2H4 /

C3H8 C3H8 C3H8 /

C3H6 C3H6-2 C3H6 /

C2H2 C2H2 C2H2 /

PD C3H4-1 PD /

MA C3H4-2 MA /

WATER H2O WATER

FLOWSHEET

BLOCK HEAT1 IN=PRODRX1 FEEDHT1 OUT=FEEDRX2 PRODHT1
BLOCK RX2 IN=FEEDRX2 OUT=PRODRX2
BLOCK HEAT2 IN=PRODRX2 FEEDHT2 OUT=FEEDRX3 PRODHT2
BLOCK RX3 IN=FEEDRX3 OUT=PRODRX3
BLOCK B1 IN=FEEDRX1 OUT=PRODRX1

PROPERTIES PENG-ROB

PROP-DATA PRKIJ-1

IN-UNITS ENG
PROP-LIST PRKIJ
BPVAL C2H2 C2H4 .06520
BPVAL CH4 C2H4 .02150
BPVAL CH4 C2H6 -.00260
BPVAL CH4 CO .030
BPVAL CH4 H2 .01560
BPVAL CH4 C3H6 .0330
BPVAL CH4 C3H8 .0140
BPVAL C2H4 C2H6 .00890
BPVAL C2H4 H2 .00740
BPVAL C2H4 C2H2 .06520
BPVAL C2H4 CH4 .02150
BPVAL C2H6 C2H4 .00890
BPVAL C2H6 CO -.02260
BPVAL C2H6 H2 -.06670
BPVAL C2H6 C3H6 .00890
BPVAL C2H6 C3H8 .00110
BPVAL C2H6 CH4 -.00260
BPVAL CO C2H6 -.02260
BPVAL CO H2 .09190
BPVAL CO C3H8 .02590
BPVAL CO CH4 .030
BPVAL H2 C2H4 .00740

BPVAL H2 C2H6 -.06670
 BPVAL H2 CO .09190
 BPVAL H2 C3H6 -.10370
 BPVAL H2 C3H8 -.08330
 BPVAL H2 CH4 .01560
 BPVAL C3H6 C2H6 .00890
 BPVAL C3H6 H2 -.10370
 BPVAL C3H6 C3H8 .00740
 BPVAL C3H6 CH4 .0330

STREAM FEEDHT1

SUBSTREAM MIXED TEMP=35.00000 VFRAC=0.0 MASS-FLOW=55360.00
 MOLE-FRAC WATER 1.0

STREAM FEEDHT2

IN-UNITS SI
 SUBSTREAM MIXED TEMP=308.150 VFRAC=0.0 MASS-FLOW=15.3777779
 MOLE-FRAC WATER 1.0

;69.415 was the opt temp

STREAM FEEDRX1

IN-UNITS SI
 SUBSTREAM MIXED TEMP=69.2 <C> PRES=35.97 <kg/sqcm> &
 MASS-FLOW=135007.5 <kg/hr>
 MOLE-FRAC H2 0.1574 / CO 0.000379 / CH4 0.253281 / &
 C2H6 0.084127 / C2H4 0.366618 / C3H8 0.004001 / &
 C3H6 0.126441 / C2H2 0.004401 / PD 0.001801 / MA &
 0.0015 / WATER 0.0

; "opt"

;was 71.17

BLOCK HEAT1 HEATX

IN-UNITS SI

DESCRIPTION "top"

PARAM T-HOT=66.8 <C>

FEEDS HOT=PRODRX1 COLD=FEEDHT1

PRODUCTS HOT=FEEDRX2 COLD=PRODHT1

;was 54.55

BLOCK HEAT2 HEATX

IN-UNITS SI

DESCRIPTION "temp"

PARAM T-HOT=37.2 <C>

FEEDS HOT=PRODRX2 COLD=FEEDHT2

PRODUCTS HOT=FEEDRX3 COLD=PRODHT2

BLOCK B1 RPLUG

PARAM TYPE=ADIABATIC LENGTH=1.522 <meter> DIAM=3. <meter> &
PDROP=0.25

REACTIONS RXN-IDS=R-1

BLOCK RX2 RPLUG

PARAM TYPE=ADIABATIC LENGTH=1.522000 DIAM=3.000000 &
PDROP=0.25

REACTIONS RXN-IDS=R-2

BLOCK RX3 RPLUG

IN-UNITS SI

PARAM TYPE=ADIABATIC LENGTH=1.5220 DIAM=3.0 PDROP=0.25

REACTIONS RXN-IDS=R-3

SENSITIVITY S-1

DEFINE C2H2P1 MASS-FRAC STREAM=PRODRX1 SUBSTREAM=MIXED &


```
COMPONENT=C2H2
DEFINE C2H2P2 MASS-FRAC STREAM=PRODRX2 SUBSTREAM=MIXED &
COMPONENT=C2H2
DEFINE C2H2P3 MASS-FRAC STREAM=PRODRX3 SUBSTREAM=MIXED &
COMPONENT=C2H2
DEFINE C2H6P1 MOLE-FRAC STREAM=PRODRX1 SUBSTREAM=MIXED &
COMPONENT=C2H6
DEFINE C2H6P2 MOLE-FRAC STREAM=PRODRX2 SUBSTREAM=MIXED &
COMPONENT=C2H6
DEFINE C2H6P3 MOLE-FRAC STREAM=PRODRX3 SUBSTREAM=MIXED &
COMPONENT=C2H6
F C1=C2H2P1*1000000
F C2=C2H2P2*1000000
F C3=C2H2P3*1000000
TABULATE 1 "C1"
TABULATE 2 "C2"
TABULATE 3 "C3"
TABULATE 4 "C2H6P1"
```

VITA

Mr. Kitipan Kitbamroong graduated high school from Bodin Decha (Sing SingHa-Senee) School in 1991 and received a Bachelor Degree from Chulalongkorn University in 1995. He subsequently studies for requirement of master degree in Chemical Engineering, Faculty of Engineering, Chulalongkorn University from 1997-2000.

From 1996 to 1997, he worked at the National Petrochemical (Public) Company at Map Ta Phut, Rayong, Thailand, for more than a year as a process control engineer. His work related to process simulation development of the ethylene and propylene process, and making use of it in real plant.

After resignation, he has joined the Department of Chemical Engineering, Faculty of Engineering at Chulalongkorn University as a lecturer teaching Basic Computer for Chemical Engineering and Unit Operation Laboratory.