```
card "PFR" (id 33290)
 of stack "PFR With Heat Exchange"


on openCard
  global labInitialize
  setInfo empty
  if labInitialize is "true" then initThisLab
  enterLab
end openCard

# ---------------------

on closeCard
  setInfo empty
end closeCard

# ---------------------

on initThisLab

  global labType, setCount
  global dataHeaders, dataUnits, dataMinMax, dataPrompts
  global xVarNum, yVarNum

  global labCardName  # ••• special for "compound" labs •••

  # ••• specify labType •••
  put "P" into labType  # Profile

  # ••• start localization •••
  put "PFR" into labCardName
  # ••• end localization •••

  initLabStart

  # ••• start localization •••

  # start definition of input variables, list in order by varNum = 1, 2, 3, etc.

  put 1 into varNum
  put "k*" into item varNum of dataHeaders
  put 1E-6 into item varNum of line 1 of dataMinMax
  put 100 into item varNum of line 2 of dataMinMax
  put "1/s (value at 300 K)" into line varNum of dataUnits
  put "Enter k at 300 K" into line varNum of dataPrompts

  put 2 into varNum
  put "Ea" into item varNum of dataHeaders
  put zero into item varNum of line 1 of dataMinMax
  put 250 into item varNum of line 2 of dataMinMax
  put "kJ/mol" into line varNum of dataUnits
  put "Enter activation energy in kJ/mol" into line varNum of dataPrompts

  put 3 into varNum
  put "del_H" into item varNum of dataHeaders
  put -250 into item varNum of line 1 of dataMinMax
  put 250 into item varNum of line 2 of dataMinMax
  put "kJ/mol" into line varNum of dataUnits
  put "Enter the heat of reaction in kJ/mol (exothermic is negative)" into line varNum of dataPrompts

  put 4 into varNum
  put "dens" into item varNum of dataHeaders
  put 0.1 into item varNum of line 1 of dataMinMax
  put 2E4 into item varNum of line 2 of dataMinMax
  put "kg/m3" into line varNum of dataUnits
  put "Enter the fluid density in kg/m3" into line varNum of dataPrompts

  put 5 into varNum



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put "capac" into item varNum of dataHeaders
put 1E-3 into item varNum of line 1 of dataMinMax
put 100 into item varNum of line 2 of dataMinMax
put "kJ/(kg K)" into line varNum of dataUnits
put "Enter the fluid heat capacity in kJ/(kg K)" into line varNum of dataPrompts

put 6 into varNum
put "Tin" into item varNum of dataHeaders
put 200 into item varNum of line 1 of dataMinMax
put 550 into item varNum of line 2 of dataMinMax
put "K" into line varNum of dataUnits
put "Enter the inlet temperature in Kelvin" into line varNum of dataPrompts

put 7 into varNum
put "Cin" into item varNum of dataHeaders
put "0" into item varNum of line 1 of dataMinMax
put 1e3 into item varNum of line 2 of dataMinMax
put "mol/m3" into line varNum of dataUnits
put "Enter the initial reactant concentration in mol/m3" into line varNum of dataPrompts

put 8 into varNum
put "vol" into item varNum of dataHeaders
put 1E-3 into item varNum of line 1 of dataMinMax
put 100 into item varNum of line 2 of dataMinMax
put "m3" into line varNum of dataUnits
put "Enter the volume of fluid in the reactor in m3" into line varNum of dataPrompts

put 9 into varNum
put "flow" into item varNum of dataHeaders
put 1E-5 into item varNum of line 1 of dataMinMax
put 1E3 into item varNum of line 2 of dataMinMax
put "m3/s" into line varNum of dataUnits
put "Enter the inlet volumetric flow rate in m3/s" into line varNum of dataPrompts

put 10 into varNum
put "Tj" into item varNum of dataHeaders
put 200 into item varNum of line 1 of dataMinMax
put 450 into item varNum of line 2 of dataMinMax
put "K" into line varNum of dataUnits
put "Enter the jacket coolant temperature in Kelvin" into line varNum of dataPrompts

put 11 into varNum
put "U" into item varNum of dataHeaders
put zero into item varNum of line 1 of dataMinMax
put 10 into item varNum of line 2 of dataMinMax
put "kJ/(s K m2)" into line varNum of dataUnits
put "Enter the jacket heat coefficient U in kJ/(s K m2)" into line varNum of dataPrompts

put 12 into varNum
put "A" into item varNum of dataHeaders
put zero into item varNum of line 1 of dataMinMax
put 1E3 into item varNum of line 2 of dataMinMax
put "m2" into line varNum of dataUnits
put "Enter the jacket heat transfer area A in m2" into line varNum of dataPrompts

# end input variables that user can vary

# tau is a computed input variable, doesn't need dataMinMax or dataPrompts
put 13 into varNum
put "tau" into item varNum of dataHeaders
put "s" into line varNum of dataUnits

# define output variables, don't need dataMinMax or dataPrompts
# for labType "P", there can be a maximum of 6 output variables
# no special limit for other labTypes
```

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 # ••• the next line must appear at the start of the output variables •••
 put varNum into inputCount

 put 14 into varNum
 put "V" into item varNum of dataHeaders
 put "m3" into line varNum of dataUnits

 put 15 into varNum
 put "C" into item varNum of dataHeaders
 put "mol/m3" into line varNum of dataUnits

 put 16 into varNum
 put "conv" into item varNum of dataHeaders
 put "(dimensionless)" into line varNum of dataUnits

 put 17 into varNum
 put "T" into item varNum of dataHeaders
 put "K" into line varNum of dataUnits

 # specify default variables for lab plots

 put 17 into yVarNum  # plot T for default
 put 14 into xVarNum  # plot vs V for default

 # specify text for info box on this card after initialization
 put "Reaction in a PFR with heat transfer." into infoText

 # specify text for announcement dialog after initialization
 put "Make sure you click on the 'info' button in the navigation bar."  & return into announceText
 put "After you become familiar with the lab, click on the 'quiz' button"   & space after announceText
 put "in the navigation bar to do the Quiz." after announceText

 # ••• end localization •••

 initLabFinish varNum, inputCount, xVarNum, yVarNum

 if the customFirstEntry of this stack is "false" then
  # only display announcement the first time a lab in this stack is entered
  answer announceText
  set the customFirstEntry of this stack to "true"
 end if

 setInfo infoText

end initThisLab
```