In [3]:

```
# %load http://che.byu.edu/imports.py
import numpy                as np
import matplotlib.pyplot as plt
%matplotlib inline
from scipy.optimize      import fsolve, curve_fit
from scipy.integrate     import odeint, quad
from scipy.interpolate   import interp1d
from scipy.misc          import derivative
import scipy.constants   as const
import sympy             as sp
sp.init_printing()
import glob
import time
#import pint; u = pint.UnitRegistry()
```

This is an example of CO2 using the SRK Equation of State

In [5]:

```
Tc = 304.2                                              # Critical Temperature in K
Pc = 72.9                                               # Critical Pressure in atm
R = 0.08206                                             # Universal Gas Constant in liter-a
a = 0.42747*(R*Tc)**2/Pc                                # The "a" parameter in the SRK equa
b = 0.08664*(R*Tc)/Pc                                   # The "b" parameter in the SRK equa
omega = 0.225                                           # Pitzer acentric factor from Table
m = 0.48508 + 1.55171*omega - 0.1561*omega**2           # The "m" parameter in the SRK equa

T = 400                                                 # The system temperature in K
P = 50                                                  # The system pressure in atm

Tr = T/Tc                                               # The reduced temperature
alpha = (1 + m*(1-Tr**0.5))**2                          # The alpha in the SRK

print (a,b,m,Tr,alpha)                                  # Print the values of a,b,m,Tr,alph

Videal = R*T/P                                          # Calculate the volume in liters fr

print(Videal)                                           # Print the volume from the ideal g

def g(x) :
    return P - R*T/(x - b) + a*alpha/(x*(x+b))          # This is the function evaluation,
V = fsolve(g,Videal)                                    # Fsolve finds the zero of the func

print(V,g(V))                                           # Print the value of V in liters
```

```
3.6539244003896534 0.0296675469037037 0.8263121875 1.314924391847469 0.7722520745415591
0.65648
[0.60109199] [5.82645043e-13]
```

```
tm/(K-gmole)
tion
tion
 5.3-1
tion








a

om the ideal gas equation

as equation


LHS - RHS of SRK equation
tion g(V) with current T & P
```