## AS – 5680 High Temperature Gas Dynamics
## Dr. T. M. Muruganandam
## Supplementary Exercise – 2
## Aug 20, 2012

**1.** Consider a mixture of gases CO, O2 and CO2 with composition 2:2:1 at 300K and 1atm in a closed system. Let the mixture come to equilibrium. Plot equilibrium composition of the gases as a function of Temperature in the range of 300K to 3000K assuming **pressure** is maintained constant. Check your answers with free softwares on the web, like Gaseq, Stanjan, CEA etc.

The thermodynamic data for the gases are given in the class website

**2.** Le Chatelier's principles:

In a system in chemical equilibrium,

(a) Changing the concentration of an ingredient will shift the equilibrium to the side that would reduce that change in concentration.

(b) Decreasing the temperature will shift the equilibrium in such a way as to produce heat.

(c) Decreasing the pressure (in an equilibrium reaction with change in number of moles) will shift the equilibrium in such a way as to increase the total number of moles.

Prove these statements assuming second law of thermodynamics is obeyed by nature.

**Also prove this by changing the inputs to your program!**