

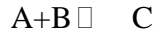
CHG 3127
Assignment#3

(Due Feb 15/2011, assigned ahead of time upon request)

Problem 1

Calculate the equilibrium conversion and concentrations for each of the following reactions.

- (a) The liquid-phase reaction



with $C_{A0} = C_{B0} = 2 \text{ mol/dm}^3$ and $K_C = 10 \text{ dm}^3/\text{mol}$

- (b) The gas-phase reaction

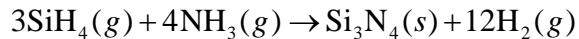


carried out in a flow reactor with no pressure drop. Pure A enters at a temperature of 400 K and 10 atm. At this temperature, $K_C = 0.25 \text{ dm}^3/\text{mol}^2$

- (c) The gas-phase reaction in part (b) carried out in a constant-volume batch reaction.
(d) The gas-phase reaction in part (b) carried out in a constant-pressure batch reaction.

Problem 2

Chemical vapor deposition (CVD) is a process used in the microelectronics industry to deposit thin films of constant thickness on silicon wafers. This process is of particular importance in manufacturing of very large scale integrated circuits. One of the common coatings is Si_3N_4 , which is produced according to the reaction



This dielectric is typically more resistant to oxidation than other coating. Set up a stoichiometric table for this reaction and plot the concentration of each species as a function of conversion. The entering pressure is 1 Pa and temperature is constant at 700 °C. The feed is equimolar in NH_3 and SiH_4 .