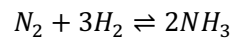


CHG 3127 Tutorial Session 2: (2020-01-23)

Question A

The following reversible reaction takes place in a batch reactor:



The molar feed fed to the reactor is 40% N_2 and 50% H_2 , with the remaining moles consisting of an inert, I .

i) Complete the stoichiometric table below in Excel:

Species	Symbol	Initial	Change	remaining
N_2	A			
H_2	B			
NH_3	C			
I	I			
Total				

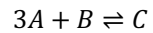
ii) Find δ and ϵ

Question B

For the same reaction system in Question A, solve in Excel the concentrations of each species (reactants, products and inert) as a function of X for (i) a flow reactor with a specified total volumetric flow rate v of $4.0 \text{ dm}^3/\text{min}$ and inlet molar flow rate of 4 mol/min as well as (ii) for a batch reactor with fixed reactor volume of $V = 20 \text{ dm}^3$ and a total of 4 mol introduced into the reactor at start-up. Please provide the resulting table of concentrations and concentration profile plot, making your calculations in intervals of $0.1 X$ from 0 to 1 .

Question C

The kinetics of a reversible, elementary gas phase reaction follow the stoichiometric equation



where A and B are initially introduced to a flow reactor at concentrations of 0.9 mol/L and 1.1 mol/L , respectively.

Determine the equilibrium fractional conversion to an accuracy of at least 0.02 using Excel. (Hint: express the equilibrium equation in root finding form as $f(X) = 0$.)