SAPIENZA
UNIVERSITÀ DI ROMA

International Medical School
Course of Chemistry and Introduction to Biochemistry
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Homework: Reactions at equilibrium (see lecture 5)

1. 2 mol of CH_4 and 1 mol of H_2S in the gas phase are filling in a box at 727°C. At equilibrium there are 0.4 mol of H_2 and the total pressure is 0.2 atm. Calculate the volume of the box. (the reaction is: $CH_4+2H_2S \leftrightarrows CS2+4H_2$)

2. The equilibrium constant at 793K of the reaction: $2HF \leftrightarrows H_2 + F_2$ is $1.56 \cdot 10^{-2}$. The reaction is started by adding 0.5mol F_2 and 1mol of H_2 to an isothermal box of 10 L. Calculate the molar concentration of the three species at equilibrium.

3. In a box of 0.5L, 8g of PCl_5 are introduced at 250°C. The constant of the reaction in the gaseous phase: $PCl_5 \leftrightarrows PCl_3 + Cl_2$ is 0.041 M. Calculate the concentration of the three species at equilibrium. [FW_{PCl5}=208]

4. 4 mol of A and 8 mol of B are introduced in a box of 1L. The equilibrium is attained when there are 4 mol of C in the box. Calculate Kc for the equilibrium: $A + 3B \leftrightarrows 2C$

5. In a box of 2L at high T, there are 4g of PCl_5. At equilibrium there are 0.8g of PCl3. Calculate how many grams of Cl_2 are needed to obtain 0.5g of PCl_3.
   (the reaction is $PCl_5 \leftrightarrows PCl_3 + Cl_2$)

6. 1 mol of H_2 and 1 mol of I_2 are inserted in a box of 1L. In these conditions Kc=50. Calculate the concentration of the three species for the equilibrium reaction $H_2+I_2 \leftrightarrows 2HI$