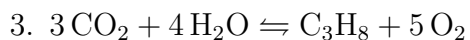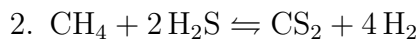# Equilibrium Problems

Write the expression for the equilibrium constants for each of the following reactions.

1. $Xe + 3\,F_2 \rightleftharpoons XeF_6$

2. $CH_4 + 2\,H_2S \rightleftharpoons CS_2 + 4\,H_2$

3. $3\,CO_2 + 4\,H_2O \rightleftharpoons C_3H_8 + 5\,O_2$

4. Write the chemical equation for the equilibrium system given by the expression

$$K_{eq} = \frac{[H_2O]^2\,[O_2]}{[H_2O_2]^2}$$

5. Write the chemical equation for the equilibrium system given by the expression:

$$K_{eq} = \frac{[NH_3]^2}{[N_2]\,[H_2]^3}$$

6. Write the chemical equation for the equilibrium system given by the expression:

$$K_{eq} = \frac{[HCl]^4\,[O_2]}{[H_2O]^2\,[Cl_2]^2}$$

7. A reaction vessel contains $0.150\,M$ CH_4, $0.233\,M$ H_2O, $0.259\,M$ H_2, and $0.513\,M$ CO. If the equilibrium reaction is $CH_4 + H_2O \rightleftharpoons CO + 3\,H_2$, calculate the equilibrium constant K_{eq}.

8. A $10\,\ell$ flask contains 0.128 mol of CO, 0.155 mol of H_2 and 0.0244 mol of CH_3OH. If the equilibrium reaction is $CH_3OH \rightleftharpoons CO + 2\,H_2$, calculate the equilibrium constant K_{eq}.

9. For the reaction $2\,NOBr \rightleftharpoons 2\,NO + Br_2$, the value of the equilibrium constant K_{eq} is 0.0125. If the concentration of NO is $0.750\,M$ and the concentration of Br_2 is $0.200\,M$, what is the concentration of NOBr?