Chem12 Equilibrium : Test-90

1) At equilibrium there is constant pressure, temperature and concentrations of reactants and products. Give three other conditions for equilibrium.

2) Given : $2NO(g) + O_2(g) <-> 2NO_2(g)$. At 500° K the equilibrium constant is 6.0×10^4. If [NO] = 0.50, $[O_2]$ = 0.0020, and $[NO_2]$ = 1.00. Is the reaction at equilibrium or will it shift left or right?

3) What does Le Chatelier's principle say?

4) Given : $PCl_5(g) <-> PCl_3(g) + Cl_2(g)$ $\Delta H = 92.6kJ$
Give the direction of the shift in the equilibrium or state No Change.

a) Volume is decreased

b) Some $PCl_3(g)$ is removed

c) Temperature decreases

d) Pressure decreases

e) Helium is added

5) Given : $2Sb(s) + 3Br_2(g) <-> 2SbBr_3(g)$ $\Delta H < 0$
Give the direction of the shift in the equilibrium or state No Change.

a) Volume is decreased

b) Some $SbBr_3(g)$ is removed

c) Temperature increases

d) Pressure increases

e) Sb(s) is added

6) Given : $2SO_2(g) + O_2(g) <-> 2SO_3(g)$
Calculate the equilibrium concentrations of the reactants if the initial concentrations are SO_2 = 0.500 M, O_2 = 0.500 M and SO_3 = 0.000 M, and the final concentration of SO_3 is 0.200 M.

7) Given : $NH_4Br(s) <-> NH_3(g) + HBr(g)$ $K_{eq} = 1.1x10^{-7}$
Some $NH_4Br(s)$ is introduced into a container. Find the equilibrium concentrations of the products.

8) Given : $H_2(g) + I_2(g) <-> 2HI(g)$

a) If the initial concentrations of the two reactants are 1.00 M, find K_{eq} if the equilibrium concentration of HI = 1.52.

b) If 1.00 M of H_2 is added to the above equilibrium mixture, find the new equilibrium concentrations. (Hint : You will have to use the quadratic formula).

Answers : 1) System is closed, Forward rate equals reverse rate, Equilibrium can be reached from either direction., 2) $K_{trial} = 2.0x10^3 < 6.0x10^4$, shift is right., 3) If a system at equilibrium is subjected to a change, then processes will occur which will tend to counteract that change., 4)a) left, b) right, c) left, d) right, e) N.C., 5)a) right, b) right, c) left, d) right, e) N.C., 6) 0.300, 0.400, 7) $3.3x10^{-4}$, $3.3x10^{-4}$, 8)a) 40., b) 1.07, 0.07, 1.86.