UNIVERSITY CEU SAN PABLO
SCHOOL OF PHARMACY
DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY

COMPLEMENTARY PROBLEMS OF PHYSICAL CHEMISTRY

2018-19

LESSON 5

29. ΔG° at 298 K for the decomposition reaction of NH_4Cl is 21,8 kcal·mol-1, calculate the equilibrium constant K_P^o and Kx at 25 ° C and 1 atm

Data: R = 0.082 l·atm·K^{-1}·mol^{-1} = 1.987 cal·K^{-1}·mol^{-1} = 8.314 J·K^{-1}·mol^{-1}

$$NH_4Cl\,(s) \rightleftarrows NH_{3\,(g)} + HCl_{\,(g)}$$

Solution: $K_{P,298}^o = 1.0252\cdot10^{-16}; K_{x,298} = 1.0252\cdot10^{-16}$

30. The equilibrium constant for the process:

$$\frac{1}{2}N_2(g)+\frac{1}{2}O_2(g) \rightleftarrows NO(g)$$

can be approximately calculated by the expression:

$$\log K_P^o = -\frac{10872.463}{T}+1.2574\,(J)$$

Determine:

a) the equilibrium constant at 1000 K and 1200 K.

b) ΔH^o, ΔS^o and ΔG^o at 1000K

Data: R = 0.082 l·atm·K^{-1}·mol^{-1} = 1.987 cal·K^{-1}·mol^{-1} = 8.314 J·K^{-1}·mol^{-1}

31. Calculate the pH of an aqueous solution of an acid type 1: 1 in a concentration 0.010 m, knowing that its dissociation constant is $6.6 \cdot 10^{-5}$.

Solution: pH = 3.108

32. For AgCl, the solubility product is $1.78 \cdot 10^{-10}$ at 25 ° C. Calculate the solubility, at 25 ° C, In the following solvents

a) pure water
b) 0.01 m-KNO_3 solution
c) 0.01 m-KCl solution

Explain your answer using the appropriate equations.

Solution: s = $1.33 \cdot 10^{-5}$ mol $\cdot$ kg^{-1}; **b)** s = $1.50 \cdot 10^{-5}$ mol $\cdot$ kg^{-1}; **c)** s = $2.55 \cdot 10^{-8}$ mol kg^{-1}