AP CHEMISTRY CHAPTER 14 PROBLEMS

Sample problem1

Write the simple dissociation reaction (omitting water) for each of the following acids

1. Hydrochloric acid
2. Acetic Acid
3. The ammonium ion
4. The anilinium ion (C6H5NH3+)
5. The hydrated aluminum (III) ion [Al(H2O)6]3+

Sample problem 2

Using table 14.2 (page 658) arrange the following species according to their strength as bases. H2O, F-, Cl-, NO2-, and CN-

Sample problem 3

Calculate [H+] or [OH-] as required for each of the following solutions at 25oC and state whether the solution is neutral, acidic, or basic

1. 1.0 x 10-3 M OH-
2. 1.0 x 10-7 M OH-
3. 10.0 M H+

Sample problem 4

At 60oC, the value of Kw is 1 x 10-13

1. Using LeChatelier’s principle, predict whether the autoionization of water is endothermic or exothermic
2. Calculate [H+] and [OH-] in a neutral solution at 60oC

Sample problem 5

Calculate the pH and pOH for each of the following solutions at 25oC

1. 1.0 x 10-3 M OH-
2. 1.0 M H+

Sample problem 6

The pH of a sample of blood was measured to be 7.41 at 25oC. Calculate pOH, [OH-] and [H+] for the sample

Sample problem 7

1. Calculate the pH of a 0.10 M HNO3
2. Calculate the pH of a 1.0 x 10-10 M HCl

Sample problem 8

The hypochlorite ion (OCl-) is a strong oxidizing agent often found in household bleaches and disinfectants. It is also the active ingredient that forms when swimming pool water is treated with chlorine. In addition to its oxidizing abilities, the hypochlorite ion has a relatively high affinity for protons (it is a much stronger base than Cl-, for example) and form the weakly acidic hypochlorous acid (HOCl, Ka = 3.5 x 10-8). Calculate the pH of a 0.100 M aqueous solution of hypochlorous acid

Sample problem 9

Calculate the pH of a solution that contains 1.00 M HCN (Ka = 6.2 x 10-10), and 5.00 M HNO2

(Ka = 4.0 x 10-4). Also calculate the concentration of cyanide ion in the solution at equilibrium.

Sample problem 10

Calculate the percent dissociation of acetic acid (Ka = 1.8 x 10-5)

1. 1.00 M acetic acid
2. 0.100 M acetic acid

Sample problem 11

Lactic acid (HC3H5O3) is a waste product that accumulates in muscle tissue during exertion, leading to pain and a feeling of fatigue. In a 0.100 M aqueous solution, lactic acid is 3.7% dissociated. Calculate the Ka for this acid.

Sample problem 12

Calculate the pH of a 5.0 x 10-2 M NaOH

Sample problem 13

Calculate the pH for a 15.0 M NH3 (Kb = 1.8 x 10-5)

Sample problem 14

Calculate the pH of a 1.0 M solution of methylamine (Kb = 4.38 x 10-4)

Sample problem 15

Calculate the pH of a 5.0 M H3PO4, and the equilibrium concentrations of the species: H3PO4, H2PO4-, HPO42-, and PO43-

Sample problem 16

Calculate the pH of a 1.0 M H2SO4

Sample problem 17

Calculate the pH of a 1.00 x 10-2 M H2SO4

Sample problem 18

Calculate the pH of a 0.30 M NaF solution. The Ka for HF is 7.2 x 10-4

Sample problem 19

Calculate the pH of a 0.10 M NH4Cl solution. The Kb for NH3 is 1.8 x 10-5

Sample problem 20

Calculate the pH of a 0.010 M AlCl3. The Ka for Al(H2O)63+ is 1.4 x 10-5

Sample problem 21

Predict whether an aqueous solution of each of the following salts will be acidic, basic, or neutral

1. NH4C2H3O2
2. NH4CN
3. Al2(SO4)3