CHAPTER 16 AND 17 PRACTICE PROBLEMS

1. Calculate the concentration of [H+] in a solution in [OH-] is 1.8 x 10 -9 M 5.56 x 10-6
2. A)Write the equation for the reaction between NH3 and water. (B) Identify the conjugate acid and base pairs NH3 + H2O NH4+  + OH-
3. What is the conjugate base of each of the following: HClO4 and HCO3- ClO4- CO32-
4. What is the conjugate acid of each of the following: H2O and SO42- H3O+ HSO4-
5. In a sample of lemon juice [H+] is 3.8 x 10-4 M. What is the pH? 3.42
6. A commonly available window-cleaning solution has [OH-] = 1.9 x 10-6M. What is the pH? 8.28
7. A sample of freshly pressed apple juice has a pH of 3.76. Calculate [H+] 1.7 x 10-4 M
8. Name the strong acids
9. Name the strong bases
10. What is the pH of a 0.040M solution of perchloric acid 1.40
11. What is the pH of a 0.028M solution of NaOH 12.45
12. What is the pH of a 0.0011M solution of calcium hydroxide 11.34
13. A student prepared a 0.10M solution of formic acid(HCOOH) and measured its pH. The pH at 25®C was found to be 2.38. Calculate the Ka. 1.8 x 10-4
14. Calculate the pH of a 0.30 *M* solution of acetic acid, HC2H3O2, at 25°C. The Ka for acetic acid is 1.8 x 10-5 2.64
15. A 0.020M solution of niacin has a pH of 3.26. Calculate the percent ionization of the niacin

 2.75 %

1. The pH of a 0.10 M solution of a weak base is 9.82. What is the Kb for this base? 6.61 x 10-4
2. Calculate the pH of a 0.500 M aqueous solution of NH3. The Kb of NH3 is 1.77  10–5 11.47
3. Calculate the pH of a solution containing 0.085M nitrous acid (Ka= 4.5 x 10-4 ) and 0.10 M potassium nitrate. 3.42
4. Calculate the fluoride ion concentration and pH that is 0.20M in HF and 0.10M in HNO3

 [F-]= 1.4 x 10-3M pH = 1.00

1. A buffer is made by adding 0.300mol of acetic acid and 0.300 mol sodium acetate. To enough water to produce 1.00L of solution. Calculate the pH of this solution after 0.020 mol of NaOH is added 12.30

21) Consider the diagram of an acid-base titration curve shown below.



Which of the following indicators would be the best one to use for this titration?

|  |  |
| --- | --- |
| **Indicator** | **p*Ka*** |
| A.methyl red | 5.3 |
| B. bromthymol blue | 6.8 |
| C. thymol blue | 8.8 |
| D. phenolphthalein | 9.1 |

22 Does the pH increase, decrease, or remain the same on addition of each of the following? (i) NaNO2 to a solution of HNO2, (ii) HCl to a solution of NaC2H3O2  increase decrease

23) Calculate the pH of a solution of 0.080 *M* potassium propionate, KC3H5O2, and 0.16 *M* propionic acid, HC3H5O2 (*Ka* = 1.3 x 10-5). 4.59

**24)** What is the final pH if 0.020 mol HCl is added to 0.500 L of a 0.30 *M* NH3 and 0.26 *M* NH4Cl buffer solution (*Kb* (NH3) = 1.8 x 10-5)? 9.20

25) Determine the pH of a solution prepared by mixing 45 mL of 0.183 *M* KOH with 65 mL of 0.145 *M* HCl.

 1.97

**26)** A 50.0-mL sample of 0.50*M* acetic acid, HC2H3O2, is titrated with a 0.150 *M* NaOH solution. Calculate the pH after 25.0 mL of the base have been added (*Ka* = 1.8 x 10-5).

 3.99

27) What is the *Ksp* expression for magnesium phosphate, Mg3(PO4)2?

 Ksp= [Mg2+]3[PO43-]2

28) Would a precipitate be observed if equal volumes of a 0.040 *M* AgNO3 solution and a 0.030 *M* NaNO2 solution are mixed (*Ksp*(AgNO2) = 6.0 x 10-4)? Yes because Q > Ksp

29) Draw the titration curves for strong acid/strong base weak acid/strong base weak base/strong acid

30) Calculate the solubility of Ca3(PO4)2 in a 5.2 x 10-4M solution of AlPO4 Ksp for Ca3(PO4)2 is 2.0 x 10-29

 1.4 x 10-8 M

31) Which of the following would you *not* expect to be more soluble in acid than in pure water?

|  |  |
| --- | --- |
| A. | CuCN |
| B. | AgCl |
| C. | FeS |
| D. | BaCO3 |
| E. | AlPO4 |

32)Consider the titration of 30.0mL of 0.030M NH3 with 0.025M HCl. Calculate the pH after the following volumes of titrant have been added. Kb for NH3 1.8 X 10-5

A) 0.00mL B) 10.0mL C) 20.0mL D) 35.0mL E) 36.0mL F) 37.0mL

 10.86 9.67 9.16 7.71 5.56 3.43

33) You need to make a buffer with a pH of 2.99 from citric acid and sodium dihydrogen citrate. If you ignore all higher ionizations of the dihydrogen citrate ion, what concentration of sodium dihydrogen citrate needs to be added to 0.35 *M* acid (*Ka* = 7.4 x 10-4)? 0.25M

34) Calculate the pH at the equivalence point when 50.0mL of 0.035M benzoic acid (Ka= 6.3 x 10-5) is titrated with 0.020M NaOH 8.15

35) A solution containing which one of the following pairs of substances will be a buffer solution?

a. NaI, HI b. KBr, HBr c. RbCl, HCl d. CsF, HF e. none of the above

36) A 25.0 mL sample of an aqueous NaOH solution is titrated with a 0.475M H2 SO4 solution. The equivalence point is reached with 65.2mL of the acid. The concentration of NaOH is \_\_\_2.48\_\_\_\_\_\_\_ M.

37) Which compound listed below has the greatest molar solubility in water?

a. CdCO3 Ksp= 5.2 x 10-12

b. Cd(OH)2 Ksp= 2.5 x 10-14

c. AgI Ksp= 8.3 x 10-17

d. CaF2 Ksp= 3.9 x 10-11

e. ZnCO3 Ksp= 1.4 x 10-11

38) In which of the following aqueous solutions would

you expect AgBr to have the lowest solubility?

a. pure water

b. 0.20 M NaBr

c. 0.10 M AgNO3

d. 0.15 M KBr

e. 0.10 M LiBr

39) Are the following salts acidic, basic, or neutral

 A) KNO3\_\_neutral\_\_\_\_\_\_\_\_\_ B) CaF2\_\_\_\_basic\_\_\_\_\_\_\_ C) AlCl3\_\_\_\_\_\_\_\_\_\_acidic\_\_\_\_\_\_\_\_