AP CHEMISTRY CHAPTER 14 PRACTICE TEST

1. For a series of weak acids having identical initial concentrations, as acid strength INCREASES
2. the percent ionization increases, the [H+] increases, and the Ka increases
3. the percent ionization increases, the [H+] decreases, and the Ka increases
4. the percent ionization increases, the [H+] decreases, and the Ka decreases
5. the percent ionization increases, the [H+] increases, and the Ka decreases
6. the percent ionization decreases, the [H+] decreases, and the Ka decreases
7. Which of the following statements is TRUE? As the [H+] in an aqueous solution increases:
8. the [OH-] also increases, the pH decreases, and the pOH of the solution decreases
9. the [OH-] also increases, the pH decreases, and the pOH of the solution increases
10. the [OH-] decreases, the pH increases, and the pOH of the solution decreases
11. the [OH-] decreases, the pH decreases, and the pOH of the solution increases
12. the [OH-] decreases, the pH decreases, and the pOH of the solution decreases
13. When comparing a series of aqueous solution having varying [OH-], the solution having the greatest [OH-] has the
14. lowest [H+], highest pH and highest pOH
15. lowest [H+], highest pH and lowest pOH
16. lowest [H+], lowest pH and highest pOH
17. highest [H+], highest pH and lowest pOH
18. highest [H+], lowest pH and highest pOH
19. An aqueous solution is prepared by dissolving 2.00 x 10-3 mol of a weak base in 2.00 L of solution. The pH of this solution:
20. could be any value greater than 7.000
21. could be any value between 7.000 and 11.000
22. could be any value greater than 3.000
23. could be any value greater than 11.000
24. The [OH-] in an aqueous solution is 1.37 x 10-5 M. The pH of this solution, with the correct number of significant digits is:
25. 4.86
26. 4.863
27. 9.14
28. 9.137
29. Which of the following solutions contains an acid? (other than water)
30. [H+] = 2.6 x 10-9 M
31. [OH-] = 3.6 x 10-11 M
32. [H+] = 3.5 x 10-5 M
33. pOH = 5.72
34. I only
35. II and III only
36. I and III only
37. III and IV only
38. All are acidic
39. An aqueous solution is prepared by dissolving 1.0 x 10-3 mol of a WEAK ACID in 1.0 L of solution. The pH of this solution could be
40. equal to 3
41. any value less than 3
42. any value greater than 3
43. any value between 3 and 7
44. Which of the following is the strongest base? Use the following Ka values

Ka for HNO2 = 4.5 x 10-4

Ka  for HOCl = 3.5 x 10-8

Ka for HCN = 4.9 x 10-10

Ka for HC2H3O2 = 1.8 x 10-5

1. NO2-
2. ClO-
3. CN-
4. C2H3O2-
5. What is the pH of a 0.50 M solution of a WEAK acid having a pKa = 4.67
6. 2.49
7. 3.52
8. 4.67
9. 4.97
10. Choose the couple which is NOT a conjugate acid-base pair.
11. HCO3-/CO32-
12. H3O+/H2O
13. OH-/O2-
14. H3PO4/HPO42-
15. NH2OH2+/NH2OH

The following three equations represent reactions that occur in the forward direction more than 90 percent of the time.

HNO3(aq) + CN-(aq) → HCN(aq) + NO3-(aq)

HCN(aq) + OH-(aq) → H2O(l) + CN-(aq)

H2O(l) + CH3O-(aq) → CH3OH(aq) + OH-(aq)

1. What is the strongest acid?
2. HCN
3. HNO3
4. H2O
5. OH-
6. CH3OH
7. What is the strongest base?
8. CH3O-
9. CH3OH
10. CN-
11. H2O
12. NO3-
13. Calculate the pH of a 5.0 M solution of KOH.
14. 14.00
15. 2.0 x 10-15
16. 14.70
17. -0.70
18. none of these
19. Calculate the [H+] in a solution that shows a pH of 2.30
20. 2.3 M
21. 11.7 M
22. 5.0 x 10-3 M
23. 2.0 x 10-12 M
24. none of these
25. A solution has [H+] = 4.0 x 10-8 M. The pOH of this solution is
26. 3.20
27. 6.60
28. 7.40
29. 10.80
30. none of these
31. A 0.001 M solution of a weak base has a pH of 10.0. What is the Kb of the weak base?
32. 1 x 10-4
33. 1 x 10-5
34. 1 x 10-8
35. 1 x 10-17
36. 1 x 10-20
37. What is the pH of a 0.10 M solution of HOCl, Ka = 3.5 x 10-8?
38. 4.23
39. 8.46
40. 3.73
41. 1.00
42. 3.23

2 POINTS EACH

Suppose you have aqueous solutions of the following salts, all having identical initial concentrations; Ka  for HCN = 4.9 x 10-10, Kb for NH3 = 1.8 x 10-5, Ka for HNO2 = 4.5 x 10-4

PLEASE USE ROMAN NUMERALS FOR YOUR ANSWERS!!!

1. NaCN
2. KClO4
3. NH4NO2
4. NH4I
5. Which solution(s) will be acidic? \_\_\_\_\_\_\_\_\_\_
6. Which solution(s) will be basic? \_\_\_\_\_\_\_\_\_\_\_
7. Which solution(s) will be neutral? \_\_\_\_\_\_\_\_\_\_\_\_\_\_
8. Which of the basic anions is the strongest conjugate base? \_\_\_\_\_\_\_\_\_\_\_\_\_
9. Which solution will have the highest pH? \_\_\_\_\_\_\_\_\_\_\_\_
10. Which solution will have the lowest pH? \_\_\_\_\_\_\_\_\_\_\_\_\_
11. Which of the acidic ions is the strongest conjugate acid? \_\_\_\_\_\_\_\_\_\_\_\_
12. Write the reaction that shows how CN- reacts with water.

PROBLEMS

1. Each of the three beakers contains 25.0 mL of a 0.100 M solution of HCl, NH3, or NH4Cl, as shown above. Each solution is at 25oC
2. Determine the pH of the solution in beaker 1. Justify your answer with a calculation
3. In beaker 2, the reaction NH3(aq)  + H2O(l) ↔ NH4+(aq) + OH-(aq) occurs. The value of Kb for NH3(aq) is 1.8 x 10-5 at 25oC
4. Write the Kb expression for the above reaction.
5. Calculate the [OH-] in the solution in beaker 2
6. In beaker 3, the reaction NH4+(aq) + H2O(l) ↔ NH3(l) + H3O+(aq) occurs.
7. Calculate the value of Ka for NH4+
8. What is the pH of the solution in beaker 3?

ANSWERS

1. A
2. D
3. B
4. B
5. D
6. B
7. D
8. C
9. A
10. D
11. B
12. A
13. C
14. C
15. B
16. B
17. A
18. III, IV
19. I
20. II
21. I (CN-)
22. I
23. IV
24. III OR IV
25. CN- +H2O ↔ HCN + OH-
26. a. pH = 1.000

b. (i) Kb = [NH4+][OH-] / [NH3]

(ii) [OH-] = 1.3 x 10-3M

c.(i) 5.6 x 10-10

(ii) pH = 5.13