

School Of Excellence Secondary School 2016 A.Y

CHEMISTRY Grade 12th Work Sheet

1. Determine the pH of a 0.15 M aqueous solution of KF. For hydrofluoric acid, $K_a = 7.0 \times 10^{-4}$.

A. 5.83 B. 6.59 C. 8.16 D. 2.33 E. 12.01

2. A 0.0035 M aqueous solution of a particular compound has $\text{pH} = 2.46$. The compound is _____.

A. a strong base B. a weak acid C. a weak base D. a strong acid E. a salt

3. The K_a for formic acid (HCHO_2) is 1.8×10^{-4} . What is the pH of a 0.35-M aqueous solution of sodium formate (NaCHO_2)?

A. 5.36 B. 8.64 C. 10.71 D. 4.20 E. 3.29

4. The acidic ingredient in vinegar is acetic acid. The pH of vinegar is around 2.4, and the molar concentration of acetic acid in vinegar is around 0.85 M. Based on this information, determine the value of the acid ionization constant, K_a , for acetic acid.

A. 2.5×10^{-5} B. 1.9×10^{-5} C. 5.0×10^{-5} D. 7.4×10^{-3} E. 4.7×10^{-3}

5. A solution with an $[\text{OH}^-]$ concentration of $1.20 \times 10^{-7} \text{ M}$ has pOH and pH of _____.
A. 6.92 and 7.08 B. 7.08 and 6.92 C. 1.00 and 13.00 E. 5.94 and 8.06 F. 5.35 and 8.75

6. Determine the pH of a 0.15M aqueous solution of KF. For hydrofluoric acid, $K_a = 7.0 \times 10^{-4}$.

A) 5.83 B) 6.59 C) 8.16 D) 2.33 E) 12.01

7. A 0.0035-M aqueous solution of a particular compound has $\text{pH} = 2.46$. The compound is _____.

A) a strong base B) a weak acid C) a weak base D) a strong acid E) a salt

8. The K_a for formic acid (HCHO_2) is 1.8×10^{-4} . What is the pH of a 0.35 M aqueous solution of sodium formate (NaCHO_2)?

A) 5.36 B) 8.64 C) 10.71 D) 4.20 E) 3.29

9. The base-dissociation constant, K_b , for pyridine, C_5H_5N , is 1.4×10^{-9} . The acid-dissociation constant, K_a , for the pyridinium ion, $C_5H_5NH^+$, is _____.

A) 7.1×10^{-6} B) 1.4×10^{-5} C) 1.0×10^{-7} D) 1.4×10^{-23} E) 7.1×10^{-4}

10. Which of the following ions will act as a weak base in water?

A) ClO^- B) Cl^- C) NO_3^- D) OH^- E) None of the above will act as a weak base in water.

11. The pH of a 0.10M solution of a weak base is 9.82. What is the K_b for this base?

A) 4.3×10^{-8} B) 2.0×10^{-5} C) 6.6×10^{-4} D) 2.1×10^{-4} E) 8.8×10^{-8}

12. The acid-dissociation constant for chlorous acid, $HClO_2$, at $25^\circ C$ is 1.0×10^{-2} . Calculate the concentration of H^+ if the initial concentration of acid is 0.100 M.

A) 1.0×10^{-3} B) 1.0×10^{-2} C) 2.7×10^{-2} D) 3.7×10^{-2} E) 3.2×10^{-2}

13. HZ is a weak acid. An aqueous solution of HZ is prepared by dissolving 0.020 mol of HZ in sufficient water to yield 1.00 L of solution. The pH of the solution was 4.93 at $25^\circ C$. The K_a of HZ is _____.

A) 6.9×10^{-9} B) 1.4×10^{-10} C) 1.2×10^{-5} D) 2.8×10^{-12} E) 9.9×10^{-2}

14. The K_a of hypochlorous acid ($HClO$) is 3.0×10^{-8} at $25^\circ C$. What is the % ionization of hypochlorous acid in a 0.015 M aqueous solution of $HClO$ at $25^\circ C$?

A) 1.4×10^{-3} B) 14 C) 2.1×10^{-5} D) 4.5×10^{-8} E) 0.14

15. The pH of a 0.55 M aqueous solution of hypobromous acid, $HBrO$, at $25^\circ C$ is 4.48. What is the value of K_a for $HBrO$?

A) 3.3×10^{-5} B) 2.0×10^{-9} C) 6.0×10^{-5} D) 1.1×10^{-9} E) 3.0×10^{-4}

16. The K_a of hypochlorous acid ($HClO$) is 3.0×10^{-8} . What is the pH at $25^\circ C$ of an aqueous solution that is 0.020 M in $HClO$?

A) +2.45 B) -2.45 C) -9.22 D) +9.22 E) +4.61

17. The acid-dissociation constants of phosphoric acid (H_3PO_4) are $K_{a1} = 7.5 \times 10^{-3}$, $K_{a2} = 6.2 \times 10^{-8}$, and $K_{a3} = 4.2 \times 10^{-13}$ at 25°C . What is the pH of a 2.5M aqueous solution of phosphoric acid?

A) 0.13 B) 1.8 C) 2.5 D) 0.40

18. The pH of a solution is 4.80. What is the concentration of hydroxide ions in this solution?

A. $4.2 \times 10^{-9} \text{ M}$ B. $1.6 \times 10^{-5} \text{ M}$ C. $3.6 \times 10^{-12} \text{ M}$ D. $6.3 \times 10^{-10} \text{ M}$ E. $2.0 \times 10^{-8} \text{ M}$

19. A 0.10 M solution of a weak acid, HX, is 0.059% ionized. Evaluate K_a for the acid.

A. 3.8×10^{-9} B. 6.5×10^{-7} C. 7.0×10^{-6} D. 4.2×10^{-6} E. 3.5×10^{-8}

20. What is the percent ionization of an 1.2 M HF solution?

A. 2.4 % B. 4.2 % C. 0.84 % D. 0.082 % E. 0.22 %

21. Which one of the following is not a conjugate acid-base pair?

A. NH_3 and NH_4^+ B. HS^- and H_2S C. H_3O^+ and OH^- E. NH_3 and NH_2^- F. H_2PO_4^- and HPO_4^{2-}

22. Which one of the following is a conjugate acid-base pair?

a. NH_3 and NH_4^+ d. H_2O and O_2^- b. H_3O^+ and OH^- e. NaF and F^- c. NH_2^- and NH_4^+

23. Which one of the following is a conjugate acid-base pair?

a. NaF and F^- b. NH_4^+ and NH_2^- c. HNO_3 and HNO_2 d. H_2O and H_2O_2 e. HI and I^-

24. Which one of the following is not a conjugate acid-base pair?

a. NH_3 and NH_2^- b. H_2PO_4^- and HPO_4^{2-} c. HNO_3 and HNO_2 d. H_2O and OH^- c. HI and I^-

25. Use the following acid ionization constants to identify the correct decreasing order of base strengths. HF $K_a = 7.2 \times 10^{-4}$ HNO_2 $K_a = 4.5 \times 10^{-4}$ HCN $K_a = 6.2 \times 10^{-10}$

a. $\text{CN}^- > \text{NO}_2^- > \text{F}^-$ b. $\text{F}^- > \text{NO}_2^- > \text{CN}^-$ c. $\text{NO}_2^- > \text{F}^- > \text{CN}^-$ d. $\text{NO}_2^- > \text{CN}^- > \text{F}^-$

e. $\text{F}^- > \text{CN}^- > \text{NO}_2^-$.

26. Three acids found in foods are lactic acid (in milk products), oxalic acid (in rhubarb), and malic acid (in apples). The pK_a values are LA = 3.88, OA = 1.23, and MA = 3.40. Which list has the conjugate bases of these acids in order of decreasing strength?

a. lactate > oxalate > malate

d. oxalate > lactate > malate

b. oxalate > malate > lactate

e. malate > lactate > oxalate

c. lactate > malate > oxalate

27. What is the pH of a 0.20 M solution of cubaramine? The K_b value for jaspersamine is 2.5×10^{-6} . 50. What is the pH of a 0.10 M solution of trimethylamine ($\text{pK}_b = 4.13$)? 9 51. How would you calculate K_b for the formate ion, given that the K_a for formic acid is 1.8×10^{-4} ? ($\text{K}_w = 1.0 \times 10^{-14}$)

a. $\text{K}_b = \text{K}_a \times \text{K}_w$ d. $\text{K}_b = \text{K}_w + \text{K}_a$ b. $\text{K}_b = \text{K}_w / \text{K}_a$ e. $\text{K}_b = \text{K}_w - \text{K}_a$ c. $\text{K}_b = \text{K}_a / \text{K}_w$

4. What is the pH of a 0.20 M solution of jaspersamine? The pK_b value for jaspersamine 4.40.

28. What is the pH of a 0.15 M solution of weak acid ammonium bromide? The K_b value for ammonia is 1.8×10^{-5} .

a. 11.22 b. 5.04 c. 7.00 d. 10.08 e. 2.78

29. What is the pH of a 0.20 M solution of sodium acetate? The K_a for acetic acid is 1.8×10^{-5} ?

30. What is the pH of a 0.40 M solution of sodium nitrite, NaNO_2 ? The pK_a for nitrous acid (HNO_2) is 3.35.

31. What is the pH of a 0.20 M solution of weak acid jaspersammonium bromide? The K_b value for jaspersamine is 4.0×10^{-5} .

32. What is the pH of a 0.10 M solution of weak acid trimethylammonium chloride? The $\text{pK}_b = 4.13$ for its conjugate base triethylamine

