

Unit 8 – Chapter 14: Acids & Bases

Name _____

Take-home test

Period _____

1) Which of the following substances does not fit the definition of an Arrhenius base?

- a. NH_3
- b. NaOH
- c. KOH
- d. H_2O

2) The conjugate acid of NH_3 is:

- a. NH_2^-
- b. NHOH
- c. NH_4^+
- d. NH_3^+

3) Which of the following is the correct equilibrium expression for this reaction:



- a. $\frac{[\text{CN}^-][\text{H}_3\text{O}^+]}{[\text{H}_2\text{O}][\text{HCN}]}$
- b. $\frac{[\text{H}_3\text{O}^+][\text{CN}^-]}{[\text{HCN}]}$
- c. $\frac{[\text{HCN}]}{[\text{H}_3\text{O}^+][\text{CN}^-]}$
- d. $\frac{[\text{H}_2\text{O}][\text{HCN}]}{[\text{CN}^-][\text{H}_3\text{O}^+]}$

4) Which one of the following acids would produce the weakest conjugate base?

- a. Sulfuric acid
- b. Ammonium ion
- c. Phenol
- d. Acetic acid

5) What is K_b if K_a of an acid is 2.0×10^{-3} ?

- a. 5.0×10^{11}
- b. 1×10^{-3}
- c. 2.0×10^{-11}
- d. 5.0×10^{-12}

6) What is the value of pK_w at 25°C ?

- a. 7.0
- b. 14
- c. 1×10^{-14}
- d. 5.0×10^{-12}

7) What is the pK_a of the acid in problem 5?

- a. 2.7
- b. -2.6
- c. 6.2
- d. -6.21

8) What is the $[\text{OH}^-]$ of a solution with $\text{pH} = 3$?

- a. 3×10^{11}
- b. 1×10^{-11}
- c. 1.8×10^5
- d. 11

9) The pOH of a 2.0 M HCl solution is:

- a. 12
- b. 14
- c. 14.3
- d. 0.3

10) The pOH of a 0.300 M HI solution is:

- a. 13.5
- b. 0.522
- c. 0.150
- d. 3.5

- 11) What is the final pH of a 0.100 M hydrochloric solution that is diluted by a factor of 10?
- a. 2
 - b. 13
 - c. 1
 - d. 4
- 12) What is the final pH of a sulfuric acid solution prepared by mixing together 392.0 g of H_2SO_4 with enough water to reach 2.0 liters? After it is diluted by a factor of 15?
- a. -0.30, 0.88
 - b. -0.6, 0.57
 - c. 1, 6.3
 - d. 0.30, 0.88
- 13) Calculate the pH of a 0.25 M HCN solution. $K_a = 6.2 \times 10^{-10}$.
- a. 4.7
 - b. 9.3
 - c. 2.5
 - d. 5.0
- 14) 0.276 g of HCN are dissolved in 50.0 mL of solution. What is the pH of this acidic solution?
- a. 2.0
 - b. 4.7
 - c. 5.0
 - d. 6.5
- 15) A 0.50 M HX solution is 0.30% ionized. What is the pH?
- a. 0.30
 - b. 0.0016
 - c. 0.65
 - d. 2.8
- 16) What is the pH of a 0.44 M solution of an acid with $K_a = 7.5 \times 10^{-5}$?
- a. 2.24
 - b. -0.54
 - c. 11.8
 - d. 4.48
- 17) What is the percent ionization of a 0.55 M HW solution with a $K_a = 1.5 \times 10^{-2}$?
- a. 16.5%
 - b. 30.0%
 - c. 0.30%
 - d. 65.0%
- 18) What is the pOH of a 0.50 M ethylamine, $\text{C}_2\text{H}_5\text{NH}_2$, solution? $\text{p}K_b = 5.3$
- a. 11.2
 - b. 2.8
 - c. 0.28
 - d. 0.0016
- 19) Calculate the pH of a 0.0075 M solution of a weak base, $K_b = 1.6 \times 10^{-6}$.
- a. 10.04
 - b. 3.96
 - c. 0.00124
 - d. 13.98
- 20) Calculate the $\text{p}K_a$ of the conjugate acid of methylamine (CH_3NH_2) if the pH of a 0.750 M methylamine solution is 11.8.
- a. 9.72
 - b. -9.59
 - c. 11.8
 - d. 2.32

21) Calculate the pH of a 0.10 M H_2S solution. $K_{a1} = 1.3 \times 10^{-7}$, $K_{a2} = 1.0 \times 10^{-13}$

- a. 4.2
- b. 6.1
- c. 3.9
- d. 1.1

22) What is the pH of a 0.1 M phosphoric acid solution?

$K_{a1} = 7.5 \times 10^{-3}$, $K_{a2} = 6.2 \times 10^{-8}$, $K_{a3} = 4.8 \times 10^{-13}$.

- a. 4.0
- b. 1.5
- c. 2.0
- d. 1.0

23) Which of the following salts would produce an acidic solution?

- a. NaCl
- b. $\text{CH}_3\text{NH}_3\text{Cl}$
- c. CH_3NHNa
- d. NaNO_3

24) Which one of the following substances is most acidic?

- a. CH_3Cl
- b. CH_2ClO
- c. H_3CCOOH
- d. HI

25) Which one of the following substances has the strongest conjugate base?

- a. HI
- b. HBr
- c. HF
- d. HCl

26) Which one of the following substances is the strongest base?

- a. H_2O
- b. NH_3
- c. NH_2^-
- d. CH_4

27) Which one of the following oxides is acidic?

- a. CaO
- b. K_3O
- c. SO_2
- d. MgO

28) A solution is prepared by mixing water with the oxide of which one of the following groups of elements would yield an acid?

- a. Group IA (column 1)
- b. Group IB (column 11)
- c. Group VIA (column 16)
- d. Group VIIA (column 17)

29) A Lewis acid:

- a. accepts a proton.
- b. releases hydrogens.
- c. accepts electrons.
- d. donates electrons.