



HW05 - Acids, Bases, and Salts

Question 1 1.0 pts

In the reversible reaction



the two Bronsted-Lowry acids are...

- There is only one Bronsted-Lowry acid shown: H_3O^+ .
- H_2O and CN^-
- HCN and CN^-
- HCN and H_3O^+
- H_2O and H_3O^+

Question 2 1.0 pts

A water solution of sodium acetate is basic because...

- the acetate ion acts as a Bronsted-Lowry base in a reaction with water.
- The statement is false. A water solution of sodium acetate is acidic.
- sodium acetate is only weakly ionized.
- the conjugate base of the acetate ion is a strong base.

Question 3 1.0 pts

According to the Bronsted-Lowry concept of acids and bases, which of the following statements about a base is NOT true?

- A base will share one of its electron pairs to bind H^+ .
- A base reacts with an acid to form a salt.
- If a base is strong, then its conjugate acid will be relatively weaker.
- A base must contain a hydroxide group.

Question 4 1.0 pts

Which of the following is true in pure water at any temperature?

- $\text{pH} = 7.0$
- $[\text{H}_3\text{O}^+][\text{OH}^-] = 1.0 \times 10^{-14}$
- K_w decreases with increasing temperature.
- $[\text{H}_3\text{O}^+] = [\text{OH}^-]$

Question 5 1.0 pts

What is $[\text{H}_3\text{O}^+]$ when $[\text{OH}^-] = 3.3 \times 10^{-9} \text{ M}$?

- $3.0 \times 10^{-6} \text{ M}$
- $3.3 \times 10^{-5} \text{ M}$
- $1.0 \times 10^{-7} \text{ M}$
- $3.3 \times 10^{-9} \text{ M}$

Question 6 1.0 pts

A strong acid (or base) is one which...

- dissociates completely in aqueous solution.
- should only be used when wearing goggles and gloves.
- dissolves metals.
- reacts with a salt to form water.

Question 7 1.0 pts

Which of the following substances is a strong acid?

- H_3PO_4
- HSO_3
- H_2CO_3
- HF
- H_2SO_4

Question 8 1.0 pts

HCN is classified as a weak acid in water. This means that it produces...

- no hydronium ions.
- a relatively small fraction of the maximum number of possible hydronium ions.
- 100% of the maximum number of possible hydronium ions.
- a relatively large fraction of the maximum number of possible hydronium ions.

Question 9 1.0 pts

Which of the following substances is a weak acid?

- HI
- HClO_4
- HClO_3
- H_2CO_3
- HBr
- HNO_3
- H_2SO_4
- HCl

Question 10 1.0 pts

Which is NOT a conjugate acid-base pair, respectively?

- $\text{HCN} : \text{CN}^-$
- $\text{H}_2\text{O} : \text{OH}^-$
- $\text{SO}_4^{2-} : \text{HSO}_4^-$
- $\text{H}_3\text{O}^+ : \text{H}_2\text{O}$

Question 11 1.0 pts

The conjugate base of H_2SO_4 is:

- HSO_4^-
- SO_4^{2-}
- HSO_4
- H_3SO_4^+

Question 12 1.0 pts

What is the conjugate acid of NO_3^- ?

- NH_3
- HNO_3
- NO_3^{2-}
- NO_2^-

Question 13

1.0 pts

Assume that five weak acids, identified only by numbers (1, 2, 3, 4, and 5) have the following ionization constants:

- 1 - 1.0×10^{-3}
- 2 - 3.0×10^{-5}
- 3 - 2.6×10^{-7}
- 4 - 4.0×10^{-9}
- 5 - 7.3×10^{-11}

The anion of which acid is the strongest base?

- a. 3
- b. 2
- c. 5
- d. 4
- e. 1

Question 14

1.0 pts

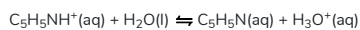
The term " K_a for the ammonium ion" describes the equilibrium constant for which of the following reactions?

- a. $\text{NH}_4^+ + \text{H}_2\text{O} \rightleftharpoons \text{NH}_3 + \text{H}_3\text{O}^+$
- b. $\text{NH}_4^+ + \text{OH}^- \rightleftharpoons \text{NH}_3 + \text{H}_2\text{O}$
- c. $\text{NH}_3 + \text{H}_2\text{O} \rightleftharpoons \text{NH}_4^+ + \text{OH}^-$
- d. $\text{NH}_4\text{Cl}(\text{solid}) + \text{H}_2\text{O} \rightleftharpoons \text{NH}_4^+ + \text{Cl}^-$

Question 15

1.0 pts

If the value of K_b for pyridine ($\text{C}_5\text{H}_5\text{N}$) is 1.8×10^{-9} , calculate the equilibrium constant for the following reaction:



- a. -1.8×10^{-9}
- b. 5.6×10^{-6}
- c. 1.8×10^{-16}
- d. 5.6×10^8

Question 16

1.0 pts

What is $[\text{OH}^-]$ in a 0.0050 M HCl solution?

- a. 2.0×10^{-12} M
- b. 1.0×10^{-7} M
- c. 1.0 M
- d. 6.6×10^{-5}

Question 17

1.0 pts

Which pH represents a solution with 1000 times higher $[\text{OH}^-]$ than a solution with a pH of 5?

- a. pH = 4
- b. pH = 7
- c. pH = 8
- d. pH = 6

Question 18

1.0 pts

What is the pH of a 0.1 M $\text{Ba}(\text{OH})_2$ aqueous solution?

- a. 1.33
- b. 8.7
- c. 13.3
- d. 9.98

Question 19

1.0 pts

Hydroxylamine is a weak molecular base with $K_b = 6.6 \times 10^{-9}$. What is the pH of a 0.0500 M solution of hydroxylamine?

- a. 10.4
- b. 9.48
- c. 9.26
- d. 8.93

Question 20

1.0 pts

What is the pH of a 0.23 M solution of potassium benzoate ($\text{K}^+\text{C}_6\text{H}_5\text{COO}^-$)? K_a for the generic acid R-COOH is 2.7×10^{-8} .

- a. 10.83
- b. 10.23
- c. 10.60
- d. 10.47

Question 21

1.0 pts

Which solution has the highest pH?

- a. 0.1 M KClO , K_a for HClO is 3.5×10^{-8}
- b. 0.1 M of KNO_2 , K_a for HNO_2 is 4.5×10^{-4}
- c. 0.1 M of KCl , K_a for HCl is VERY LARGE!
- d. 0.1 M KCH_2COO , K_a for CH_3COOH is 1.8×10^{-5}

Question 22

1.0 pts

What is the pH of a solution that contains 11.7g of NaCl for every 200 mL of solution?

- a. 9.0
- b. 7.0
- c. 10^{-1}
- d. 1.0×10^{-7}

Question 23

1.0 pts

What is the pH of a solution made by mixing 0.050 mol of NaCN with enough water to make a liter of solution? K_a for HCN is 4.9×10^{-10} .

- a. 12
- b. 11
- c. 10^{-3}
- d. 3

Question 24

1.0 pts

Identify the list in which all salts produce a basic aqueous solution.

- a. KCH_3COO , NaCN , KF
- b. NH_4Cl , $\text{C}_6\text{H}_4\text{NH}_3\text{NO}_3$, FeI_3
- c. AgNO_3 , NaCHO_2 , CrI_3
- d. AlCl_3 , $\text{Zn}(\text{NO}_3)_2$, KClO_4

Question 25

1.0 pts

What is the pH in a solution made by dissolving 0.100 moles of sodium acetate (NaCH_3COO) in enough water to make one liter of solution? K_a for CH_3COOH is 1.80×10^{-5} .

- a. 10.25
- b. 8.87
- c. 5.74
- d. 9.25

Question 26

1.0 pts

A 0.200 M solution of a weak monoprotic acid HA is found to have a pH of 3.00 at room temperature. What is the ionization constant of this acid?

- a. 5.3
- b. 5.0×10^{-6}
- c. 1.0×10^{-3}
- d. 2.0×10^{-9}

Question 27

1.0 pts

What is the percent ionization for a weak acid HX that is 0.40 M? $K_a = 4.0 \times 10^{-7}$.

- a. 0.0010%
- b. 0.20%
- c. 0.10%
- d. 0.0020%

Question 28

1.0 pts

A 0.28 M solution of a weak acid is 3.5% ionized. What is the pH of the solution?

- a. 0.55
- b. 2.01
- c. 1.46
- d. 3.17

Question 29

2.0 pts

The pH of 0.010 M aqueous aniline is 8.32. What is the percentage protonated?

- a. 0.021%
- b. 0.0021%
- c. It is impossible to tell without knowing the K_a or the K_b for aniline.
- d. 2.1%