

## HW04 - Acids, Bases, and Salts

⚠ This is a preview of the published version of the quiz

Started: Feb 21 at 8:59am

### Quiz Instructions

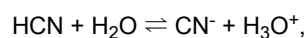
## Homework 04

### Acids, Bases, and Salts

#### Question 1

1 pts

In the reversible reaction



the two Bronsted-Lowry acids are...

- ☐ HCN and  $\text{CN}^-$
- ☐  $\text{H}_2\text{O}$  and  $\text{CN}^-$
- ☐  $\text{H}_2\text{O}$  and  $\text{H}_3\text{O}^+$
- ☐ There is only one Bronsted-Lowry acid shown:  $\text{H}_3\text{O}^+$ .
- ☐ HCN and  $\text{H}_3\text{O}^+$

#### Question 2

1 pts

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

- ☐ sodium acetate is only weakly ionized.
- ☐ the conjugate base of the acetate ion is a strong base.
- ☐ 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.

**Question 3****1 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  $\text{H}^+$ .
- ☐ A base reacts with an acid to form a salt.
- ☐ A base must contain a hydroxide group.
- ☐ If a base is strong, then its conjugate acid will be relatively weaker.

**Question 4****1 pts**

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

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

**Question 5****1 pts**

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

- ☐  $3.3 \times 10^{-9} \text{ M}$
- ☐  $3.0 \times 10^{-6} \text{ M}$

☐  $1.0 \times 10^{-7} \text{ M}$ ☐  $3.3 \times 10^{-5} \text{ M}$ **Question 6****1 pts**

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

☐ should only be used when wearing goggles and gloves.☐ dissociates completely in aqueous solution.☐ reacts with a salt to form water.☐ dissolves metals.**Question 7****1 pts**

Which of the following substances is a strong acid?

☐  $\text{H}_2\text{SO}_4$ ☐  $\text{H}_2\text{CO}_3$ ☐  $\text{H}_3\text{PO}_4$ ☐  $\text{HF}$ ☐  $\text{HSO}_3$ **Question 8****1 pts**

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

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

**Question 9****1 pts**

Which of the following substances is a weak acid?

- ☐ HI
- ☐ HNO<sub>3</sub>
- ☐ H<sub>2</sub>CO<sub>3</sub>
- ☐ HClO<sub>4</sub>
- ☐ HClO<sub>3</sub>
- ☐ H<sub>2</sub>SO<sub>4</sub>
- ☐ HBr
- ☐ HCl

**Question 10****1 pts**

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

- ☐ H<sub>2</sub>O : OH<sup>-</sup>
- ☐ H<sub>3</sub>O<sup>+</sup> : H<sub>2</sub>O
- ☐ SO<sub>4</sub><sup>2-</sup> : HSO<sub>4</sub><sup>-</sup>

☐ HCN : CN<sup>-</sup>

**Question 11****1 pts**

The conjugate base of H<sub>2</sub>SO<sub>4</sub> is:

☐ HSO<sub>4</sub>

☐ HSO<sub>4</sub><sup>-</sup>

☐ SO<sub>4</sub><sup>2-</sup>

☐ H<sub>3</sub>SO<sub>4</sub><sup>+</sup>

**Question 12****1 pts**

What is the conjugate acid of NO<sub>3</sub><sup>-</sup>?

☐ HNO<sub>3</sub>

☐ NO<sub>2</sub><sup>-</sup>

☐ NO<sub>3</sub><sup>2-</sup>

☐ NH<sub>3</sub>

**Question 13****1 pts**

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

1 - 1.0 x 10<sup>-3</sup>

2 - 3.0 x 10<sup>-5</sup>

3 - 2.6 x 10<sup>-7</sup>

4 -  $4.0 \times 10^{-9}$

5 -  $7.3 \times 10^{-11}$

The anion of which acid is the strongest base?

☐ 1

☐ 2

☐ 4

☐ 3

☐ 5

#### Question 14

1 pts

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

☐  $\text{NH}_4\text{Cl}(\text{solid}) + \text{H}_2\text{O} \rightleftharpoons \text{NH}_4^+ + \text{Cl}^-$

☐  $\text{NH}_3 + \text{H}_2\text{O} \rightleftharpoons \text{NH}_4^+ + \text{OH}^-$

☐  $\text{NH}_4^+ + \text{H}_2\text{O} \rightleftharpoons \text{NH}_3 + \text{H}_3\text{O}^+$

☐  $\text{NH}_4^+ + \text{OH}^- \rightleftharpoons \text{NH}_3 + \text{H}_2\text{O}$

#### Question 15

1 pts

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



☐  $5.6 \times 10^{-6}$

☐  $5.6 \times 10^8$

☐  $1.8 \times 10^{-16}$

☐  $-1.8 \times 10^{-9}$

**Question 16****1 pts**

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

☐  $6.6 \times 10^{-5}$

☐  $1.0 \times 10^{-7} \text{ M}$

☐ 1.0 M

☐  $2.0 \times 10^{-12} \text{ M}$

**Question 17****1 pts**

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

☐ pH = 8

☐ pH = 4

☐ pH = 6

☐ pH = 7

**Question 18****1 pts**

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

☐ 13.3

☐ 1.33

☐ 8.7☐ 9.98**Question 19****1 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?

☐ 10.4☐ 9.26☐ 9.48☐ 8.93**Question 20****1 pts**

What is the pH of a 0.23 M solution of potassium generate (KR-COO)?  $K_a$  for the generic acid R-COOH is  $2.7 \times 10^{-8}$ .

☐ 10.60☐ 10.47☐ 10.83☐ 10.23**Question 21****1 pts**

Which solution has the highest pH?

☐ 0.1 M of KCl,  $K_a$  for HCl is VERY LARGE!!



- ☐ 0.1 M of  $\text{KNO}_2$ ,  $K_a$  for  $\text{HNO}_2$  is  $4.5 \times 10^{-4}$
- ☐ 0.1 M  $\text{KCH}_3\text{COO}$ ,  $K_a$  for  $\text{CH}_3\text{COOH}$  is  $1.8 \times 10^{-5}$
- ☐ 0.1 M  $\text{KClO}$ ,  $K_a$  for  $\text{HClO}$  is  $3.5 \times 10^{-8}$

**Question 22****1 pts**

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

- ☐  $1.0 \times 10^{-7}$
- ☐ 9.0
- ☐  $10^{-1}$
- ☐ 7.0

**Question 23****1 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  $4.9 \times 10^{-10}$ .

- ☐  $10^{-3}$
- ☐ 12
- ☐ 11
- ☐ 3

**Question 24****1 pts**

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

- ☐  $\text{AgNO}_3$ ,  $\text{NaCHO}_2$ ,  $\text{CrI}_3$
- ☐  $\text{KCH}_3\text{COO}$ ,  $\text{NaCN}$ ,  $\text{KF}$
- ☐  $\text{NH}_4\text{Cl}$ ,  $\text{C}_6\text{H}_4\text{NH}_3\text{NO}_3$ ,  $\text{FeI}_3$
- ☐  $\text{AlCl}_3$ ,  $\text{Zn}(\text{NO}_3)_2$ ,  $\text{KClO}_4$

**Question 25****1 pts**

What is the pH in a solution made by dissolving 0.100 moles of sodium acetate ( $\text{NaCH}_3\text{COO}$ ) in enough water to make one liter of solution?  $K_a$  for  $\text{CH}_3\text{COOH}$  is  $1.80 \times 10^{-5}$ .

- ☐ 5.74
- ☐ 10.25
- ☐ 8.87
- ☐ 9.25

**Question 26****1 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?

- ☐  $1.0 \times 10^{-3}$
- ☐ 5.3
- ☐  $2.0 \times 10^{-9}$
- ☐  $5.0 \times 10^{-6}$

**Question 27****1 pts**

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

- ☐ 0.0010%
- ☐ 0.0020%
- ☐ 0.20%
- ☐ 0.10%

**Question 28****1 pts**

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

- ☐ 1.46
- ☐ 3.17
- ☐ 2.01
- ☐ 0.55

**Question 29****2 pts**

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

- ☐ 2.1%
- ☐ 0.021%
- ☐ 0.0021%
- ☐ It is impossible to tell without knowing the  $K_a$  or the  $K_b$  for aniline.

Quiz saved at 8:59am

Submit Quiz