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Chemistry\_Questions\_0109

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#### 1-4 ACID BASE DEFINITIONS

1.

A Bronsted-Lowry base is defined as a substance that \_\_\_\_\_.

Student Response

1. increases  $[H^+]$  when placed in  $H_2O$
2. decreases  $[H^+]$  when placed in  $H_2O$
3. increases  $[OH^-]$  when placed in  $H_2O$
4. acts as a proton acceptor
5. acts as a proton donor

2.

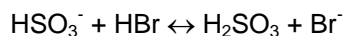
A Lewis acid is an electron-pair acceptor, and a Lewis base is an electron-pair donor.

Student Response

1. True
2. False

3.

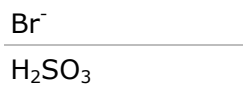
For the following acid-base reaction identify the acid, base, conjugate acid, and conjugate base.



Statement

$HSO_3^-$

HBr



4.

What is the conjugate base of  $\text{OH}^-$ ?

Student Response
1. $\text{O}_2$
2. $\text{O}^-$
3. $\text{H}_2\text{O}$
4. $\text{O}^{2-}$
5. $\text{H}_3\text{O}^+$

Score: 5/5

#### 5-8 ACID-BASE STRENGTH

5.

If the pOH of a solution is 0.4, what is the pH?

6.

If  $[\text{H}^+] = 0.34 \text{ M}$  at  $25^\circ\text{C}$ , then the  $[\text{OH}^-] = \text{_____ M}$

7.

Calculate the pOH of a 6.21 M NaOH solution.

8.

An aqueous solution has a pH of 9.74 at  $25^\circ\text{C}$ . What is  $[\text{OH}^-]$ ?

#### 9-12 WEAK ACID-BASES

9.

Calculate the pH of a 5 M solution of a weak acid HA ( $K_a = 2.88 \times 10^{-11}$ )

10.

Calculate the pH of a solution that is 2.56 M in the weak acid HA and 2.98 M in NaA, a salt of this weak acid. ( $K_a = 2.48 \times 10^{-14}$ )

11.

What change will be caused by addition of a small amount of HCl to a solution containing fluoride ions and hydrogen fluoride?

Student Response

1. The concentration of hydronium ions will increase significantly.
2. The concentration of fluoride ions will increase as will the concentration of hydronium ions.
3. The concentration of hydrogen fluoride will decrease and the concentration of fluoride ions will increase.
4. The concentration of fluoride ion will decrease and the concentration of hydrogen fluoride will increase.
5. The fluoride ions will precipitate out of solution as its acid salt.

12.

A solution has  $[\text{HC}_7\text{H}_5\text{O}_2] = 0.100 \text{ M}$  and  $[\text{Ca}(\text{C}_7\text{H}_5\text{O}_2)_2] = 0.200 \text{ M}$ .  $K_a = 6.3 \times 10^{-5}$  for  $\text{HC}_7\text{H}_5\text{O}_2$ . The solution volume is 5.00 L. What is the pH of this solution after 5.00 mL of 10.0 M HCl is added?

Student Response

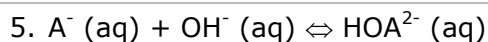
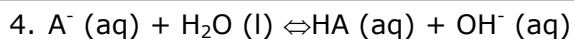
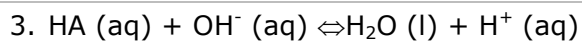
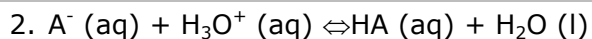
- a. 4.80
- b. 4.86
- c. 4.65
- d. 4.70
- e. 4.75

### 13-16 CONJUGATE PAIRS

13.

HA is a weak acid. Which equilibrium corresponds to the equilibrium constant  $K_b$  for  $\text{A}^-$ ?

Student Response



Score: 5/5

14.

Indicate whether an aqueous solution of each of the following substances will be acidic, neutral, or basic. (Given  $K_b = 2.0 \times 10^{-5}$  for  $\text{Ac}^-$ ,  $k_a = 5.6 \times 10^{-10}$  for  $\text{NH}_4^+$ )  
 \*{Ac = acetate ion.}

Statement

NaAc

NaCl

$\text{NH}_4\text{Ac}$

$\text{NH}_4\text{Cl}$

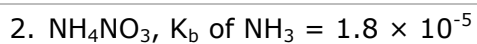
15.

$K_b$  for B is  $3.7 \times 10^{-8}$ . What is  $K_a$  for the conjugate acid,  $\text{HB}^+$ ?

16.

Of the compounds below, a 0.1 M aqueous solution of \_\_\_\_\_ will have the highest pH.

Student Response



Score: 5/5

## 17-20 TITRATIONS

17.

How many mL of 3.5 M solution of the base  $M(OH)_1$  are needed to completely titrate (all protons) 49.6 ml of a 4.7 M solution of the acid  $H_1X$ ?

Student Response	Value	Correct Answer
Answer 66.6	100%	66.61

Score: 5/5

18.

If 25 mL of 0.75 M HCl are added to 100 mL of 0.25 M NaOH, what is the final pH?

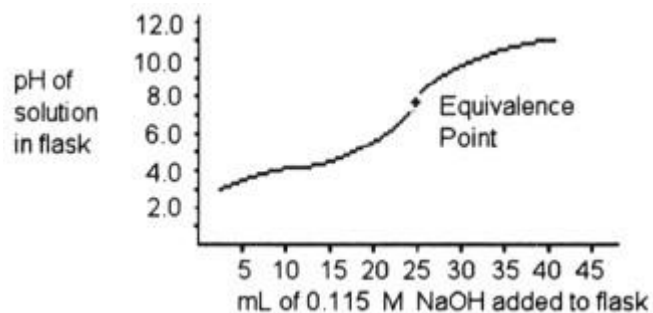
Student Response	Value	Correct Answer	Feedback
<input checked="" type="checkbox"/> a. 12.7	100%	<input checked="" type="checkbox"/>	
b. 12.8	0%		
c. 1.30	0%		
d. 1.20	0%		
e. 7.00	0%		

Score: 5/5

19.

A 37.8 mL sample of a weak acid **HA** is titrated to the equivalence point with 37.1 mL of 0.8 M  $M(OH)_2$ . If  $K_a = 6.33 \times 10^{-10}$  for HA, what is the pH at the equivalence point?

20.



A 25.0 mL sample of a solution of a monoprotic acid is titrated with a 0.115 M NaOH solution. The titration curve above was obtained. The concentration of the monoprotic acid is about \_\_\_\_\_ mol/L.

Student  
Response

1. 25.0

2. 0.0600

3. 0.240

4. 0.120

5. 0.100