

Acid Base Pre-test

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Key

1. All things that are acidic will eventually produce
 a. OH^-
 b. H_3O^+
 c. HCl
 d. H_2O
2. All things that are basic will eventually produce
 a. OH^-
 b. H_3O^+
 c. HCl
 d. H_2O
3. $\text{HNO}_2(\text{aq})$ is an oxy-acid. Which of the following would best describe its name
 a. nitric acid
 b. hydro nitric acid
 c. nitrous acid
 d. Nitrogen dioxide acid
4. Which of the following acids is considered the strongest?
 a. $0.1\text{M Ka} = 1.5 \text{E}-3$
 b. $0.2\text{M Ka} = 1.5 \text{E}-7$
 c. $0.1\text{M Ka} = 1.5\text{E}-10$
 d. $2\text{M Ka} = 1.5\text{E}-12$.0.1
5. A 0.1M HCl solution is titrated against an unknown NaOH solution. 10mL of the 0.1M HCl is required to reach the equivalency point of 10 mL of NaOH . What is the concentration of the NaOH .
 a. 0.05M
 b. 0.1M Some vol Same conc.
 c. 0.15M
 d. 0.2M
6. 10mL of 0.1M NaOH is required to neutralize 20ml of unknown HCl . What is the concentration of the HCl .
 a. 0.05M
 b. 0.1M Twice vol equivalents
 c. 0.2M
 d. 0.4M
7. What are the products of the neutralization reaction between HCl and LiOH
 a. H_2O
 b. LiCl
 c. $\text{H}_3\text{O}^+ \& \text{OH}^-$
 d. $\text{H}_2\text{O} \& \text{LiCl}$
8. Caffeine is weakly basic. In which pH range does caffeine test?
 a. $0-2$
 b. $3-6$
 c. $8-12$
 d. $13-14$
9. If a solution is neutral, which of the following must be true?
 a. $[\text{H}_3\text{O}^+] = [\text{OH}^-]$
 b. $[\text{H}_3\text{O}^+] > [\text{OH}^-]$
 c. $[\text{H}_3\text{O}^+] < [\text{OH}^-]$
 d. $[\text{OH}^-] = [\text{H}_2\text{O}]$
10. If a solution has a pH of 1 then the pOH =
 a. 0
 b. 1
 c. 13
 d. 14
 $\text{pH} + \text{pOH} = 14$
11. If a solution has a pOH = 1, it is also considered
 a. acidic
 b. basic
 c. neutral
 d. can not be determined
12. Phenolphthalein is all of the following EXCEPT
 a. neutral
 b. chemical indicator
 c. pink in bases
 d. greenish/yellow in acids

13. Ammonium is a well known weak acid. (ammonium = NH_4^+). Which of the following would be the hydrolysis reaction for ammonium.
- a. $\text{NH}_4^+ + \text{NH}_3 \Rightarrow \text{H}_2\text{O}$
 - b. $\text{NH}_4^+ + \text{H}_2\text{O} \Rightarrow \text{NH}_3 + \text{OH}^-$
 - c. $\text{NH}_4^+ + \text{H}_2\text{O} \Rightarrow \text{NH}_3 + \text{H}_3\text{O}^+$
 - d. $\text{NH}_3 + \text{H}_2\text{O} \Rightarrow \text{NH}_4^+ + \text{OH}^-$

Short Answer

14.

Can you manipulate and use all the pH formulas?

The stomach of a human is approximately 2.5. Calculate the following.

a. pOH:

$$14 - 2.5 = \boxed{11.5}$$

b. $[\text{H}^+]$ ions

$$10^{-11.5} = \boxed{3.1 \times 10^{-12} \text{ OH}^-}$$

c. $[\text{OH}^-]$ ions

$$10^{-2.5} = \boxed{0.0031 \text{ M H}^+}$$

d. Acidic/basic/neutral?

15.

Can you calculate the pH of various acids?

Three solutions have their pH tested.

0.1 M NaOH 0.1M HCl 0.1M HCN

a. Which of these has the highest pH?

NaOH - Basic

b. Calculate the pH of the hydrochloric acid.

$$-\log(0.1) = \boxed{1}$$

c. Calculate the pH of the HCN ($K_a = 1.8 \times 10^{-10}$)

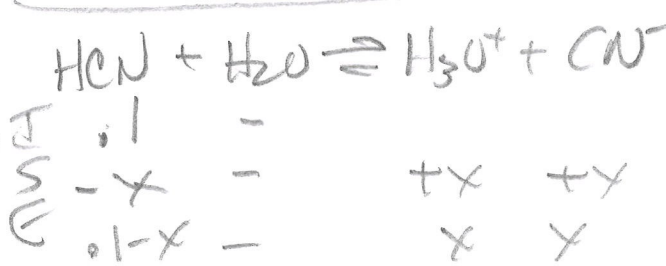
$$K_a = \frac{[\text{H}_3\text{O}^+][\text{CN}^-]}{[\text{HCN}]}$$

$$1.8 \times 10^{-10} = \frac{x^2}{0.1}$$

$$x = 4.2 \times 10^{-6} \text{ M}$$

$$-\log(4.2 \times 10^{-6})$$

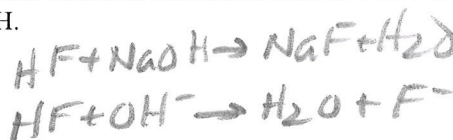
$$\boxed{5.37}$$



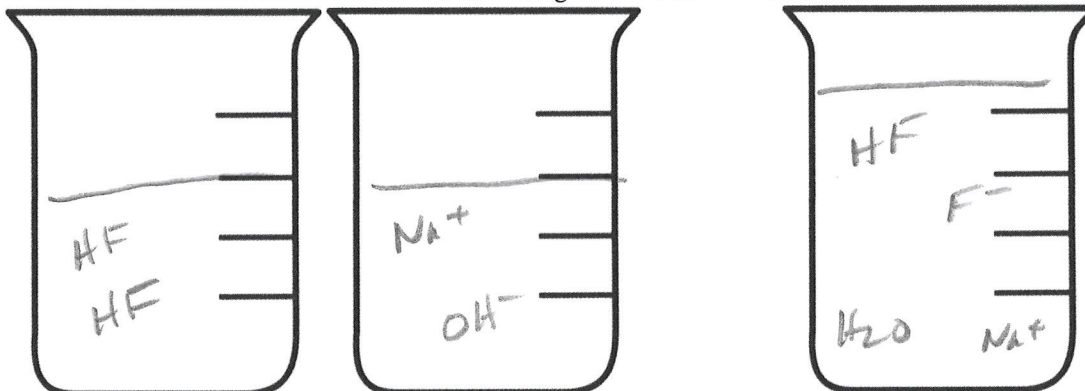
16.

Can you write out neutralization reactions and model them in beakers.
 10mL of 0.1M HF is mixed with 9mL of 0.05M NaOH.

a. Write out the reaction (molecular and net ionic)



b. Draw out three beakers. 1 beaker for each starting solution and one for the final.



17.

Can you do the standard titration calculations and model them?
 (Our question will not model anything, see previous question)

An unknown acid is being titrated by 0.5M NaOH. The student fills the burette with the NaOH to the 5mL line. Then proceeds to measure out 20mL with a beaker. Before titrating, she adds 15 drops of Phenolphthalein. After the indicator changed color the student added an extra couple of mL of NaOH just to make sure the color stayed. The buret indicated a volume of 22mL. Answer the following questions.

1. How does the color of the indicator change?

acid (clear) → base (Pink)

2. What is two things that the student did that is absolutely incorrect?

- *do not use a beaker to measure*
- *do not overshoot titration*

3. What is one thing the student did that was not technically wrong but not really standard in this type of process.

too much indicator

4. Calculate the unknown concentration. Show all work.

Base $M \cdot L = \text{mol}$
 $.5 \cdot .017 = 0.0085 \text{ mol}$

acid $M = \frac{\text{mol}}{L} = \frac{.0085}{.02 L} \downarrow$

0.42 M

Start	5
finish	22
<hr/>	
Change	17 ml