Pre-AP Chemistry Unit 11 Test Review: Acids, Bases

1. Predict products of a neutralization reaction.

Write the balanced chemical equation when hydrochloric acids reacts with lithium hydroxide.

2. What is the concentration of hydronium ions in pure water at room temp?

Remember, hydronium ions are calculated as hydrogen ions. Since pure water has a pH of 7, what is the [H+]?

3. What determines if an acid is strong?

A strong acid ionizes completely. What can you infer about the attraction strong acids have for their proton?

4. Composition of pure water which is amphoteric.

What are the particles found in pure water? (There are 3)

5. What is the pH range of a basic substance?

a. pH <7   b. pH = 7   c. pH > 7

6. What valid conclusion can be made from doing a lab which provides data that indicate mass of the products was less than the mass of the reactants?

If an acid with a mass of 50 grams reacts with 50 grams of base, the mass of the products was measured to be 93 grams. What is the most likely explanation for the change in *measured* mass?

7. Explain the differences between a strong acid with a concentration of 0.1M and a weak acid with a concentration of 0.1M.
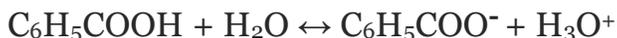
Which solution would have a higher concentration of hydronium ions? How do you know?

8. Calculate pH of a solution when given hydrogen ion concentration, [H+].

What is the pH of a solution with a hydrogen ion concentration of 2.57E⁻4?

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9. Be able to recognize and identify a Bronsted-Lowry base.

$$C_6H_5COOH + H_2O \leftrightarrow C_6H_5COO^- + H_3O^+$$

In the reaction above, which substance is acting as a Bronsted-Lowry base? How do you know?

10. Predict the pH of salt solutions produced from a neutralization reaction. This is where you must know strong acids/bases vs. weak acids/bases and what kinds of salts they make.

When nitric acid reacts with aluminum hydroxide, the salt produced is aluminum nitrate. What would you expect the pH of a 1.0M solution of aluminum nitrate to be? (not a specific number, but a range such as less than 7, equal to 7, or greater than 7)

11. Be able to calculate molarity of an unknown from data collected during a titration.

Use the data in the table to calculate the concentration of a strong acid titrated with a strong base. (This is just like what you did in the lab.)

NaOH concentration	0.1 M
Intial volume, burette	0.5 mL
Final volume, burette	21.5 mL
Volume of unknown acid	25.0 mL

12. Be able to predict the highest conductivity when given bond strength values.

Know that the relationship of bond strength to conductivity is inverse. The lower the bond strength/energy of an acid, the higher the conductivity. That makes sense when you remember that acids are proton donors; the strong acids dissociate completely because they have relatively low bond strength values. Refer to the table in our notes.

13. Be able to determine when an amphoteric substance is acting as an acid or as a base. (Some substances like water, some amino acids, and other substances can either donate a proton or accept a proton.)

In which example below is water acting as a base?

a) $NH_3 + H_2O \leftrightarrow NH_4^+ + OH^-$

b) $NH_4^+ + H_2O \leftrightarrow NH_3 + H_3O^+$

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14. Be able to predict the effect buffers have on changes in pH. Buffers are substances that resist a change in pH.

One weak acid solution has been buffered, another weak acid solution has not. What effect on pH would adding a few drops of strong acid to each solution have on the solutions? (Compare the effect on pH of the buffered solution vs. the effect on pH of the non-buffered solution.)

15. Calculate pH when given molarity.

A sample of an acid has a hydrogen ion concentration of 0.025M. What is the pH?

16. Write dissociation equations, Ka expressions, and solve for pH of a weak acid when given Ka.

Methanoic acid, HCOOH, is a weak acid with Ka = 1.78E⁻4.

a) Write the dissociation equation for methanoic acid in water.

b) Calculate the pH of a 0.2M solution of methanoic acid. Show your work.

c) Lactic acid, $HC_3H_5O_3$, is a weak acid with a Ka value = 1.38E⁻4. Does lactic acid have a higher, lower, or same concentration of H+ ions than methanoic acid?

d) Justify your answer for part c.