

Luger



Acids and Bases

The degree of acidity or alkalinity (basic) is important in organisms. The body must constantly maintain a near neutral pH (7) in the blood and body tissues. To do this, the body produces buffers that can neutralize acids. Acidic and basic conditions in the body occur due to different metabolic (chemical) reactions taking place throughout the body.

1. What does alkalinity mean?

How basic a solution is

2. What pH must organisms maintain?

near neutral - pH 7

3. What characteristic of life would maintaining this balance be? (See textbook) Ch 1

maintaining stable internal environment → homeostasis

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4. What chemicals does the body produce to keep neutral pH?

H^+ OH^-

5. Buffers neutralize acids in the body.

6. Acidic and basic conditions occur due to chemical or metabolic reactions in the body.

Water is one of the most important molecules in the body. Cells are made mostly of water and water is required for almost every metabolic reaction in the body. The force of attraction between water molecules is so strong that the oxygen atom of one molecule can actually remove the hydrogen from other water molecules. This reaction is known as dissociation, and it takes place in our cells. Water (H_2O) dissociates into H^+ and OH^- ions. A charged atom or molecule is called an ion. The OH^- ion is called the hydroxide ion, while the H^+ ion is called the hydrogen ion. Free H^+ ions can react with another water molecule to form the H_3O^+ or hydronium ion. The human body requires a neutral pH for many reasons. One reason cells like a neutral pH is for proteins. Basic or acidic solutions denature proteins (change their shape) so they no longer work.

7. What is dissociation?

Breaking apart H_2O molecules

8. What is the chemical formula for water?

H_2O

9. What is an ion?

Charged atom or molecule

10. Name the 2 ions form when water dissociates.

H^+ , OH^-

11. What is the hydroxide ion?

OH^-

12. What is a hydrogen ion?

H^+

13. What is the hydronium ion and its formula?

H_3O^+

Acidity or alkalinity is a measure of the relative amount of H^+ and OH^- ions dissolved in a solution. **Neutral solutions** have an equal number of H^+ and OH^- ions. **Acids** have more H_3O^+ ions (H^+) than OH^- ions. **Acids** taste sour and can be corrosive. **Digestive fluids** in the body are acidic and must be neutralized by buffers. **Bases** contain more OH^- ions than H_3O^+ ions. **Bases** taste bitter and feel slippery.

When an acid is combined with a base, neutralization occurs. The result of neutralization is a salt and water. Neutralization helps return our body pH to neutral. The process of our bodies maintaining neutral pH so that proteins can work properly without being denaturated (unfolded) is known as homeostasis.

14. How do you measure for acidity or alkalinity?

amount of H^+ or OH^- ions in a solution

15. What is a neutral solution?

pH 7

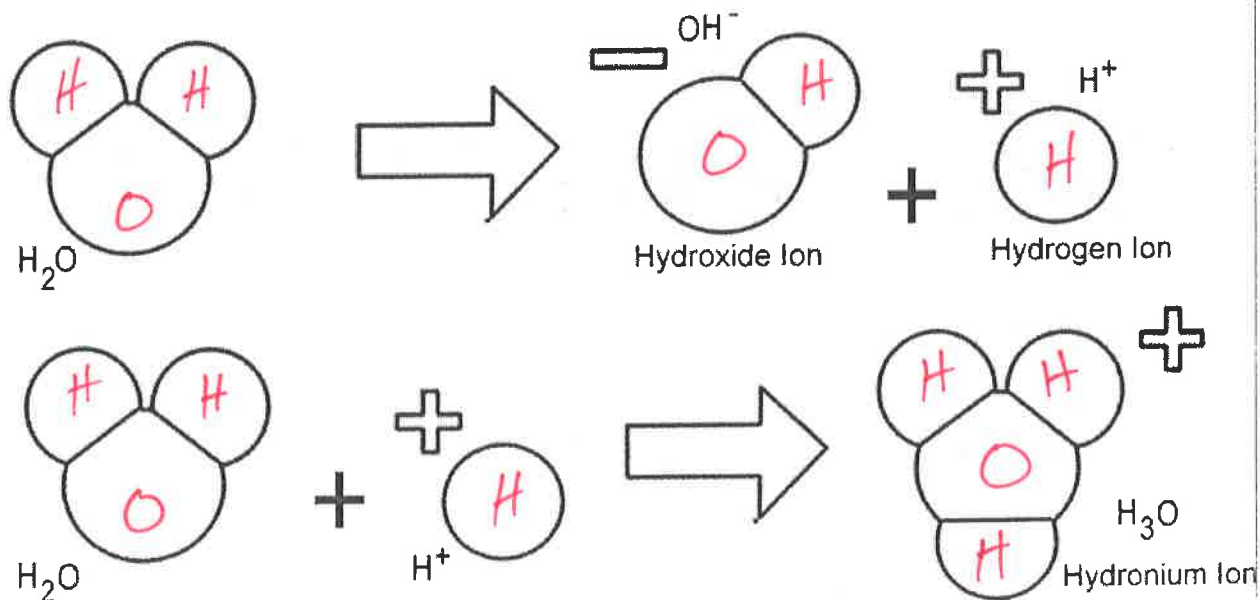
16. Acids have more H^+ ions and taste sour. And can be corrosive.
17. Bases contain more OH^- ions than H^+ ions.
18. Digestive fluids are acid in the body and must be neutralized by buffers.
19. Bases taste bitter and feel slippery.
20. What is neutralization?
acid combines with a base
21. What 2 things are produced by neutralization?
salt
water
22. Neutralization keeps our pH at neutral and is an example of maintaining homeostasis.

Color the following diagrams according to the key.

DISSOCIATION OF WATER

HYDROGEN (yellow)

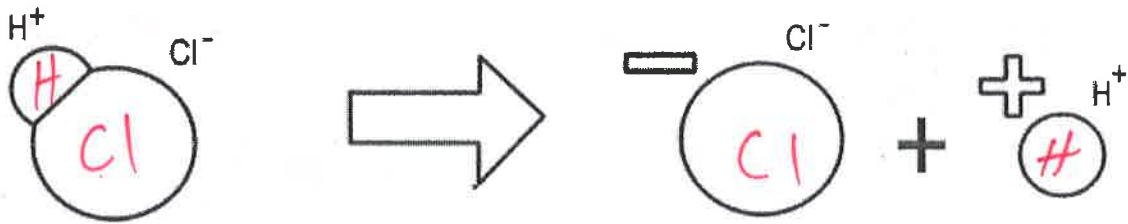
OXYGEN (red)



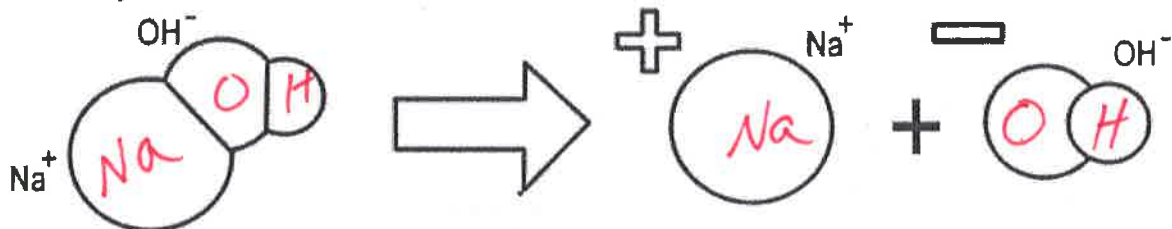
ACIDS & BASES

Chlorine (green)
Sodium (blue)

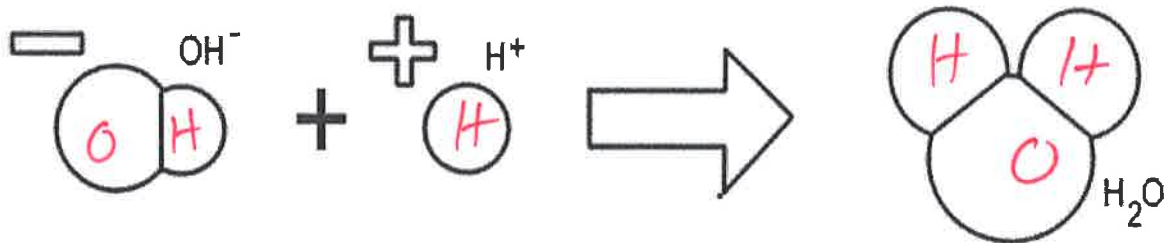
Hydrochloric Acid



Sodium Hydroxide



NEUTRALIZATION



Questions:

1. Why is the water molecule so important to organisms?

cells made mostly of water; required for almost all metabolic reactions in body

2. What ions form when water dissociates?

H^+ OH^-

3. What is meant by the term alkalinity?

How basic a solution is

4. What is produced by the body to help neutralize acidic conditions?

Buffers

5. What is the name for the OH^- ions?

Hydroxide ions

6. What is the name for the H^+ ion?

Hydrogen ion

7. How does the hydronium ion form? What is its formula?

Free H^+ reacts with $\text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+$

8. Why do most proteins need near a neutral pH?

To function properly

9. What two substances form from an acid-base neutralization?

Water and salt

10. Acids have an excess of H^+ ions.

