



Al-Zahraa University for women
College of health and medical technologies
Radiology department
The first stage

liquid mixture

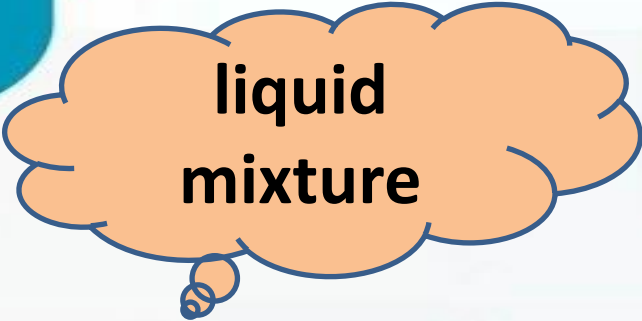
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Aims of Lecture

- The student gets to know the mixing of liquids, its importance and types
- The student gets to know PH
- The student gets to know the structured solution and its importance

What does this picture mean to you?





liquid mixture

liquid mixture : is a compound consisting of two or more oils mixed together, resulting in the desired ingredient that may or may not be complete. In exogenous presence, the components are partially distributed and cannot be distinguished by the naked eye, while in non-external presence, the components can be seen separately, such as water and oil.

The importance of fluid mixture

❖ In chemistry:

- **Chemical reactions:** Liquid mixtures are used in laboratories to perform chemical reactions, as compounds can react best when they are in a liquid state.
- **Preparing solutions:** Used to mix gases or solids with liquids to create solutions of specific compositions, such as salt or sugar solutions.

- ❖ **In the pharmaceutical industry:** Liquid mixtures are used to prepare liquid medicines such as syrups or parenteral solutions, where the active ingredients are mixed with suitable liquids.
- ❖ **In agriculture:** Liquid mixtures are used to effectively prepare pesticides and agricultural nutrients

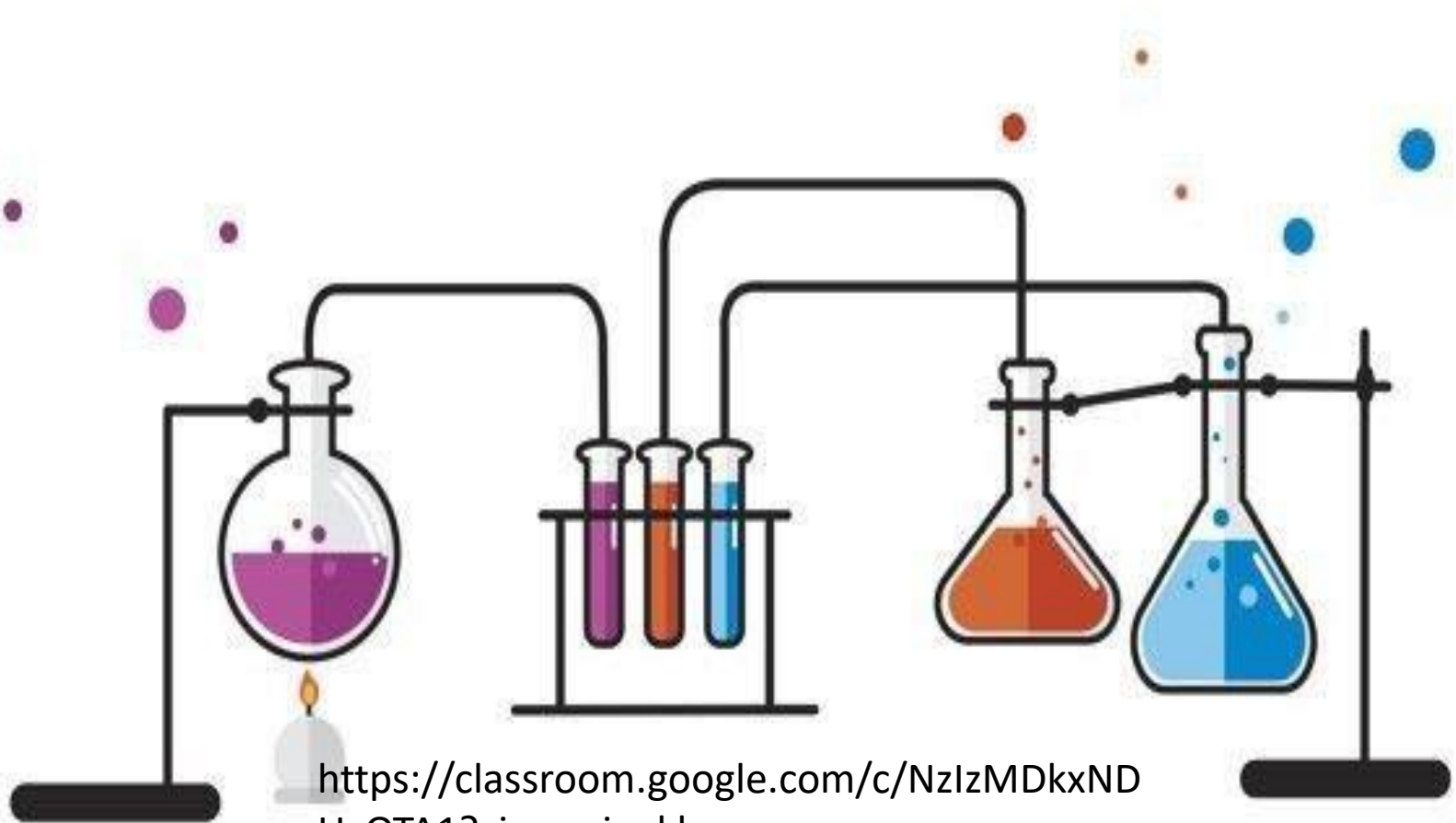
Types of fluid mixture

- **Homogeneous mixtures:** where the components of the mixture are evenly distributed (such as a solution of salt in water).
- **Heterogeneous mixtures:** where the ingredients are not evenly distributed (such as oil and water).

Factors affecting liquid mixtures

- temperature.
- the pressure.
- consitration.

How do you think the liquid mixture is prepared?



<https://classroom.google.com/c/NzIzMDkxNDUxOTA1?cjc=smjaqkh>

<https://forms.gle/SZ2JDhjs3QvY4hS57>

Methods for preparing liquid mixtures

- Mechanical mixing.
- Homogenization using heat.
- Use of solvents.

Properties of the liquid mixture

- Physical properties (density, viscosity, boiling point).
- Chemical properties (interaction of components with each other).

pH

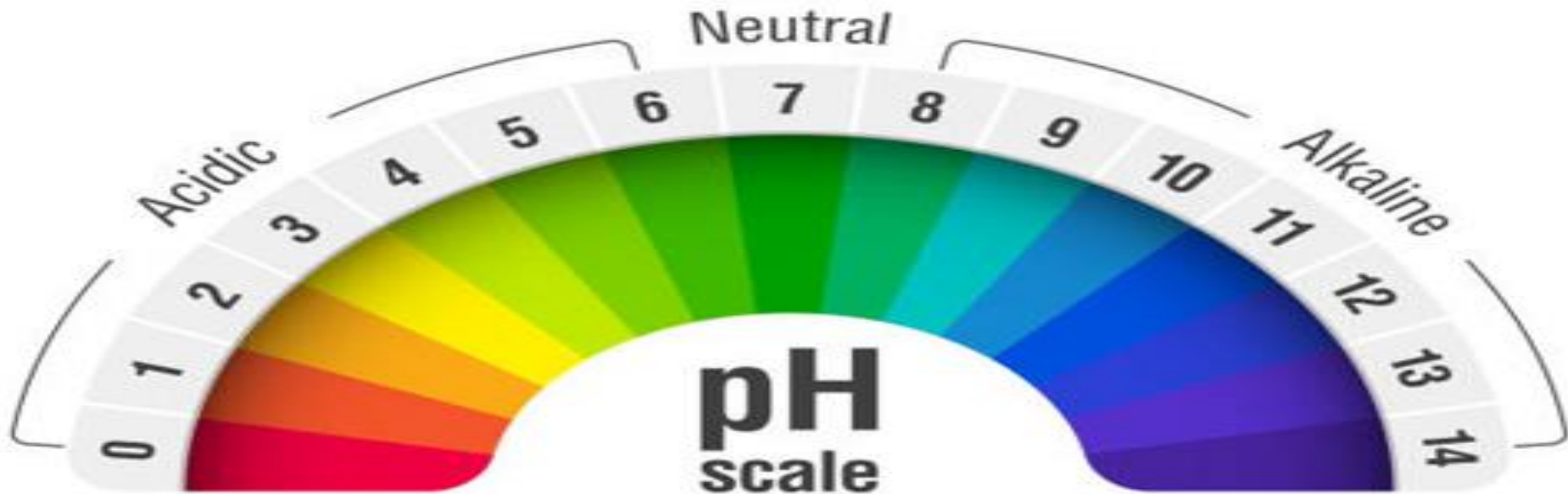
A way to express the acidity of a solution. The pH is defined as The negative logarithm of the concentration of hydrogen ions in a solution.

$$\text{pH} = -\log [\text{H}^+]$$

The negative sign indicates the inverse relationship between the pH value and the acidity of the medium:) The higher the hydrogen ion concentration, the higher the acidity of the solution, and the lower the pH value.

The hydrogen sequence or pH number starts from zero and ends with 14:

- Acidic medium pH from zero to less than 7.
- Neutral medium - pH 7.
- Basic medium pH higher than 7 to 14



buffer solution

A buffer solution is a chemical solution that resists any change in the concentration of hydronium ions and hydroxide ions, when small amounts of a strong acid or base are added to it, or when the solution is diluted. Thus, it is regulated, i.e., the pH is maintained) at or near a constant value. A buffer solution consists of a mixture of a weak acid and one of its salts or a mixture of a weak base and one of its salts

A **buffer solution** is a mixture in which the pH value changes slightly when an acid or base is added to it, i.e. the change in the buffer is less than it would be in the case of the non-buffer solution. The action of the buffer solution arises from the reaction of oxonium (H^+) ions added by an acid to a weak acid or the reaction of hydroxide ions (OH^-) added by the addition of a base to a weak base which do not tend to produce oxonium ions or hydroxide ions themselves, respectively

$$pH = pK_s + \lg \frac{c(A^-)}{c(HA)}$$

It is called (buffer solution equation) or equation.

Henderson ha-Salbalakh.

By this equation - where the chemical reactivity of substances equals their concentrations - we can calculate the ratios of acid and base concentrations at any pH value if the pks value is known.

The higher the concentrations, the less effect the addition of an acid or base has.

Calculate buffer
solution

The amount of a strong base or acid that a buffer solution can take without significantly changing its pH is expressed as It is called the capacity of buffer solution.

Examples of buffer solutions include acetic acid acetate solution or ammonia buffer solution, which consists of ions.

Ammonia and ammonia

Buffer solutions are classified into two categories:

closed buffer solution and **open buffer solution**

- **closed buffer solution** of acetic acid/acetate) absorb protons (H) or hydroxide ions (OH) resulting from a chemical reaction in the buffer solution. They react to form a conjugate acid or base of the buffer and remain in the solution.

- **open buffer solution** : (bicarbonate/carbon dioxide buffer solution in the lung) the system is in a state of exchange with the air. It is able to move compounds into the air so that the pH is adjusted, such as the release of carbon dioxide CO₂ during breathing.

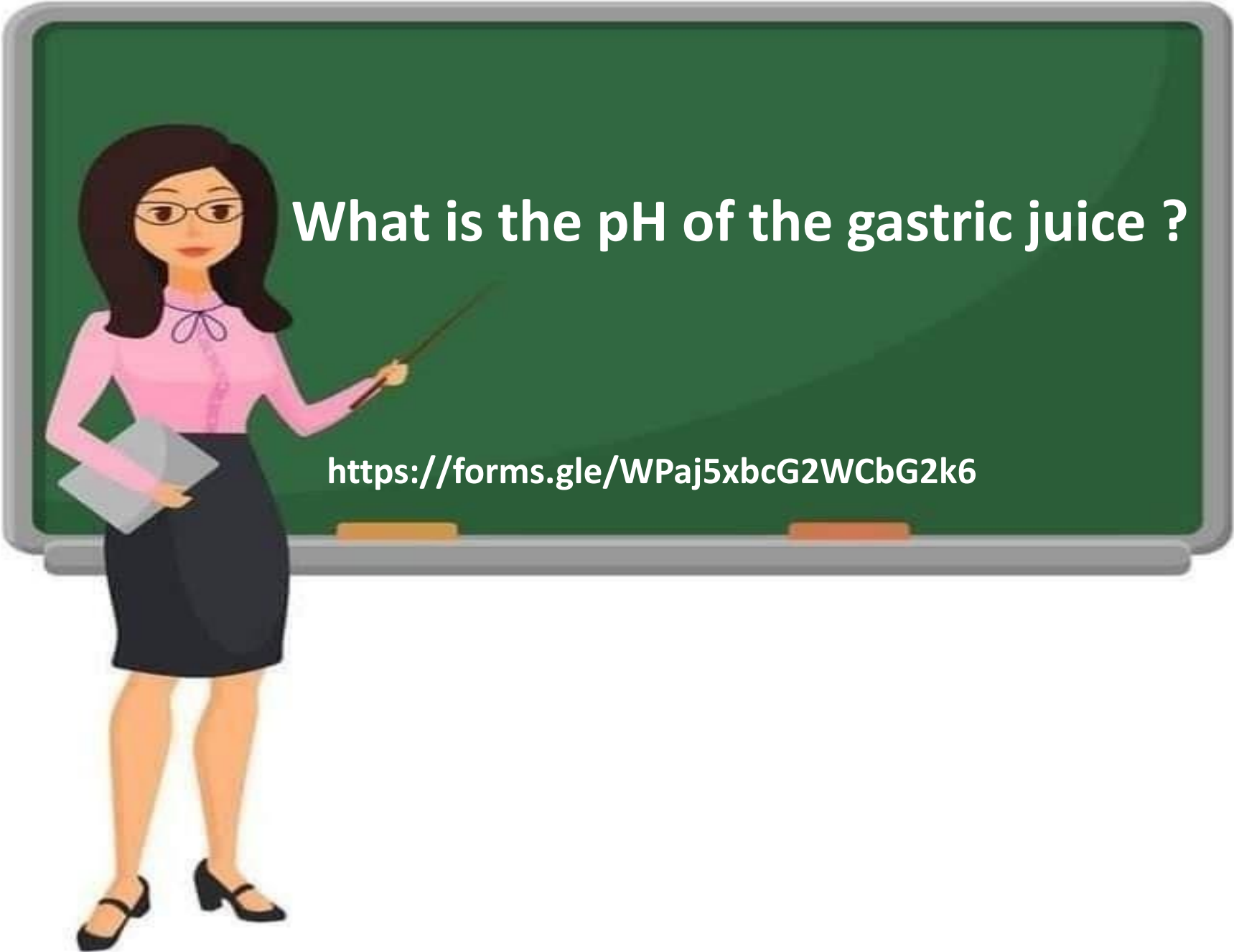
The buffer solutions consist of:

1- weak acid (conjugate acid) + salt of weak acid (conjugate base of acid_conjugate base).

2 -weak base (conjugated base) + salt of the weak base (conjugate acid of the base - conjugated acid.)

That is, the buffer solution in general consists of: the conjugated acid + its conjugated base





What is the pH of the gastric juice ?

<https://forms.gle/WPaj5xbcG2WCbG2k6>

The importance of buffer solutions:

Structured solutions are of great importance in chemical and biological systems, as biological fluids are characterized by a pH from one liquid to another.

For example, in blood it is 7.4, while in gastric juice it is 1.5

These values are considered appropriate and ideal for the functioning of enzymes and balancing osmotic pressure, and are often maintained through buffer solutions.

The most important buffer solutions are phosphate and bicarbonate. The buffered bicarbonate solution present in blood plasma maintains a stable pH value ranging between: It consists of weak carbonic acid (H_2CO_3) And bicarbonate salt: (HCO_3^-) (7.35 to 7.45)

Thank you for listening

