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SPNSECIFIC ASPECTS OF ANALYTICAL REACTIONS

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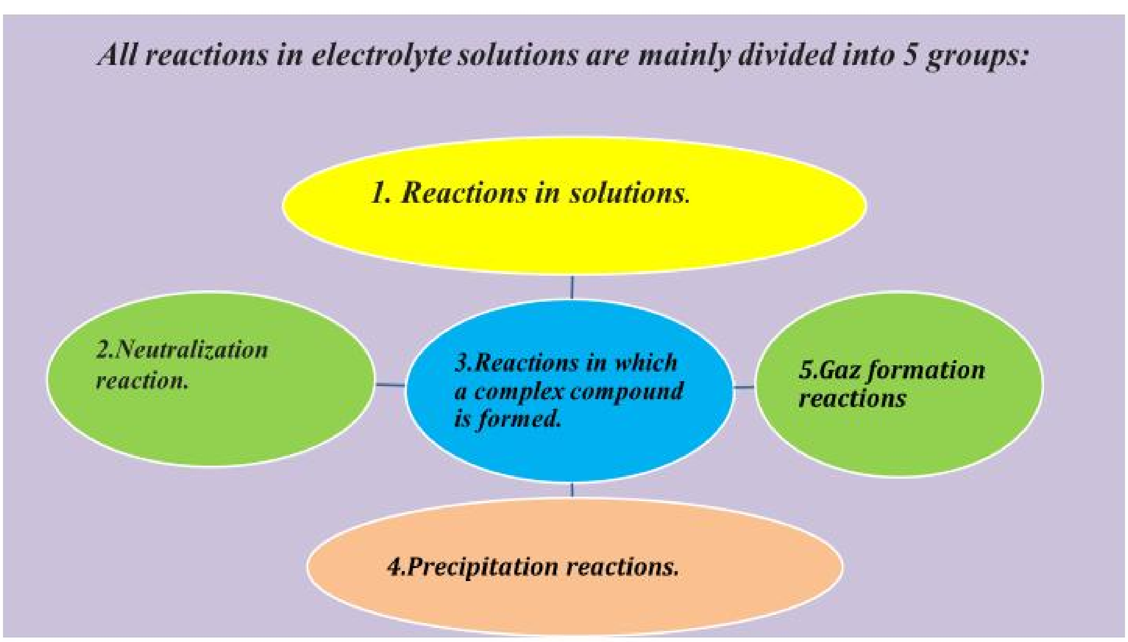
Abstract. This article is about the progress of chemical reactions, their difference from analytical chemical reactions, the difference in the observation of an effect in analytical chemical reactions (precipitation or melting of the precipitate, gas formation, color change, etc.). information provided.
Key words. Electrolyte solutions, weak, dissociation constant, pH value, neutral, alkaline, acidic environment, precipitation reactions of group I, II cations.

The different chemical processes are formed from the essence of the reaction, and the questions of what kind of reaction, in what state, what substances are formed as a result, and how the process proceeds are answered.

While talking about electrolytes, their types and differences, it is necessary to pay attention to what analytical reactions take place in the electrolyte solutions we are studying.

As you know, ions are mainly involved in reactions leading to electrolyte solutions. When writing the equations of reactions between these ions, strong electrolytes are shown separated into ions, poorly dissociable substances, precipitates and gases are written in molecular form.

Knowing such reactions, we will now dwell on the electrolytic dissociation of water.



№	Neutralization reaction	Equation	Explanation
1	Neutralization reaction.	$OH^- + H^+ = H_2O$	In a neutral environment, the color of the solution takes an average (neutral) color between red and blue.
2	Precipitation reactions.	$X^- + Ag^+ = AgX\downarrow$	Any compound solution containing Ag+ ions reacts with a solution of another compound containing halogen X- ions to form a specific colored precipitate AgX.
3	Gas formation reactions	$NH_4^+ + OH^- = NH_3\uparrow + H_2O$	From this equation, it can be concluded that when NH4+ salts are exposed to any alkali, NH3 is always released.

Usually, clean water conducts electricity very poorly. Distilled (transparent) water used in the laboratory is also not clean enough. It contains NH4OH, H2CO3 and other substances. A scientist named Kohlrausch obtained very clean water by purifying it many times. This water also has low electrical conductivity. This is due to its dissociation:

HOH = H+ + OH- or 2HOH = OH- + H3O-

Considering water as a very weak electrolyte, its dissociation constant can be written as follows:

$$\mathbf{K}=\frac{[H^+]+[OH^-]}{[H_2O]}$$

Using the electrical conductivity of water, its dissociation constant was calculated. Inspection made at 220C K=1.8 .10-16

Now, we write the above equation in the following form:

[H+] .[OH-] = K .[H2O] from this equation, since the degree of dissociation of HOH is considered a constant value, then its concentration is:

[H2O] = 1000 g/l or 1000:18 = 55, 56 mol/l.

K .[H2O] product is denoted by K w.

Then K .[H2O] =K w = [H+] . [OH-] or 1.8 .10-16 . 55.56 = [H+] . [OH-] will be.

K w is called the ion coefficient of water.

K w shows that the concentration product of H+ and OH- ions in water at a certain temperature is a constant value, that is, at 220C, the concentration product of H+ and OH- ions is equal to 10-14. From this

[H+] = [OH-]= 10-14 = 10-7 mol/l.

So, in pure neutral water [H+] = 10-7mol/l, [OH-] = 10-7mol/l.

In an acidic environment, the concentration of H+ ions is greater than 10-7mol/l

[H+] >10-7, [OH-] is less than <10-7.

In an alkaline environment, [OH-] > more than 10-7, [H+] less than 10-7.

The value of Kw changes with the temperature change.

Since the dissociation of water is an endothermic process, when the temperature increases, its dissociation into ions increases, that is, the value of Kw increases.

For example, Kw = 0.13.10-14 at 00C

Kw at 500C = 5.66, 10-14

Kw = 74 at 1000C is equal to 10-14.

Activating questions:

1. To your attention, 5 reactions are taking place in the air, how are they different from each other? Or is there a similarity?

2. At 220C, the product of the concentration of H+ and OH- ions is equal to 10-11?

If the temperature increases or the temperature decreases, does the product of the concentration of ions change?

3. What are the necessary aspects of the qualitative analysis of the study of the ion coefficient of water?

Since it is inconvenient to use numbers with a negative degree, it is accepted to express the concentration of hydrogen ions through the hydrogen indicator and to designate the symbol pH ("pe-ash"). So, the decimal logarithm of the concentration of hydrogen ions [H+] obtained with the opposite sign is called hydrogen indicator pH.

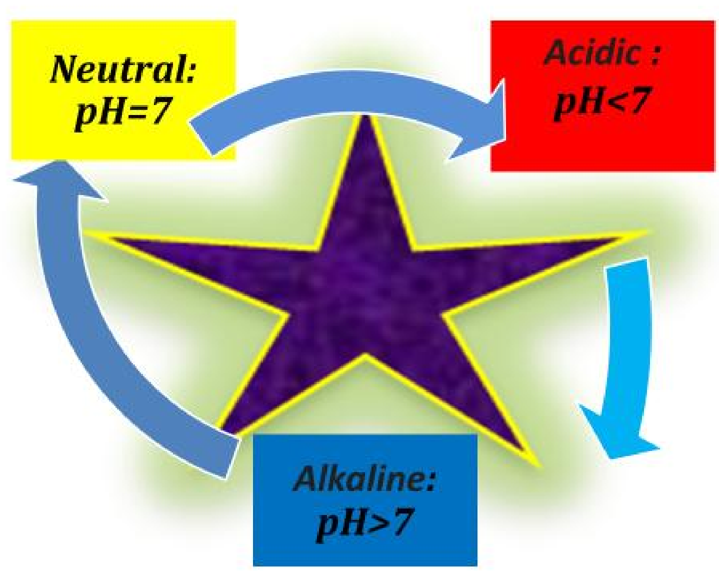
$pH = -lg [H^+]$

The concept of hydrogen index was introduced in 1909 by the Danish scientist and chemist Seryonsin.

In this case, the letter "p" is the first letter of the Danish word "potens", the word "H" is the symbol of hydrogen.

The environment of dissolution reactions is characterized by pH as follows:

The relationship between the concentration of hydrogen ions, pH, and the environment of the solution can be clearly shown as follows: the lower the pH, the more [H+]-. That is, if the acidity of the environment is high, and vice versa, the higher the pH, the smaller [H+]- is, that is, the higher the alkalinity of the environment.



For example: 1) gastric juice pH=1.7 is strongly acidic;

2) pH=4 is weak in peat water;

3) weakly acidic pH=6 in rainwater;

4) pH=7.5 in hydrogen water (weakly alkaline);

5) blood pH=7.4 (weakly alkaline);

6) pH=6.9 in saliva (weakly acidic);

7) pH=7 (neutral) in tears.

Both in nature and in technology, the role of pH in various phenomena and processes is extremely large.

During analytical chemical analysis, it is necessary to maintain the concentration of hydrogen ions (pN) in the solution at the required value during processes such as precipitation, dissolution, formation of colored compounds. For this purpose, it is recommended to carry out the analytical reactions in a buffer solution environment. The rN value of buffered solutions changes very little when the solution is diluted or when the concentration is increased when acid or alkali is added to the mixture.

In most analytical reactions, ion separation is carried out in an aqueous solution without changing the medium. For example:

1. In order to precipitate group I, II cations, it is necessary to have rN = 9.2.
2. In order to precipitate Ba2+ ions with K2Cr2O7, rN = 4-5.
3. Combinations of most cations with organic reagents are formed in a certain environment. Buffer solutions are used to keep the rN of the solution almost constant. Therefore, it is convenient to work with buffer solutions when carrying out various reactions in analytical chemistry.

If a small amount of a strong acid or alkali is added to a mixture of a weak acid and its salt, the pH change will be different, that is, if 0.01 mol of HCI is added to 1 liter of a mixture of 0.1 M CH3COONa, the H+ in the solution The concentration of ions does not increase much, because these ions do not remain free, but immediately bind to the CH3COO- ions of the salt and turn into non-ionized CH3COOH molecules. Therefore, the pH of the solution can be changed up to 4.76. If the given solution is diluted, for example, 100 times, then the concentration of H+ ions will also be greatly reduced due to the decrease in the concentration of CH3COOH.

However, it should not be forgotten that the ratio of acid and salt concentration almost does not change when diluting the solution. Therefore, the value of pH remains almost unchanged.

So, in order to know the essence of the reaction, it is necessary to pay attention to the composition and quality of the substances involved in the reaction.

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