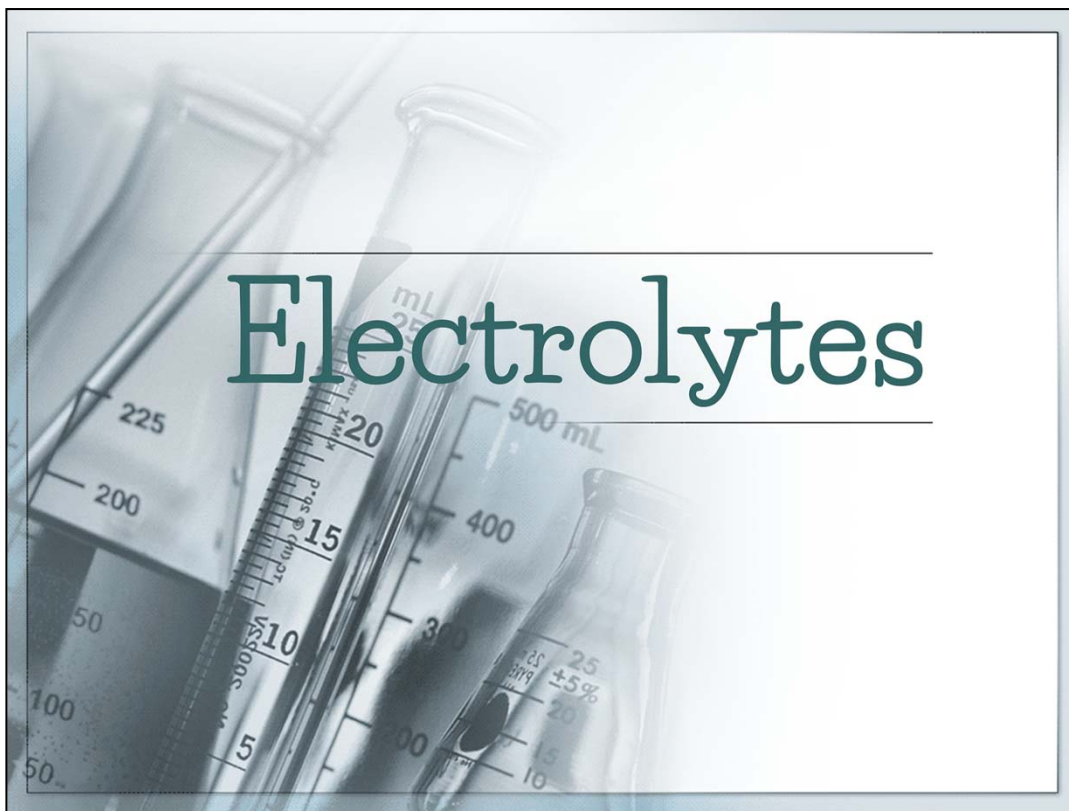


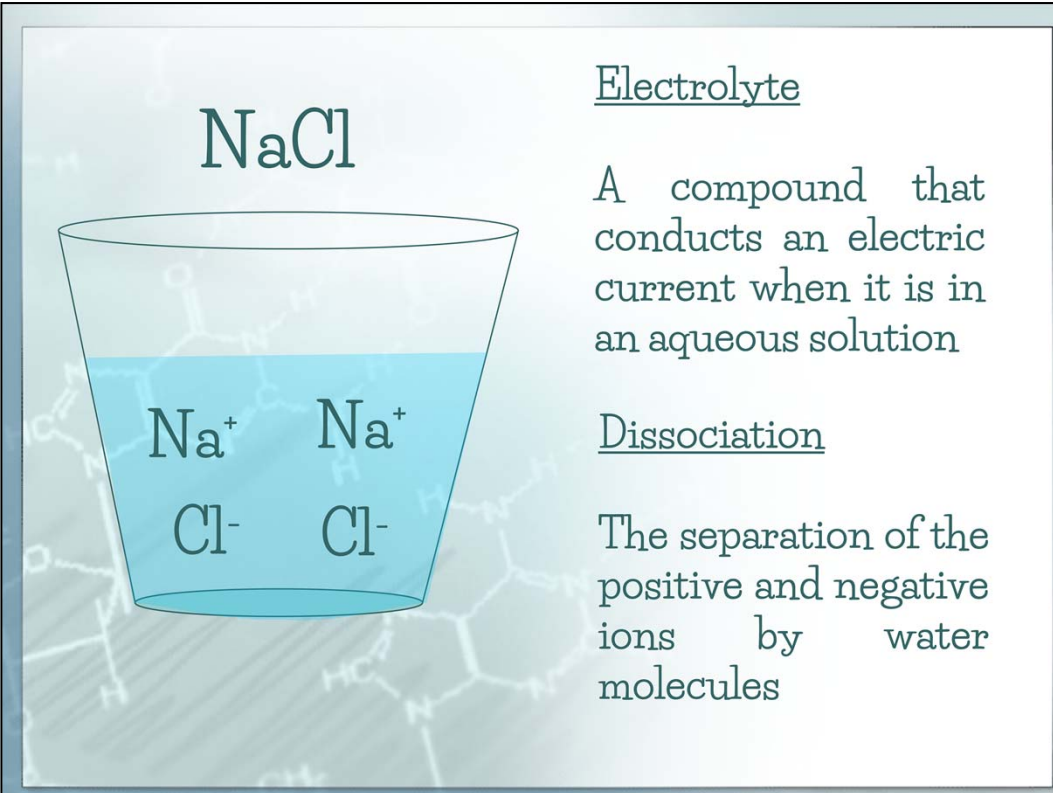
Module 10: Solutions
Topic 2 Content: Electrolytes Presentation Notes



Electrolytes

Module 10: Solutions

Topic 2 Content: Electrolytes Presentation Notes



The diagram shows a glass of water with a light blue liquid. Above the glass, the chemical formula NaCl is written. Inside the glass, four ions are shown: two Na^+ ions and two Cl^- ions. The background of the diagram features faint molecular structures.

Electrolyte

A compound that conducts an electric current when it is in an aqueous solution

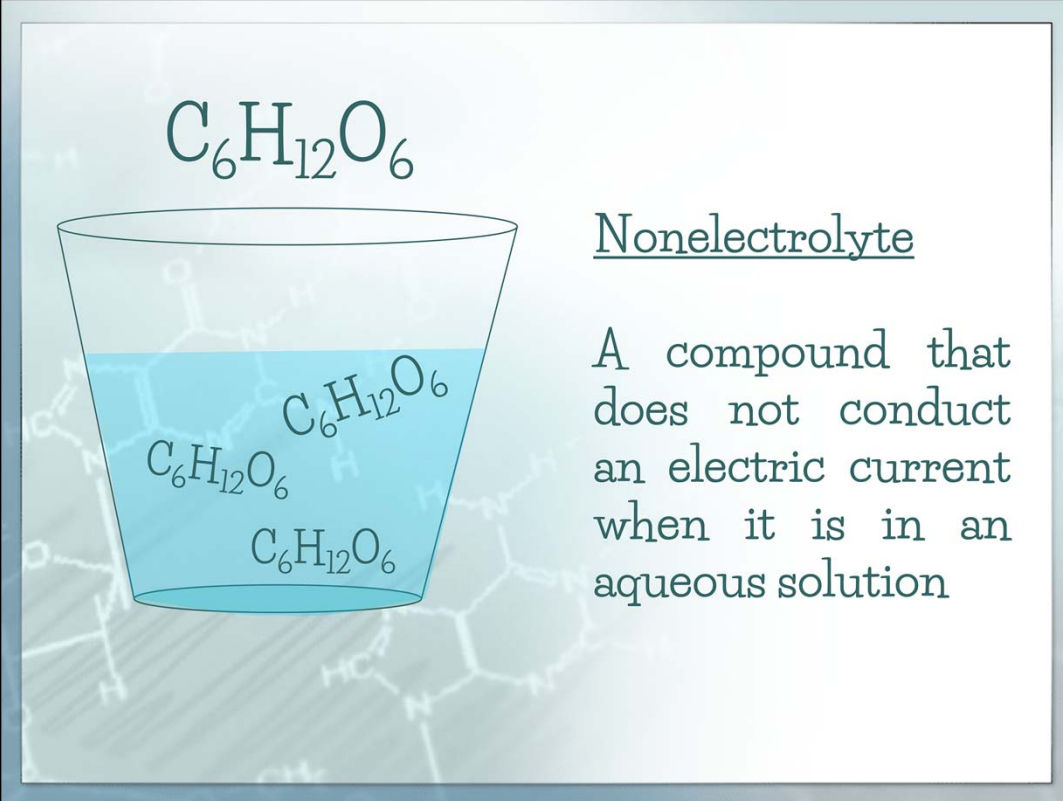
Dissociation

The separation of the positive and negative ions by water molecules

An electrolyte is a compound that conducts an electric current when it is in an aqueous solution. As an electrolyte dissolves, the ions it contained are allowed to move freely in the solution. This allows the solution to conduct electricity. Every ionic compound is an electrolyte, and as their ions break apart, the solution is able to conduct a current.

Pretend for a moment that you have a glass of water. In the glass, you put a teaspoon of sodium chloride, or table salt. With very little stirring, the salt dissolves, but what is happening on the atomic level is quite different. When ionic compounds dissolve, their positive and negative ions separate from each other and become surrounded by water molecules. This is called dissociation. These ions are then free to move around. As these charged particles move around, there is a random flow of electrons in the solution. This flow of electrons is called electricity.

Module 10: Solutions
Topic 2 Content: Electrolytes Presentation Notes



The diagram shows a glass filled with a light blue liquid. Above the glass, the chemical formula $C_6H_{12}O_6$ is written. Inside the glass, several $C_6H_{12}O_6$ molecules are depicted as small clusters of atoms. To the right of the glass, the word "Nonelectrolyte" is written and underlined. Below it, a definition states: "A compound that does not conduct an electric current when it is in an aqueous solution".

What happens when a compound does not dissolve into ions? If a compound does not dissolve into ions, the compound is a nonelectrolyte. A nonelectrolyte is a compound that does not conduct an electric current in an aqueous solution. Many molecular compounds, such as sugar, are nonelectrolytes. When these compounds dissolve in water, they do not produce ions.

Sugar is a molecular substance because it is held together by covalent bonds. It also dissolves in water, but each molecule sticks together as a unit. It does not divide up any further. In other words, there are little bundles of six carbon atoms, twelve hydrogen atoms, and six oxygen atoms roaming around in the cup of water. Sugar is considered a nonelectrolyte because it does not have mobile ions in the water to conduct electricity.

Module 10: Solutions
Topic 2 Content: Electrolytes Presentation Notes

Ionization

The process of a molecular substance forming ions

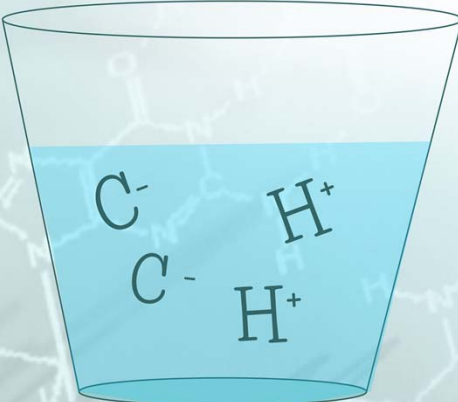
	Dissociation	Ionization
Conducts Electricity	✓	✓
Forms from ionic compound		✓
Forms from molecule	✓	

Acids are a small group of molecular substances which do form ions in water. Some examples include nitric acid, sulfuric acid, and hydrochloric acid. The process of a molecular substance forming ions is called ionization.

The results of dissociation and ionization are the same: ions are formed in water and electricity is conducted. The difference between the two processes is that dissociation takes place when an ionic compound forms ions in water and ionization is what happens when a molecule forms ions in water. Virtually all ionic compounds are electrolytes. However, you know that not all ionic substances are soluble. Is this a contradiction? Not really. A substance which is listed as insoluble actually slightly dissolves in water. The portion that dissolves becomes ions.

Module 10: Solutions
Topic 2 Content: Electrolytes Presentation Notes

HCl



Hydrochloric acid is a strong electrolyte

Strong Electrolyte

A compound in which the entire dissolved compound exists as ions

Weak Electrolyte

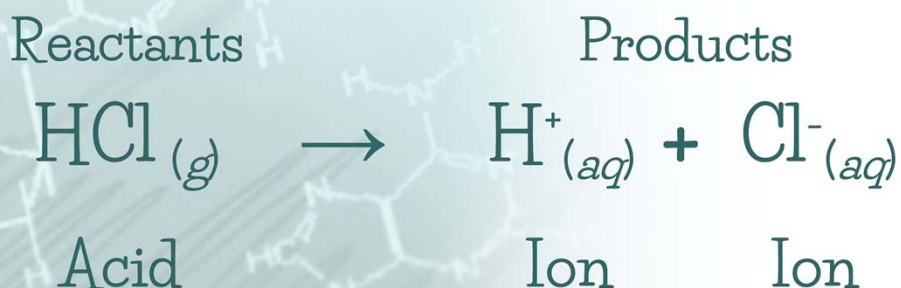
A compound in which only a small amount of the dissolved portion forms ions

Electrolytes are classified as weak or strong. A strong electrolyte is a compound in which almost the entire dissolved compound exists as ions. In other words, the portion or percentage that dissolves in water is the same amount that yields ions. A weak electrolyte is a compound in which only a small amount of the dissolved portion divides into ions.

Module 10: Solutions
Topic 2 Content: Electrolytes Presentation Notes

Writing an equation for a dissolving reaction:

1. Determine if the reactant is a solid, acid, or molecule.
2. Write down the reactants and products.
3. Balance the equation for the number of atoms.



When you are writing an equation for a dissolving reaction, you must follow a few important steps. First, determine if the reactant is an ionic solid, acid, or molecular compound. This is important because knowing the reactants will help you determine if ions are formed. Next, write down the reactants and products. The reactant is always a solid because it has not dissolved in water. The products are the aqueous ions that are formed. If the reactant is a molecular substance, you need to rewrite the formula and indicate it as an aqueous solution with a phase notation of *aq*. Last, balance the equation for the number of atoms.