

15.7: Electrolytes and Nonelectrolytes

People around the world jog for exercise. For the most part, jogging can be a healthy way to stay fit. However, problems can develop for those who jog in the heat. Excessive sweating can lead to electrolyte loss, which can be life-threatening. Early symptoms of electrolyte deficiency can include nausea, fatigue, and dizziness. If not treated, individuals can experience muscle weakness and increased heart rate (which could lead to a heart attack). Sports drinks can be consumed to restore electrolytes quickly in the body.

Electrolytes and Nonelectrolytes

An **electrolyte** is a compound that conducts an electric current when it is in an aqueous solution or melted. In order to conduct a current, a substance must contain mobile ions that can move from one electrode to the other. All ionic compounds are electrolytes. When ionic compounds dissolve, they break apart into ions which are then able to conduct a current (**conductivity**). Even insoluble ionic compounds such as CaCO_3 are electrolytes because they can conduct a current in the molten (melted) state.

A **nonelectrolyte** is a compound that does not conduct an electric current in either aqueous solution or in the molten state. Many molecular compounds, such as sugar or ethanol, are nonelectrolytes. When these compounds dissolve in water, they do not produce ions. The figure below illustrates the difference between an electrolyte and a nonelectrolyte.

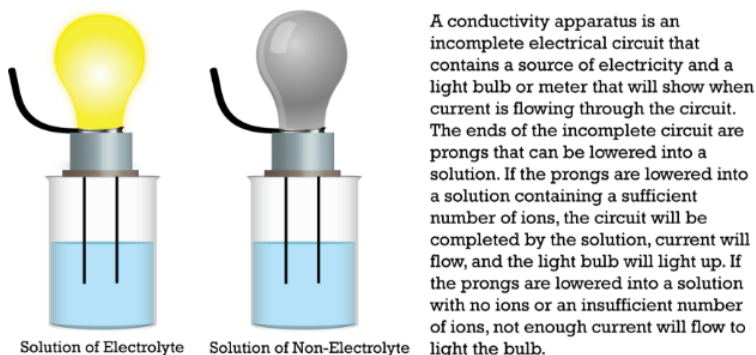


Figure 15.7.1: Conductivity apparatus.

Roles of Electrolytes in the Body

Several electrolytes play important roles in the body. Here are a few significant electrolytes:

1. Calcium - in bones and teeth. Also important for muscle contraction, blood clotting, and nerve function.
2. Sodium - found outside the cell. Mainly involved in water balance and nerve signaling.
3. Potassium - major cation inside the cell. Important for proper functioning of heart, muscles, kidneys, and nerves.
4. Magnesium - in bone and cells. Involved in muscle, bone, nervous system, and takes part in many biochemical reactions.

Summary

- Electrolytes conduct electric current when in solution or melted.
- Nonelectrolytes do not conduct electric current when in solution or melted.
- Some electrolytes play important roles in the body.

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