

18. Electrolytes and Non-electrolytes

If you place a light bulb containing two electrodes in a sugar solution, the light fails to illuminate. What happens if you dip the same gadget into a NaCl solution?



Definitions

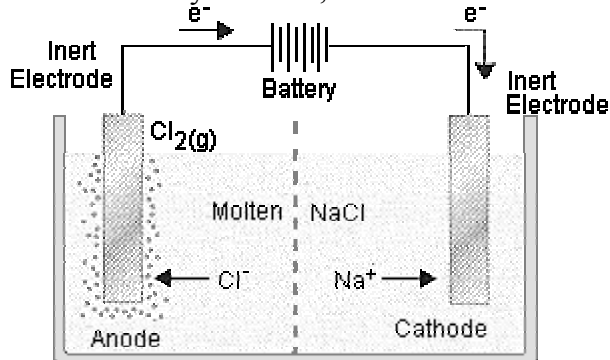
Electrolyte: _____ a solution that conducts electricity

Acids, bases and salts in solution are all examples of electrolytes.

Non-electrolyte: _____ a solution that does not conduct electricity

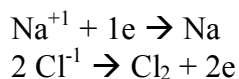
Examples: sugars (example $C_6H_{12}O_6$), alcohols (like CH_3OH etc)

1. Why do acids, bases and salts all conduct electricity?



Here we are explaining why molten NaCl conducts. Explaining why aqueous NaCl conducts is complicated by the fact that water is a better electron acceptor than Na^+ .

The positive ions found in electrolytes accept electrons and the negative ions return them to the circuit. Above:



2. From the point of view of physical properties, what do electrolytes have in common? Non-electrolytes?

Electrolytes and non electrolytes both interfere with the boiling and freezing of water. Thus they lower the freezing point of water and elevate its boiling point.

3. What chemical properties do electrolytes share? Non-electrolytes?

Electrolytes react quickly because their reactions involve the simple breaking and reforming of ionic bonds. Generally non electrolytes react more slowly because their reactions involve covalent bonds, which are harder to break and reform.

Exercises

1. Which of the following properties is **common** to acids, bases, and salts?
- A) They all react with metals to produce hydrogen gas.
 - B) They all turn litmus paper red.
 - C) They all conduct electricity.
 - D) They all are slippery to the touch.
2. Compare (list similarities) and contrast (list differences) the physical and chemical properties of electrolytes and non-electrolytes.

Similar physical properties:

Electrolytes and non electrolytes both interfere with the boiling and freezing of water. Thus they lower the freezing point of water and elevate its boiling point.

Different physical properties: Electrolytes conduct; non electrolytes don't.

Different chemical properties: Electrolytes react quickly because their reactions involve the simple breaking and reforming of ionic bonds. Generally non electrolytes react more slowly because their reactions involve covalent bonds, which are harder to break and reform.

3. Is it a good idea to go swimming in the sea with an approaching storm, even if the water remains calm?

No. Sea water is an electrolyte and it conducts electricity.

4. How do electrolytes and non-electrolytes help us survive driving in wintry conditions?

Salting(electrolytes) streets melts ice.

Adding non electrolytes to radiator coolant prevents coolant from freezing or evaporating too quickly. They are also non corrosive.

5. Draw a diagram explaining how a molten solution of KBr conducts electricity. Also show two equations.

