MAINIDEA

Dissolved particles can both lower the freezing point and raise the boiling point of a solvent.

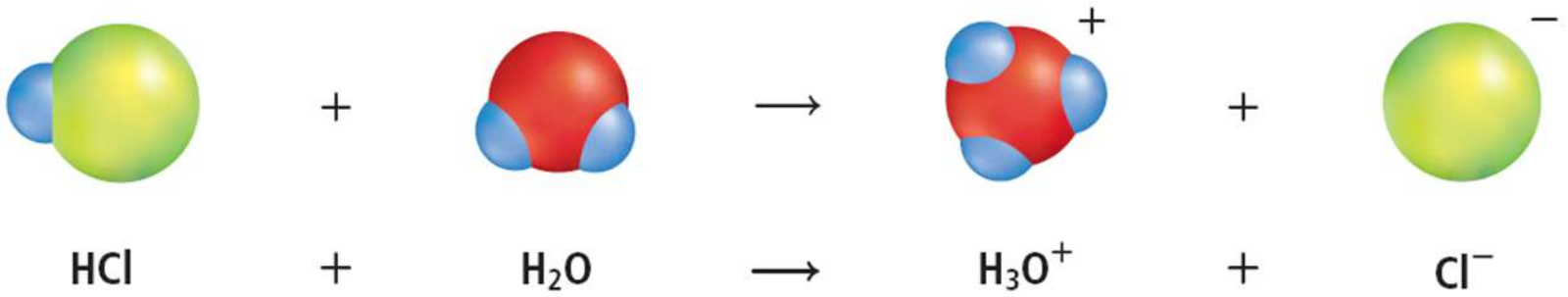
Adding a salt to water will lower the temperature at which it freezes.

Ion Formation in Solution

- Ions are charged particles
- Important in many systems, including the human body
- Compounds that produce solutions of ions in water are known as **electrolytes**.

Ion Formation in Solution

- Solutions containing electrolytes conduct electricity
  - Strong electrolytes produce many ions and conduct a strong current
  - Weak electrolytes produce few ions and conduct a weak current.
- **Nonelectrolytes** are substances that form no ions in water and cannot conduct electricity.



Ion Formation in Solution

Ionization

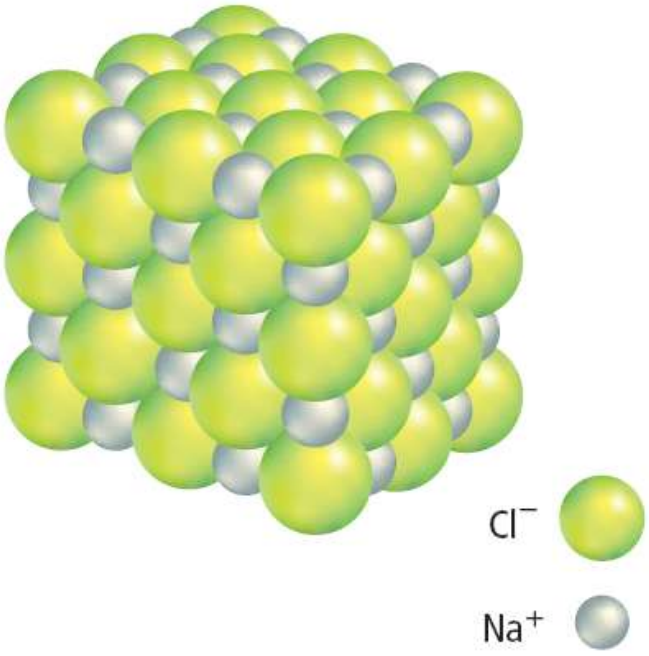
- Solutions of electrolytes form two ways, ionization or dissociation
- The process in which molecular compounds dissolve in water and form charged particles is called **ionization**.

Dissociation	Ionization
Takes place in Ionic compounds	Takes place in polar covalent compounds & Metals.
It involves separation of ions of the ions that are already present (held together by electrostatic attraction)	It involves formation of Charged ions from the molecules which were not in ionic state.
$PbBr_2 \rightarrow Pb^{2+} + 2Br^-$	$HCl \rightarrow H^+ + Cl^-$ $Mg \rightarrow Mg^{2+} + 2e^-$

Ion Formation in Solution

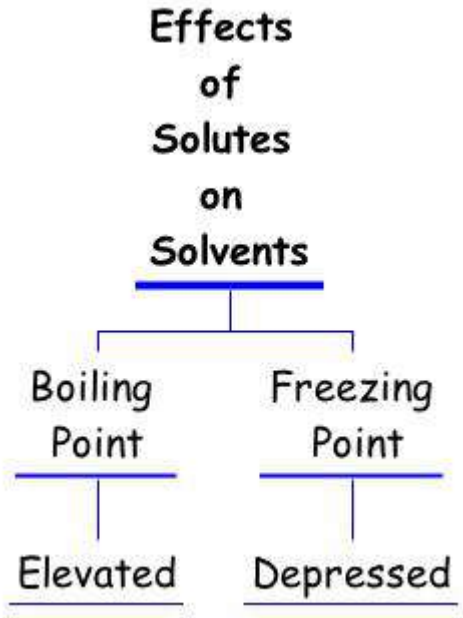
Dissociation

- The second way electrolyte solutions form is by the separation of ions in ionic compounds.
- **Dissociation** is the process in which positive and negative ions in an ionic solid mix with a solvent to form a solution.



Effects of Solute Particles

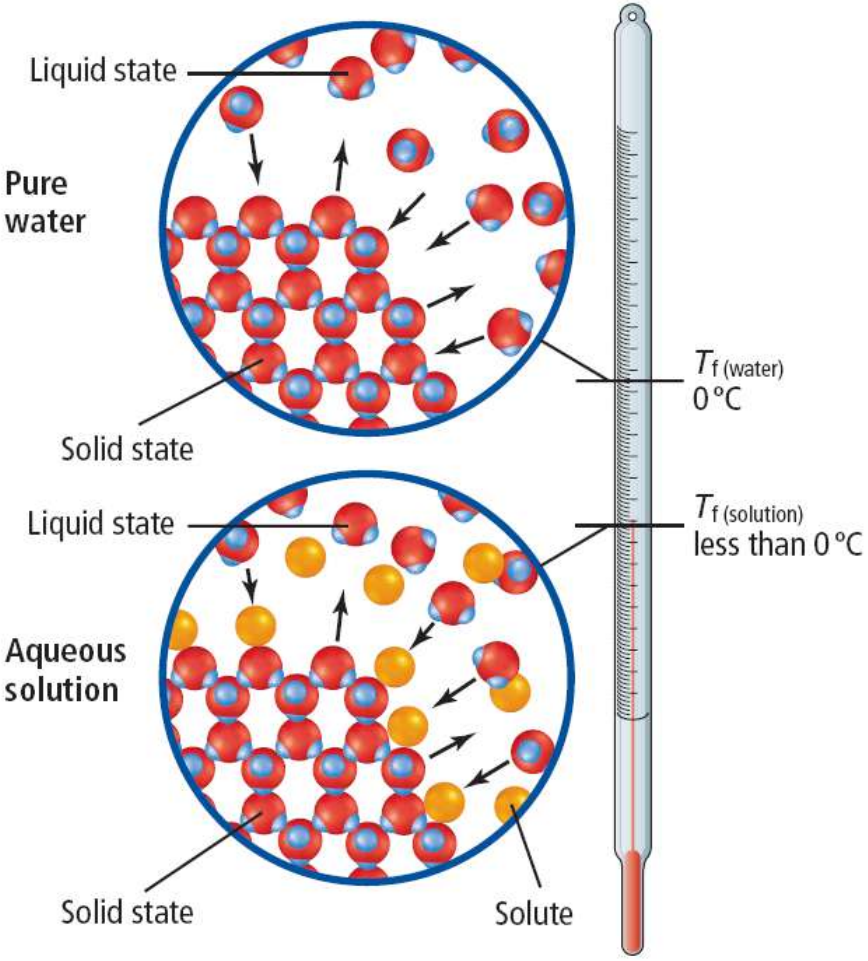
- All solute particles (polar, nonpolar, electrolyte, nonelectrolyte) affect the physical properties of the solvent
- The effect the solute has on a solvent depends on the number of solute particles in solution – not on the chemical nature of the particles.



Effects of Solute Particles

Lowering freezing point

- Adding a solute to a solvent lowers the freezing point of the solvent.
- The amount that the freezing point lowers depends on the concentration of the solute particles.
- A solute interferes with the formation of the solid pattern in a solvent, making it harder for the solvent to freeze
- This can be seen in nature – some animals increase the concentration of solutes in their tissues to prevent freezing in extreme conditions.



Effects of Solute Particles

Raising boiling point

- Similar to the freezing process, solute particles can interfere with the transition of a solvent from liquid to gas, raising the boiling point
- Solute particles interfere with the evaporation of solvent particles at the surface of the solution
- More energy is needed for the solvent particles to escape from the liquid surface.