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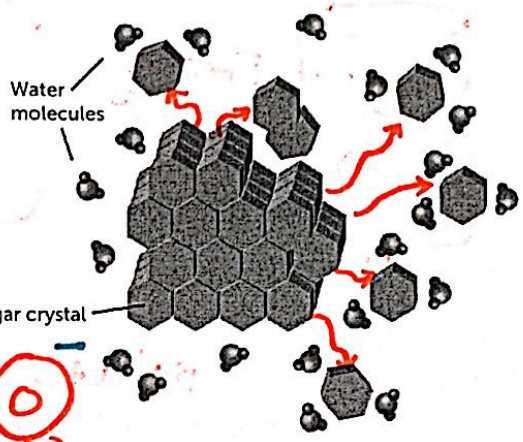
Unit 6: Properties of Ionic Solutions – Freezing and Boiling Points

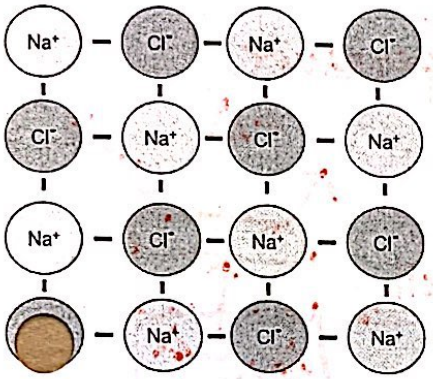
How do different substances dissolve?

How Sugar Dissolves in Water

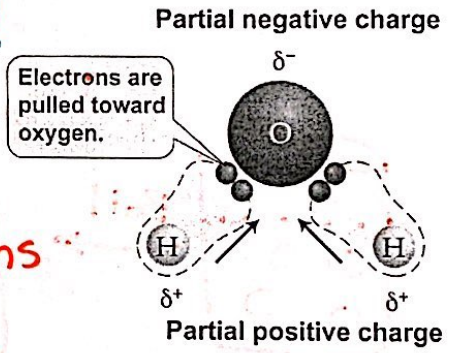


Dissolution: The process of dissolving. Most substances dissolve when water breaks the solute into individual **particles**. The water then surrounds the solute molecules.

Crystal Lattice of NaCl (table salt)



Water is **polar**, meaning one side is slightly **negatively** charged (Oxygen) and the other side is slightly **positively** charged (Hydrogens)



The **+** side of water is attracted to **−** ions in the salt crystal. The **−** side of water is attracted to the **+** ions in the salt crystal. The water pulls each salt ion out of its solid form until each ion is surrounded by water molecules (dissolved). This is called **dissolution**.

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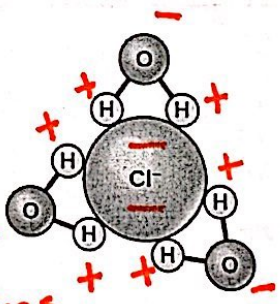
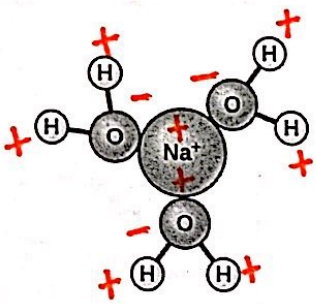




Key Point: Ionic – M + NM – Ions – Covalent – All NM's – No Ions

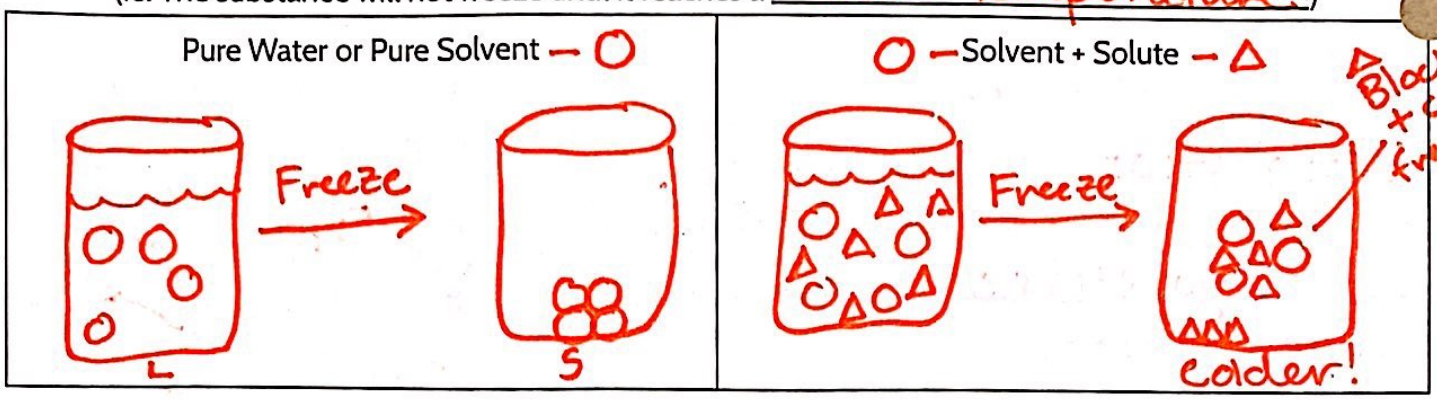
Practice: Determine if the substance is ionic. If so, identify the number of ions and charge of each ion.

Substance	Ionic or Not?	Ions and Charge of Ions
Sucrose ($C_{12}H_{22}O_{11}$)	Not	—
Aluminum Chloride ($AlCl_3$)	Ionic	$Al^{3+}\ Cl^{1-}\ Cl^{1-}\ Cl^{1-}$ = 4
Magnesium Bromide ($MgBr_2$)	Ionic	$Mg^{2+}\ Br^{1-}\ Br^{1-}$ = 3

$NaCl = Na^{+1}\ Cl^{1-}$ = 2

Freezing Point Depression

Description: Adding solute to a solvent will lower the freezing point.
(ie. The substance will not freeze until it reaches a lower temperature.)



Boiling Point Elevation

Description: Adding solute to a solvent will increase the boiling point.
(ie. The substance will not boil until it reaches a higher temperature)