Essential Question

What makes a mixture a solution?

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Homogeneous vs. Heterogeneous

- Homogeneous: same throughout (a solution)
- Heterogeneous: you can see different parts

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Solute and Solvent

- Solute: gets dissolved (less)
- Solvent: dissolves it (more)
- Solution = solute + solvent

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Aqueous Solutions and Other States

- Aqueous (aq): water is the solvent
- Water is the universal solvent
- Air, soda and brass are solutions too

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Solutions, Colloids, and Suspensions

- The difference is particle size

	Solution	Colloid	Suspension
Particles	ions, molecules	medium	large
Settles?	no	no	yes
Filter catches it?	no	no	yes
Scatters light?	no	yes	yes

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The Tyndall Effect

- Colloids scatter a light beam
- In a solution, the beam is invisible
- Tells a colloid from a solution

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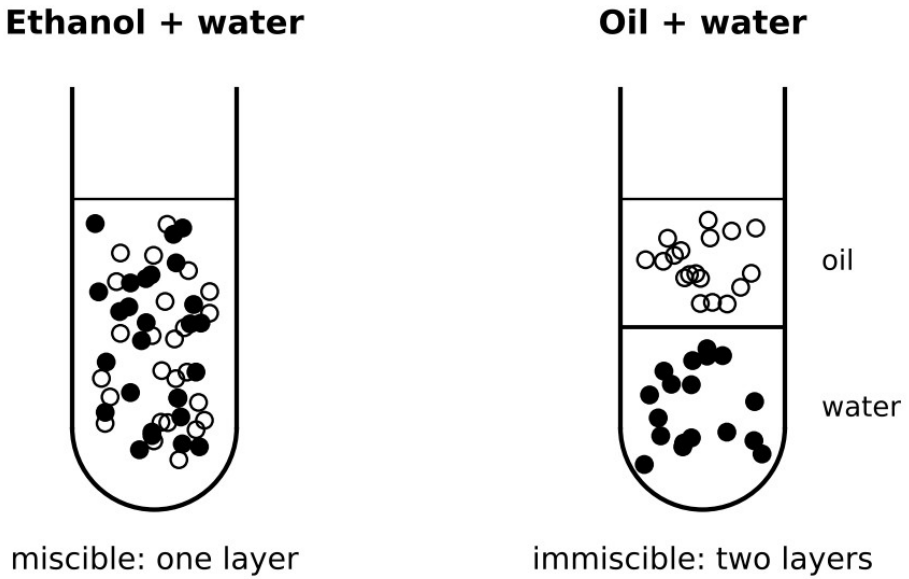
Like Dissolves Like

- Polar dissolves polar and ionic
- Nonpolar dissolves nonpolar
- Polar + nonpolar: they separate

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Miscible and Immiscible

- Miscible: liquids mix in any amount
- Immiscible: they form layers
- Solubility: how much dissolves
- Miscibility: whether liquids mix



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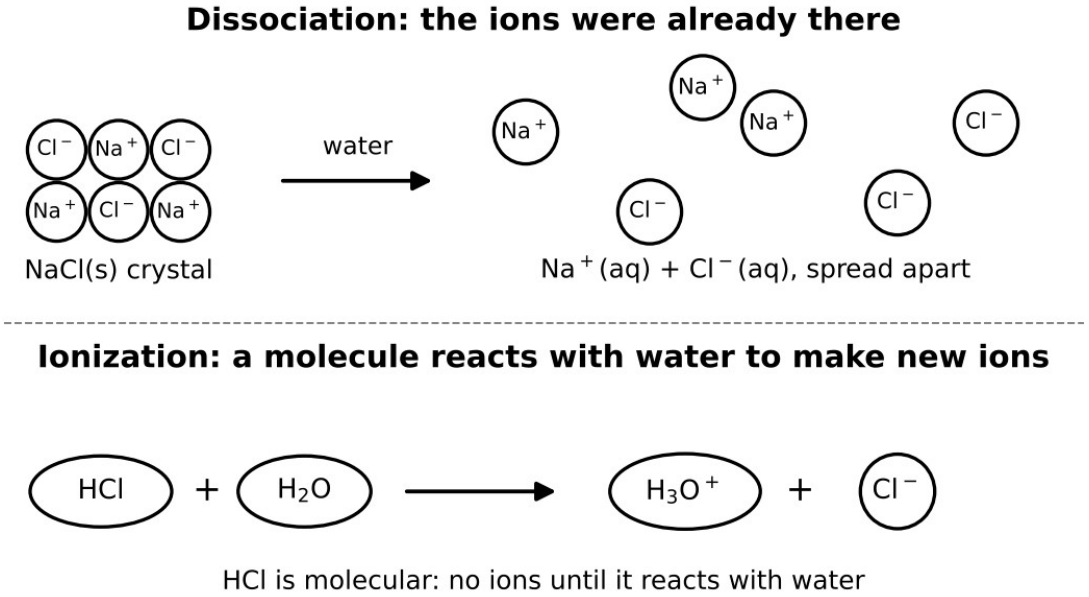
Dissolving Ionic Compounds

- Water pulls ions apart: dissociation
- O end (δ−) faces the cation
- H ends (δ+) face the anion
- Dissolution: the whole dissolving process

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Dissociation vs. Ionization

- Dissociation: ions already there
- Ionization: a molecule makes new ions
- $HCl + H_2O \rightarrow H_3O^+ + Cl^-$



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Electrolytes

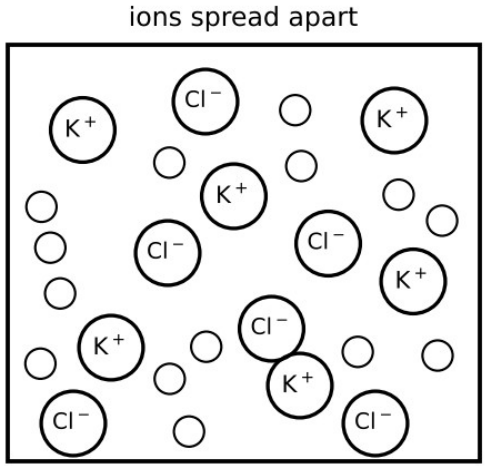
- Electrolyte: makes ions that conduct

Type	Examples	Bulb
strong	soluble ionic compounds, strong acids	bright
weak	weak acids, weak bases	dim
non	most molecular compounds	off

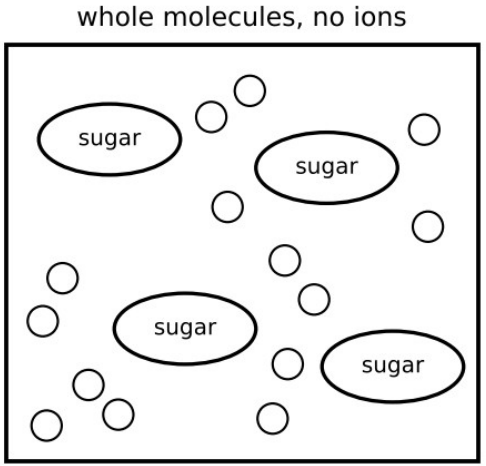
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Particle Diagrams

- Ionic solute: ions spread apart
- Molecular solute: whole molecules
- Only the ions conduct



KCl(aq)



$C_{12}H_{22}O_{11}(aq)$, sucrose

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Speeding Up Dissolving

- Stir, heat, or crush: dissolves faster
- Stirring and crushing: faster, not more
- Heating a solid solute: more can dissolve

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Example: Classify the Mixture

A liquid looks milky. After a day, nothing has settled out. A flashlight beam is visible as it passes through. Is it a solution, colloid, or suspension?

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Example: Like Dissolves Like

Will iodine, I_2, dissolve better in water or in hexane, C_6H_{14}? Explain using polarity.

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Example: Classifying Electrolytes

Classify each as a strong electrolyte, weak electrolyte, or nonelectrolyte: a) KCl, b) $C_{12}H_{22}O_{11}$ (sugar), c) $HC_2H_3O_2$ (acetic acid).

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Characteristics of Solutions

Big Ideas

- A solution is a homogeneous mixture
- The solvent dissolves the solute
- Like dissolves like (polarity)
- Miscible liquids mix; immiscible liquids layer
- Ions in water make electrolytes

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