ANSWER KEY.

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Characteristics of Solutions

Chemistry | ANSWER KEY

Use the lesson's ideas: particle size, polarity (like dissolves like) and ions in water. Write full sentences where a question asks you to explain.

1. Name the solute and the solvent in each solution. The first row is done for you.

Solution	Solute(s)	Solvent
salt water	salt	water
air	**oxygen, argon, other gases**	**nitrogen (about 78%)**
brass (zinc in copper)	**zinc**	**copper**
rubbing alcohol: 70% isopropyl, 30% water	**water**	**isopropyl alcohol (more of it)**

2. Three cloudy or clear liquids are tested. Name each type of mixture. The first row is done for you.

Sample	Settles?	Filtered out?	Scatters a light beam?	Type of mixture
A	yes	yes	yes	suspension
B	no	no	no	**solution**
C	no	no	yes	**colloid** (Tyndall effect)

Settling and filtering split out suspensions; the light beam splits colloids from solutions.

3. Use like dissolves like. Two liquids that mix in any amount are **miscible**; liquids that form layers are **immiscible**. The first row is done for you.

Pair	Polar, nonpolar or ionic?	Dissolves (or mixes)?
NaCl in water	ionic + polar	yes, it dissolves
NaCl in hexane	**ionic + nonpolar**	**no**
ethanol and water	**polar + polar**	**yes: miscible**
candle wax in hexane	**nonpolar + nonpolar**	**yes, it dissolves**
water and cyclohexane	**polar + nonpolar**	**no: immiscible, two layers**

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4. Explain the difference between **solubility** and **miscibility**.

Sentence frame: *Solubility tells _____, but miscibility tells _____.*

Solubility tells how much of a solute can dissolve in a solvent; miscibility tells whether two liquids mix in any amount.

Both follow polarity: like dissolves like.

5. Classify each solute as a strong electrolyte, weak electrolyte, or nonelectrolyte. The first one is done for you.

Solute	Type	Solute	Type
$MgCl_2$	strong electrolyte	NH_3	**weak electrolyte**
HCl	**strong electrolyte**	glucose, $C_6H_{12}O_6$	**nonelectrolyte**
KNO_3	**strong electrolyte**	ethanol, C_2H_5OH	**nonelectrolyte**

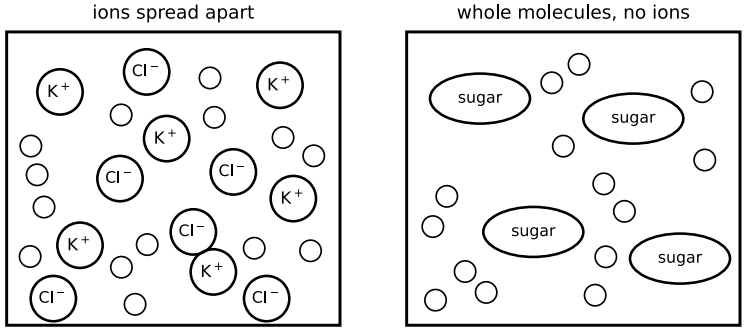
6. Complete each equation. (a) $CaCl_2(s) \rightarrow$ (b) $K_2SO_4(s) \rightarrow$ (c) $HCl(g) + H_2O(l) \rightarrow$

(d) Which one is **ionization**, not dissociation? Explain.

(a) **$Ca^{2+}(aq) + 2Cl^-(aq)$** (b) **$2K^+(aq) + SO_4^{2-}(aq)$** (c) **$H_3O^+(aq) + Cl^-(aq)$**

(d) **(c). HCl is molecular, so it has no ions until it reacts with water and makes new ones. $CaCl_2$ and K_2SO_4 are ionic: water only separates ions that were already in the crystal.**

7. In each box, draw about 6 solute particles dissolved in water. Then explain which solution lights a conductivity tester.



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

KCl lights the tester: its ions spread apart and carry charge. Sucrose stays as whole molecules, so it makes no ions.

8. (a) When salt dissolves, which end of a water molecule faces each Na^+ ion, and which faces each Cl^- ion? Why? (b) Stirring, crushing, and heating all help sugar dissolve in tea. Which one also lets *more* sugar dissolve?

(a) **The partly negative oxygen end faces Na^+; the partly positive hydrogen ends face Cl^-. Opposite charges attract.**

(b) **Heating. Stirring and crushing only make sugar dissolve faster.**

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