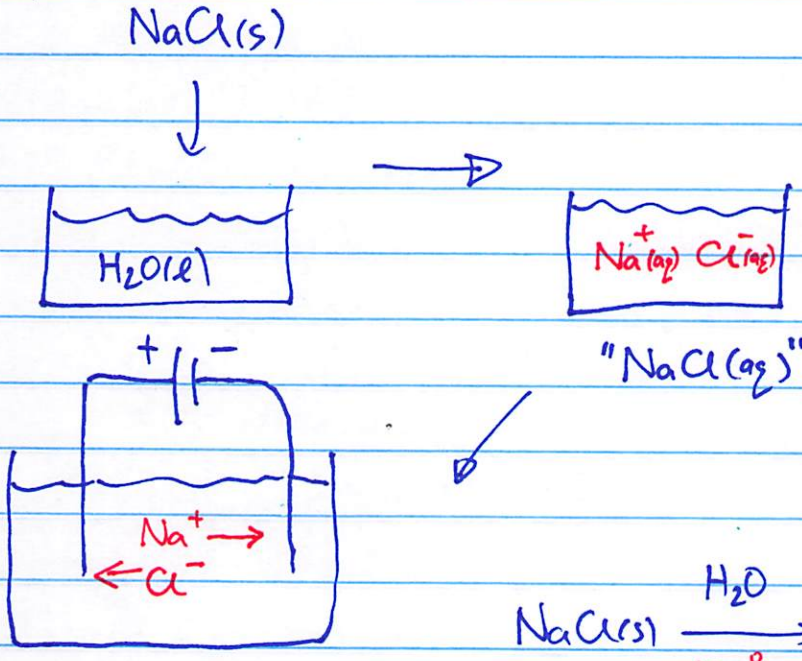
9/30/2019

Electrolytes

- dissolve in H_2O + form conductive (aq) soln!
- normally ionic compounds.

WHY?



$$NaCl(s) \xrightarrow[100\%]{H_2O} Na^+(aq) + Cl^-(aq)$$

Non-electrolytes

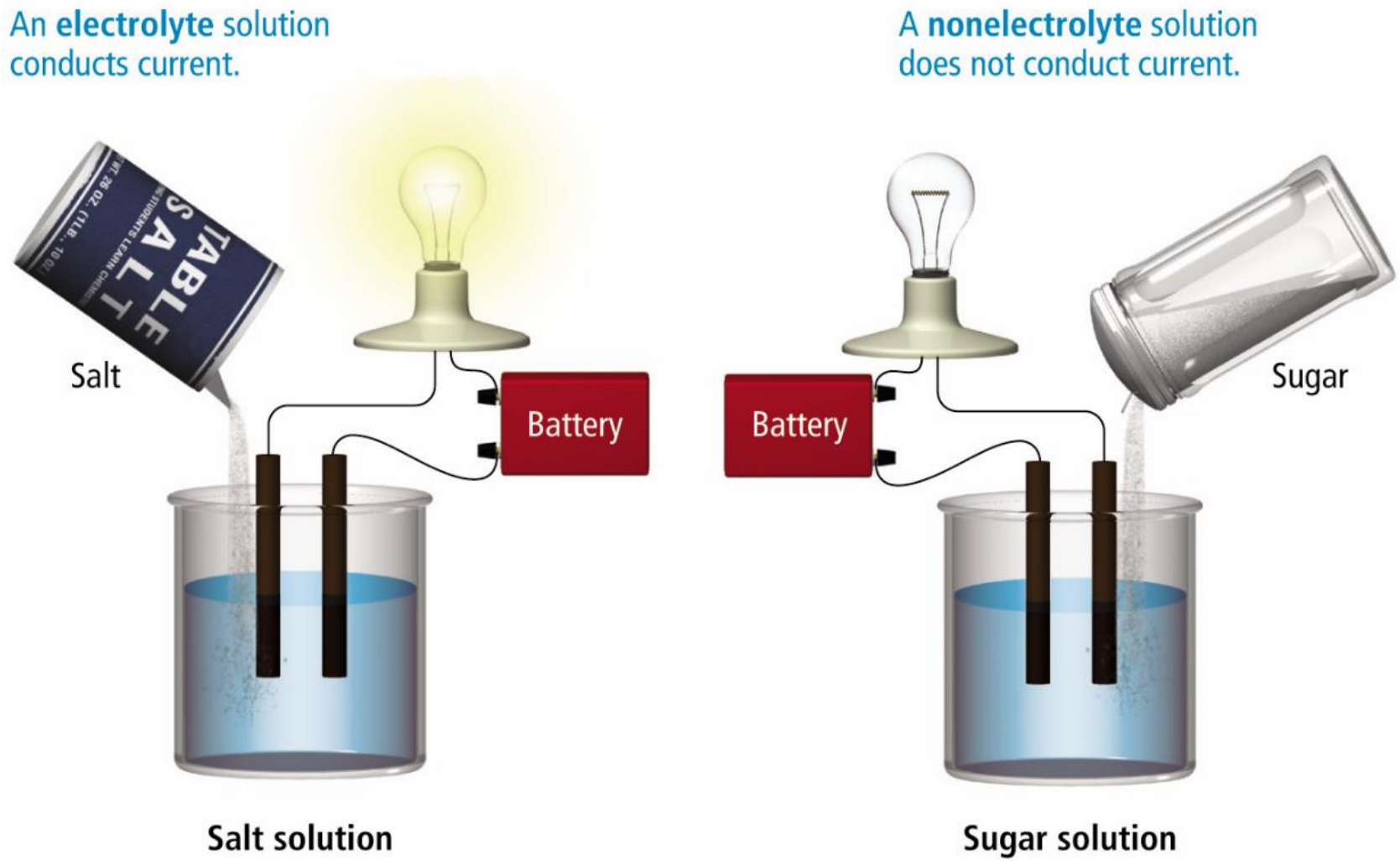
- dissolve in H_2O, but don't conduct.
  (so are not making ions)

ex: $CH_2O(l) \xrightarrow{H_2O} CH_2O(aq)$

formaldehyde (no ions!) (doesn't conduct)

other molecules that do this. sugar, alcohol

Electrolyte and Nonelectrolyte Solutions



Some substances dissolve, but conduct poorly
ex: acetic acid (in vinegar)

WHY?

97% 3%

$CH_3CO_2H(aq) \rightleftharpoons CH_3CO_2^-(aq) + H^+(aq)$

acetic acid acetate ion hydrogen ion

WEAK electrolytes ... <100% ionization/dissociation

most "weak acids" are "weak electrolytes"
"strong acids" are "strong electrolytes"
└ ≈100% ionization

Solubility of ionic cpds

- set of rules that allow to predict SOLUBILITY.

SOL/INSOL:	Li_3PO_4	$AgBr$	$CaCO_3$	CaS	Na_2SO_4
	SOL	INSOL	INSOL	SOL	SOL
	$Li_3PO_4(aq)$	$AgBr(s)$	$CaCO_3(s)$	$CaS(aq)$	$Na_2SO_4(aq)$
	$3Li^+(aq)$ $PO_4^{3-}(aq)$			$Ca^{2+}(aq) + S^{2-}(aq)$	$2Na^+(aq)$ $SO_4^{2-}(aq)$

TABLE 5.1 ■ Solubility Rules for Ionic Compounds in Water

Compounds Containing the Following Ions Are Generally Soluble	Exceptions
Li^+, Na^+, K^+, and NH_4^+	None
NO_3^- and $C_2H_3O_2^-$	None
Cl^-, Br^-, and I^-	When these ions pair with Ag^+, Hg_2^{2+}, or Pb^{2+}, the resulting compounds are insoluble.
SO_4^{2-}	When SO_4^{2-} pairs with Sr^{2+}, Ba^{2+}, Pb^{2+}, Ag^+, or Ca^{2+}, the resulting compound is insoluble.
Compounds Containing the Following Ions Are Generally Insoluble	**Exceptions**
OH^- and S^{2-}	When these ions pair with Li^+, Na^+, K^+, or NH_4^+, the resulting compounds are soluble. When S^{2-} pairs with Ca^{2+}, Sr^{2+}, or Ba^{2+}, the resulting compound is soluble. When OH^- pairs with Ca^{2+}, Sr^{2+}, or Ba^{2+}, the resulting compound is slightly soluble.
CO_3^{2-} and PO_4^{3-}	When these ions pair with Li^+, Na^+, K^+, or NH_4^+, the resulting compounds are soluble.

Precipitation rxns

... when we mix 2 aq. soln's together + form a SOLID
(precipitate (ppt))

ex: $2KI(aq) + Pb(NO_3)_2(aq) \longrightarrow PbI_2(s)\downarrow + 2KNO_3(aq)$

ppt

PbI_2: insoluble

KNO_3: SOLUBLE

How do we predict rxn?

DOUBLE-REPLACEMENT rxns!

- swap cation-anion partners!

$2KI(aq) + Pb(NO_3)_2(aq) \longrightarrow PbI_2(s) + 2KNO_3(aq)$

1. ID cat+ anions.

K^+ I^- Pb^{2+} NO_3^- NO_3^-

Pb^{2+} I^- (2) K^+ NO_3^- (1)

2. Swap

3. Write formulas

4. Balance eq.

5. Sol. rules.