



# Annotated Lecture Slides for *Sugar and Salt Solutions*

## **LECTURE DEMO TITLE**

Electrolyte and Non-electrolyte Solutions

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## **COURSE**

Introductory / Preparatory College Chemistry

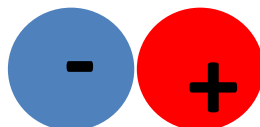
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# Learning goals

- Explain the difference between electrolytes and nonelectrolytes in terms of conductivity, the nature of the compound, and dissociation.
- Describe and visualize what happens at the atomic or molecular scale when an electrolyte or a nonelectrolyte dissolves in water

# Ionic Compounds

- Form from the *electrostatic* interaction between cations and anions.
- *Electrostatic forces*: attraction/repulsion between charged particles.



- Ionic compounds form between metals and nonmetals.

# Which compound is ionic?

A. CO

B.  $\text{MgF}_2$

C.  $\text{Al}_2\text{O}_3$

D. Both CO and  $\text{MgF}_2$

E. Both  $\text{MgF}_2$  and  $\text{Al}_2\text{O}_3$

# Which compound is ionic?

- A. CO
- B.  $\text{MgF}_2$
- C.  $\text{Al}_2\text{O}_3$
- D. Both CO and  $\text{MgF}_2$

E. Both  $\text{MgF}_2$  and  $\text{Al}_2\text{O}_3$

The periodic table is color-coded: grey for metals and pink for non-metals. Sodium (Na) and Chlorine (Cl) are highlighted with orange boxes. The legend at the bottom shows a grey square for 'Metal' and a pink square for 'Non-metal'.

H																				He
Li	Be											B	C	N	O	F	Ne			
Na	Mg											Al	Si	P	S	Cl	Ar			
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr			
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe			
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn			
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn									

A metal combined with a non-metal make an “ionic compound”.

*(Next 3 slides)*

# **BENCHTOP DEMONSTRATION**

Beaker Contents	Conductivity Observations
Unknown 1	
Unknown 2	
Water	

Beaker Contents	Conductivity Observations
Unknown 1	No conductivity
Unknown 2	High conductivity
Water	Distilled (pure) water: No conductivity Tap water: Some conductivity



# Which solution is which?

- A. 1 is sugar and 2 is salt
- B. 2 is sugar and 1 is salt
- C. Both are sugar
- D. Both are salt

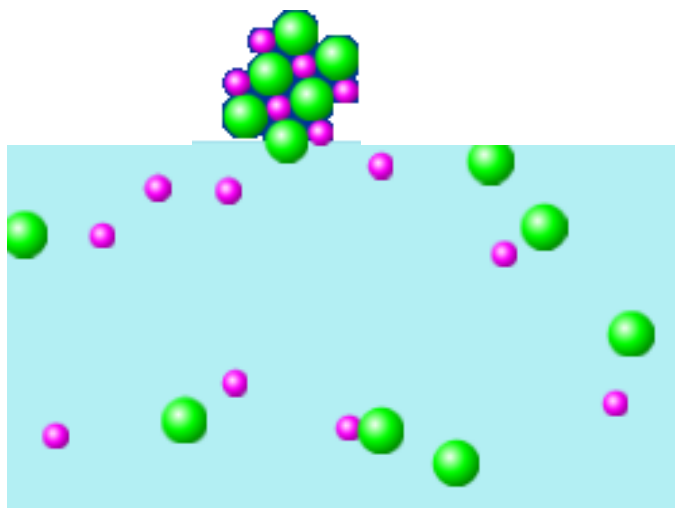
# Electrolytes and Nonelectrolytes

- **Electrolytes**
  - conduct electricity
  - substances that release ions when dissolved in water
    - This process is also called **dissociation** or **ionization**
- **Nonelectrolytes**
  - substances that do NOT dissociate in water
  - do NOT conduct electricity

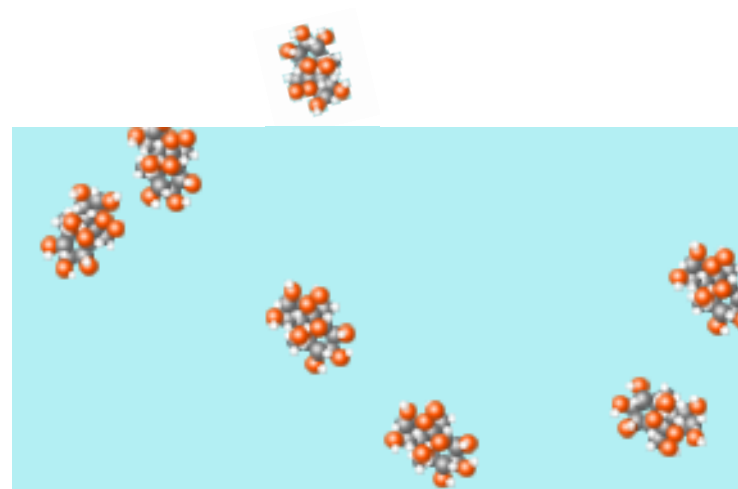
Ionic compounds (if they dissolve in water) are always electrolytes.  
*Most* molecular compounds are nonelectrolytes.

If the atom-scale view of a compound in water looks like the picture on the right (II.), you might categorize the compound as...

I.



II.

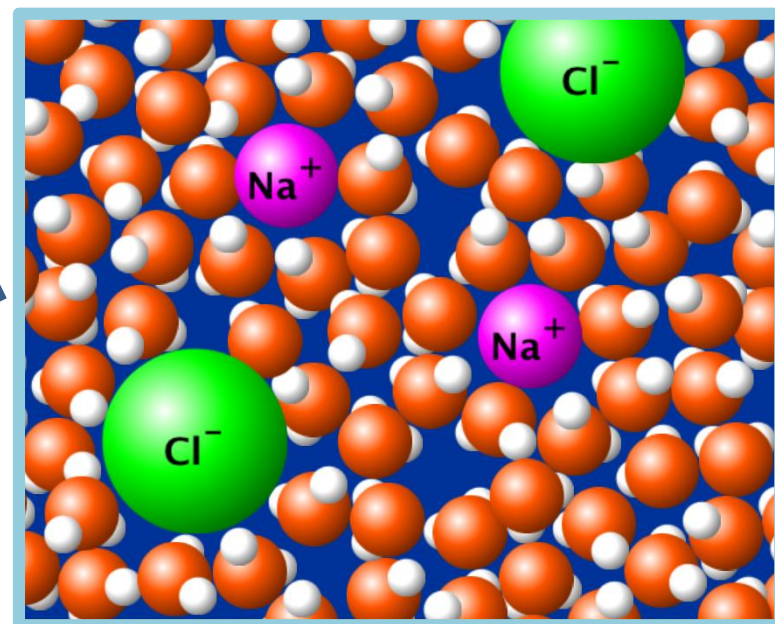
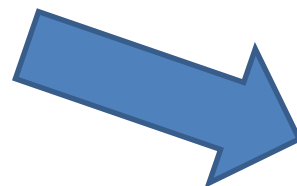
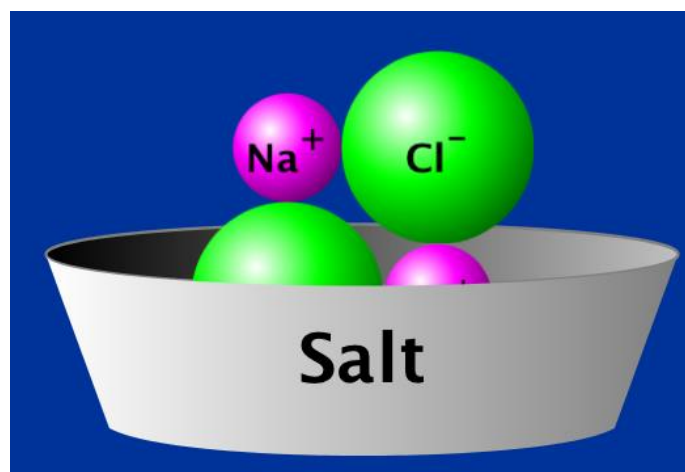
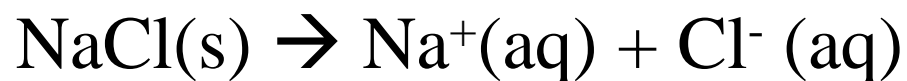


a. Ionic

b. Molecular

c. Neither

# Ionic Compound Example



## Key features of ionic solid:

- Repeated units in larger lattice
- Units are made of charged ions