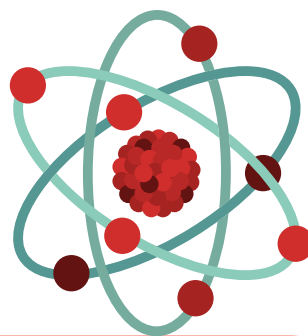




MINI- MODULE 3: IONS – HOW ARE THEY FORMED?



Learning Goals

By the end of this module, I should be able to:

- ✓ Describe what ions are and how they're formed
- ✓ Differentiate between cations and anions
- ✓ Use Lewis Electron Dot Symbols (LEDS) to show electron transfer
- ✓ Write the correct chemical formula for ionic compounds




Read & Learn: What Are Ions?

 Ions are atoms that have lost or gained electrons to become charged.

Atoms want a full outer shell (usually 8 electrons = the octet rule) to be stable.

Type of Ion	What Happens	Charge	Example
Cation	Atom loses electron(s)	Positive (+)	Na ⁺ , Ca ²⁺
Anion	Atom gains electron(s)	Negative (-)	Cl ⁻ , O ²⁻

EXAMPLE: SODIUM (NA) + CHLORINE (CL)

- Sodium (metal) loses 1 electron → becomes Na^+
- Chlorine (nonmetal) gains 1 electron → becomes Cl^-
-  Result: They form the ionic compound NaCl (table salt)

LEWIS ELECTRON DOT SYMBOLS (LEDS)

LEDS uses dots to show valence electrons around the atomic symbol.

Example:

$\text{Na} \cdot \rightarrow$ loses 1 electron $\rightarrow \text{Na}^+$

$\cdot \text{Cl} \cdot \rightarrow$ gains 1 electron $\rightarrow \text{Cl}^-$

LET'S PRACTICE: PROPERTIES OF IONIC VS COVALENT

Write I for Ionic and C for Covalent:

1. ____ Conducts electricity in water
2. ____ Shares electrons between atoms
3. ____ Forms between a metal and nonmetal
4. ____ Usually has low melting point
5. ____ Hard and brittle

ACTIVITY TIME!

◆ 1. Cation or Anion?

Fill in the chart:

Element	Metal/Nonmetal	Gain or Lose?	Ion Formed
Sodium (Na)	Metal	Lose	Na ⁺
Fluorine (F)	Nonmetal	Gain	---
Calcium (Ca)	---	---	---
Oxygen (O)	---	---	---

◆ 2. Build-a-Bond

Choose one metal and one nonmetal from below:

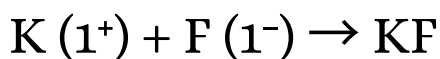
 Metals: K, Na, Ca, Al, Mg

 Nonmetals: Cl, Br, O, S, F

Write:

- LEDES for both elements
- Ions they form
- Final chemical formula using the crisscross method

Example:



◆ 3. VALENCE CHECK

Determine the valence electrons and whether the element will gain or lose electrons:

Element	Valence e ⁻	Gain or Lose?	Ion Symbol
N	5	---	---
Mg	---	---	---
Cl	---	---	---
Al	---	---	---

✓ Self-Check

- I know the difference between cation and anion
- I can draw a Lewis structure
- I can write chemical formulas for ionic compounds
- I can explain how ions form using real examples



MINI-QUIZ

What type of ion gains electrons?

- A. Cation
- B. Anion
- C. Proton
- D. Neutron

Which of the following is an example of a cation?

- A. Cl^-
- B. O^{2-}
- C. Na^+
- D. F^-

What is the charge on a calcium ion (Ca)?

- A. +1
- B. -1
- C. +2
- D. -2

Which method is used to determine subscripts in an ionic formula?

- A. LEDES
- B. Dot Method
- C. Bohr Model
- D. Crisscross

What is the correct formula for magnesium chloride?

- A. MgCl
- B. MgCl_2
- C. Mg_2Cl
- D. Mg_2Cl_2