WHAT IS THE UNIT OBJECTIVE?

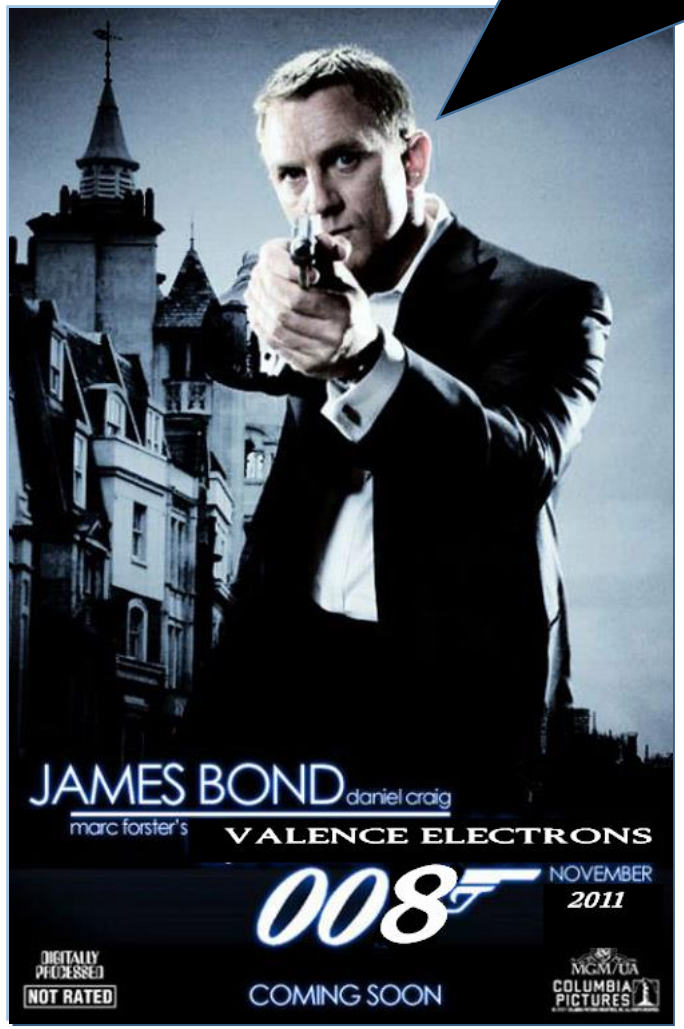

FIGURE OUT HOW & WHY ELEMENTS COMBINE

U6 Bonding – Day 1

Ionic Bonding

WHY BONDING?

Noble Gas atoms are stable because their outer ***s*** and ***p*** orbitals are filled by a total of **8 e$^-$s**.

Other elements have to bind with other elements to fill their ***s* and *p* orbitals**.

They try to fill **THE OCTET RULE: chemical compounds tend to form so that atoms *(by gaining, losing, or sharing)* have 8 e$^-$s in their outer E level**

WHY BONDING?

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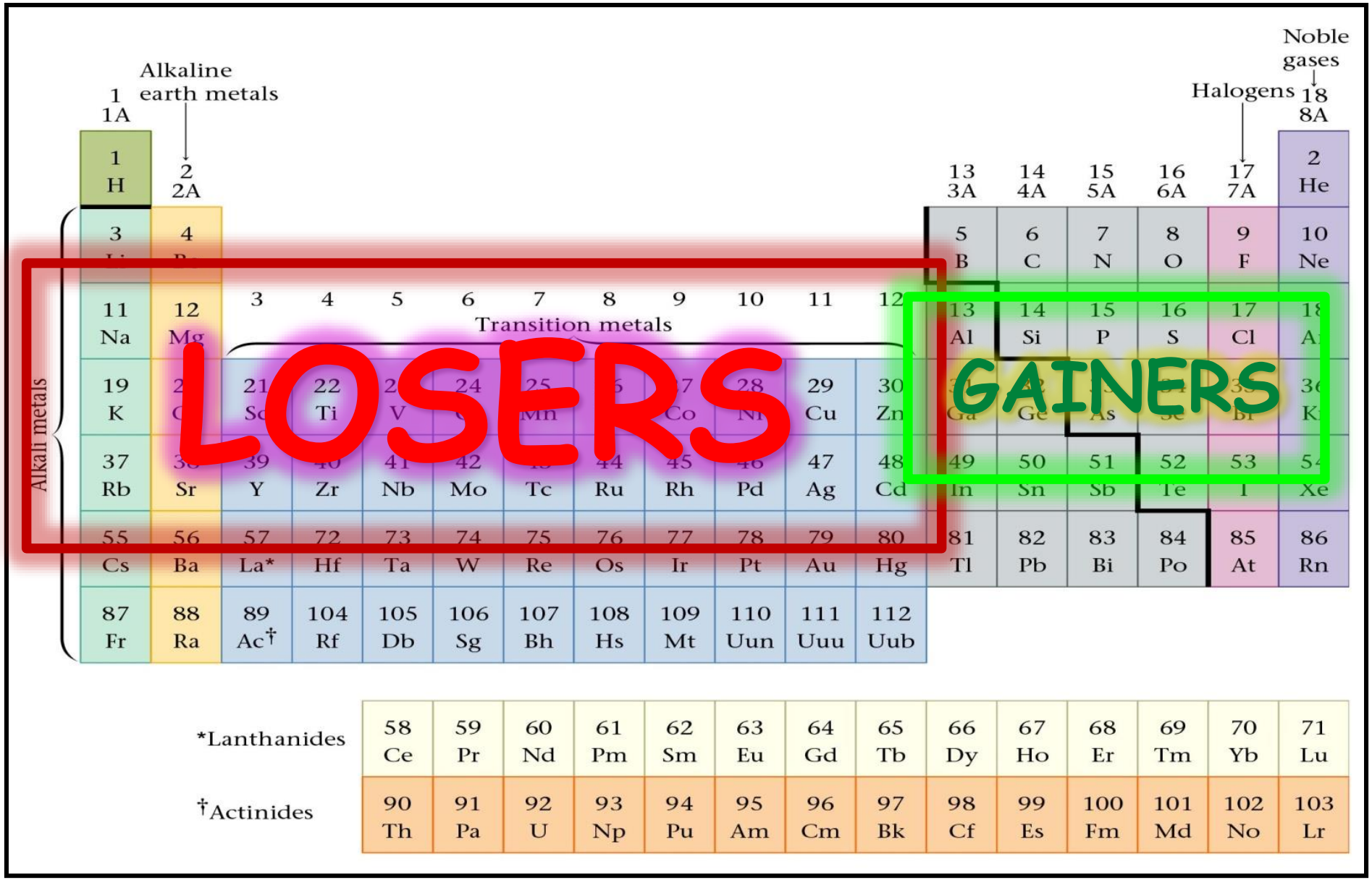
Remember the Trends…



EXCEPTIONS TO THE RULE

H and He: need only **2 e⁻s** to fill their shell

B and Be: tend to form bonds so it has **6** e⁻s around it

Elements w/ a "d" orbital

Elements past row 2 can use d-orbitals for bonding, which allows for bonding with **MORE** than 8 e⁻s

e^- DOT NOTATION

Valence e^-s: the e^-s that are in the outermost shell

How do you know how many valence e^-s an element has?

If it is *s* or *p* block, the group # tells you how many valence e^-s it has. *If it is not s or p block, it can vary.*

e^- dot notation: a way to write an element showing the valence e^-s on the **outside**

How do I draw a Lewis Dot Diagram? (for single atom)

*For a **SINGLE** atom:*

Step 1: Determine the # of valence e^-

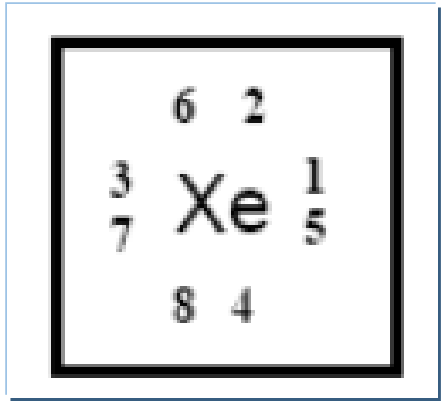
***Recall**: On "**old school**" P.T. the **group #** tells you the # of e^- (except transition metals)*

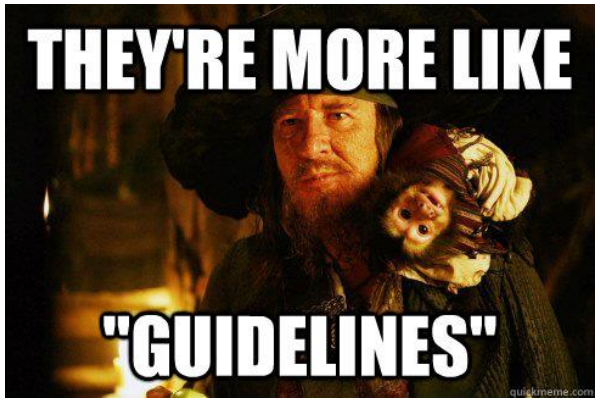
*On "**new school**" P.T. groups 1 & 2 have 1 & 2 valence e^-. For groups 13-18, the # of valence e- is the 2nd # of the group #.*

*ex. Group 1**4** has **4** valence e-*

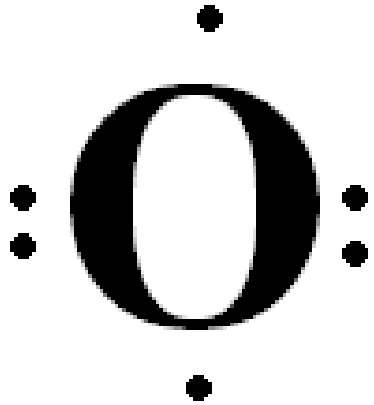
Step 2: Draw the diagram

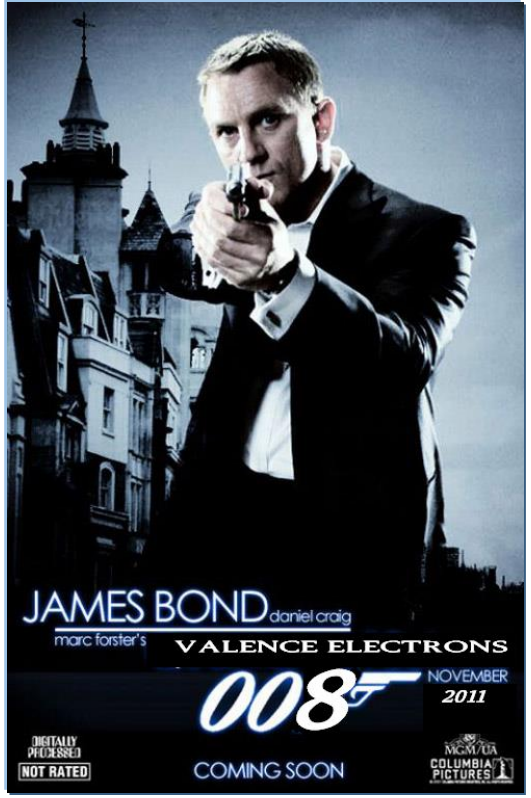
+ Order of dots:





Ex. Oxygen (O), Group 16 = ___ valence e^-





I WANT YOU TO MEET A FRIEND OF MINE

Bonding: the way atoms are attracted to each other to form **molecules**

- Determines nearly all of the chemical properties we see

Types of Chemical Bonds

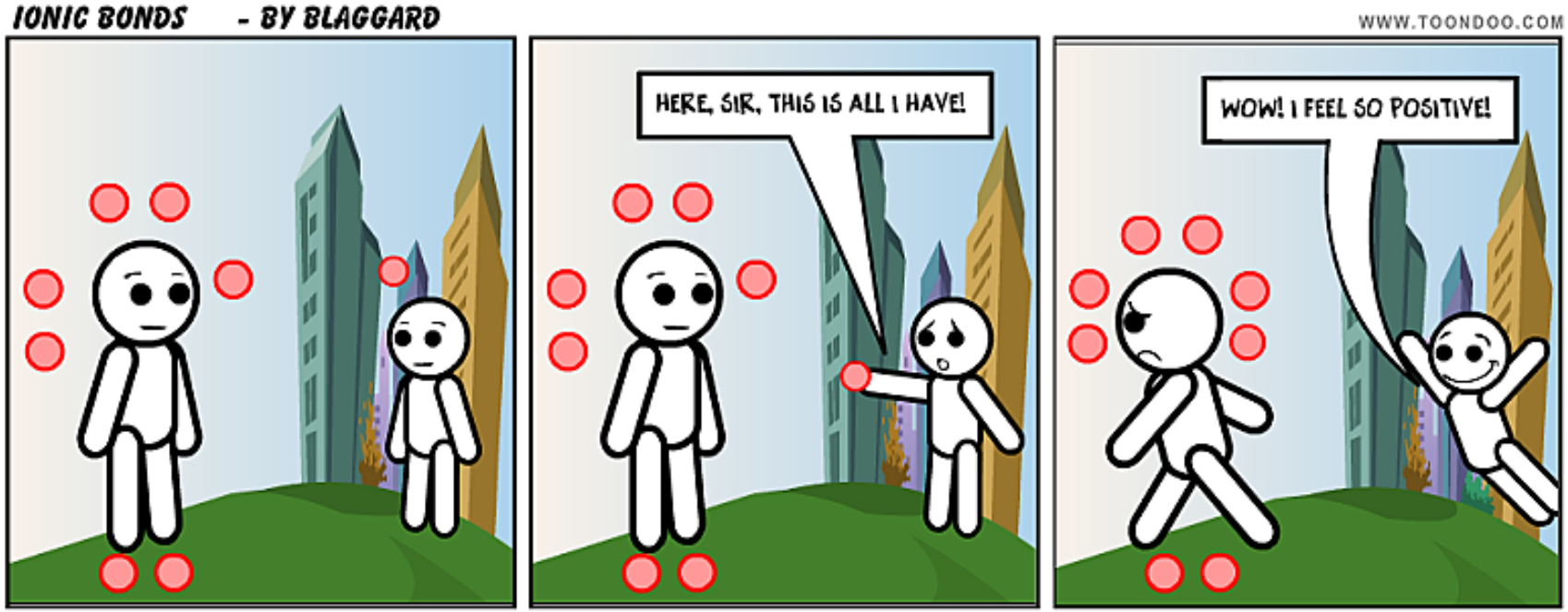
IONIC

COVALENT

METALLIC

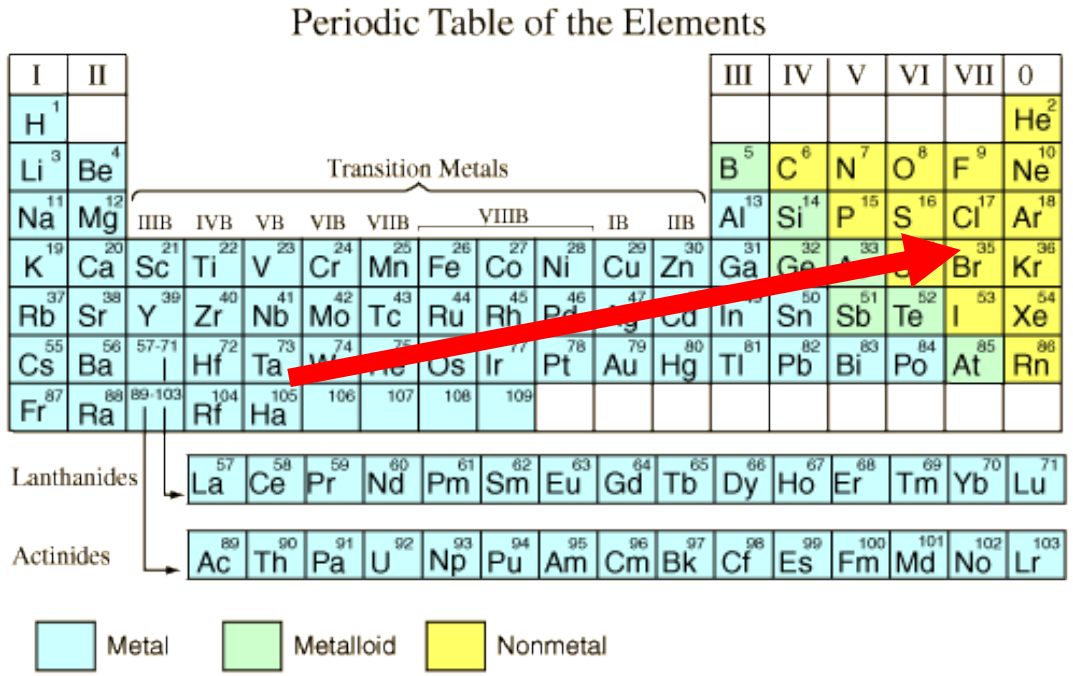
IONIC BONDS

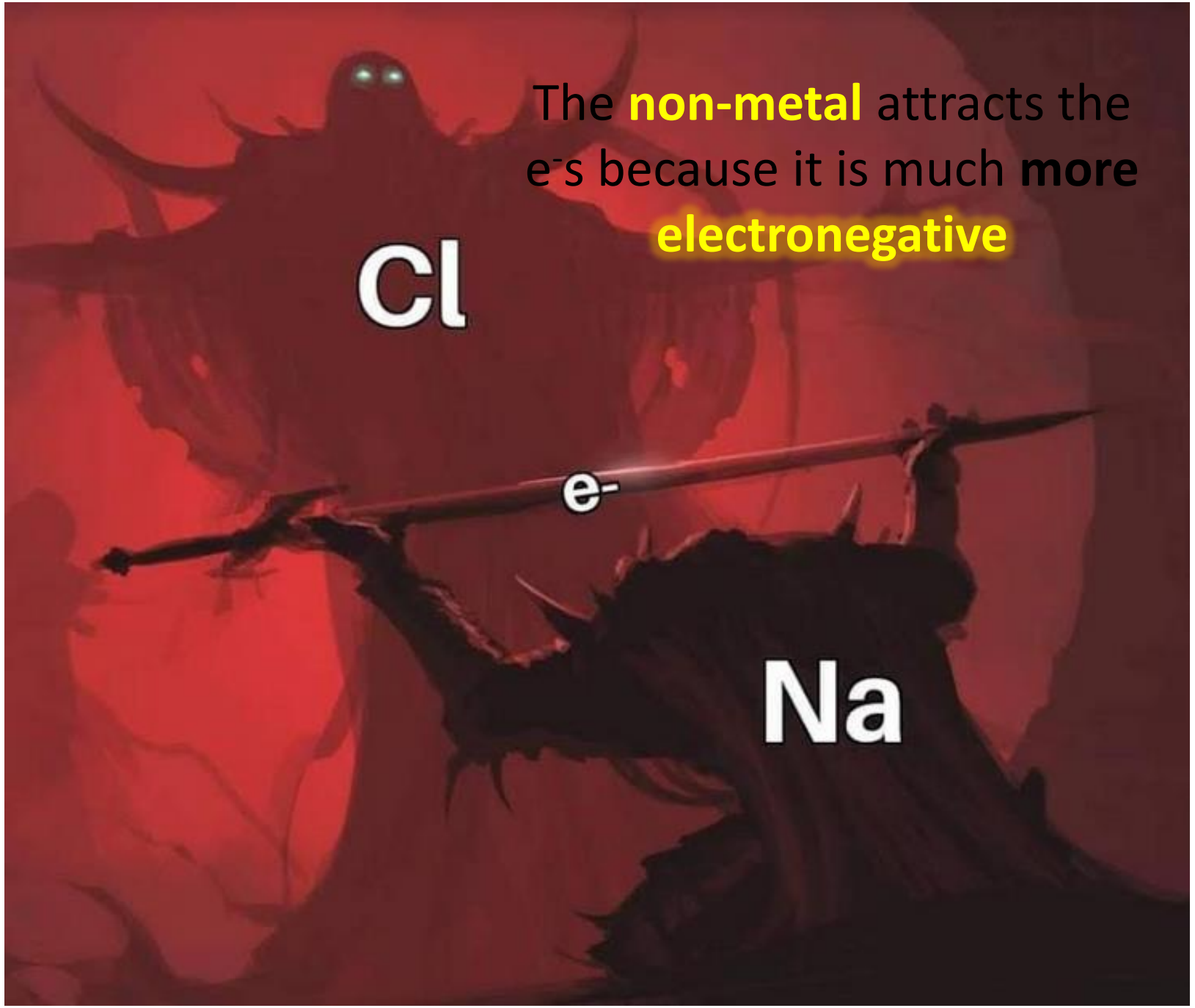
- **Ionic Bonds** are **electrostatic forces** that bind **metals** and **non-metals**
- *Ionic Bonds form between a **positive ion** **(cation)** and a **negative ion** **(anion)***



IONIC BONDS

- Are formed by the **electrostatic attraction** between **positive** and **negative** ions after the **transfer** of an electron **from** a metal **to** a nonmetal




The non-metal attracts the e⁻s because it is much more electronegative
Cl
e-
Na

RECALL

Electronegativity

Power to Attract Electrons

High Electronegativity

Highly reactive because of their strong tendency to capture electrons.

Fluorine 4.0

Oxygen 3.44

Highly reactive because they yield electrons easily.

Rb 4.18 eV

Cs 3.89 eV

Low Ionization Energy

Periodic Table of the Elements

Transition Metals

Lanthanides

Actinides

Metal

Metalloid

Nonmetal

The highly reactive corners of the Periodic Table

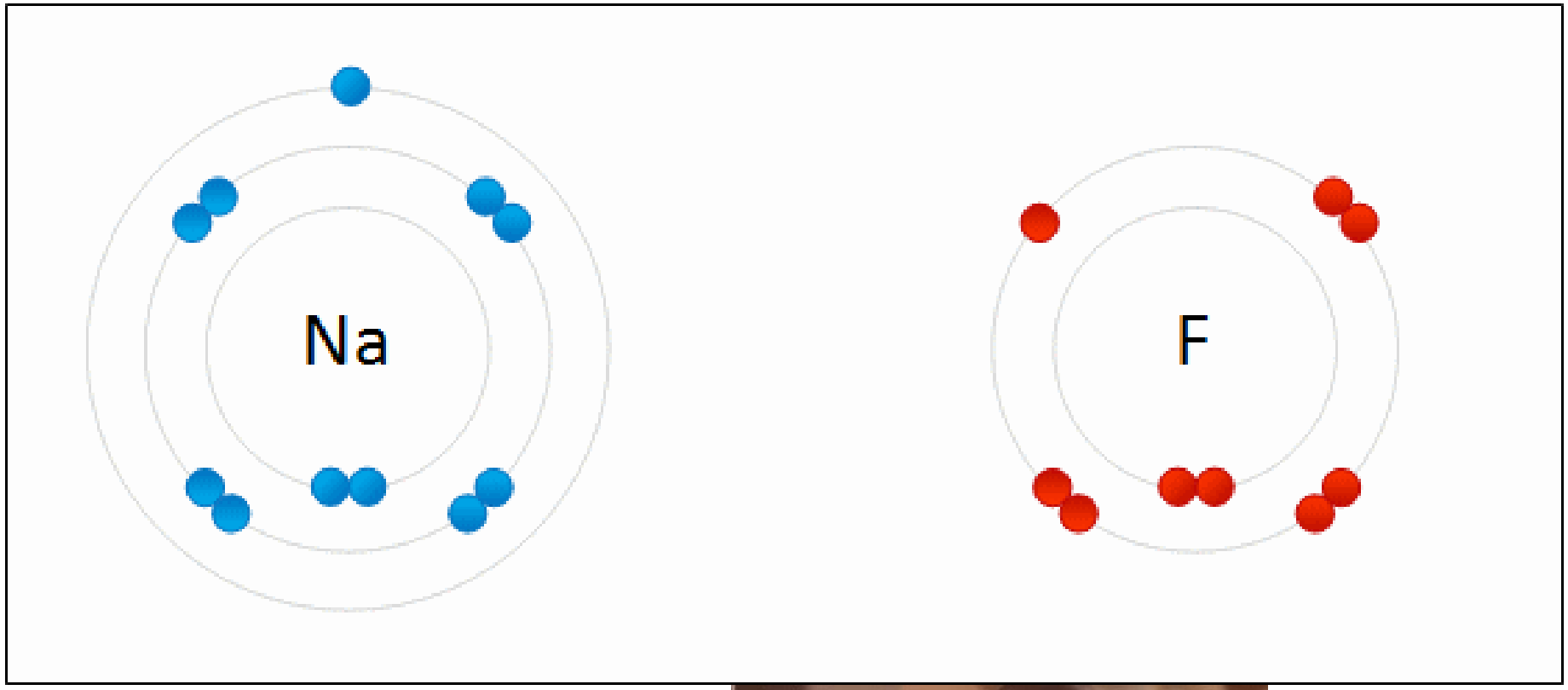
What is a chemical formula of an ionic compound?

ONE WAY: Use the Lewis Dot Structure to determine formula….. Ex: Sodium Fluoride

Step 1: Draw the Lewis Dot Structure of each atom

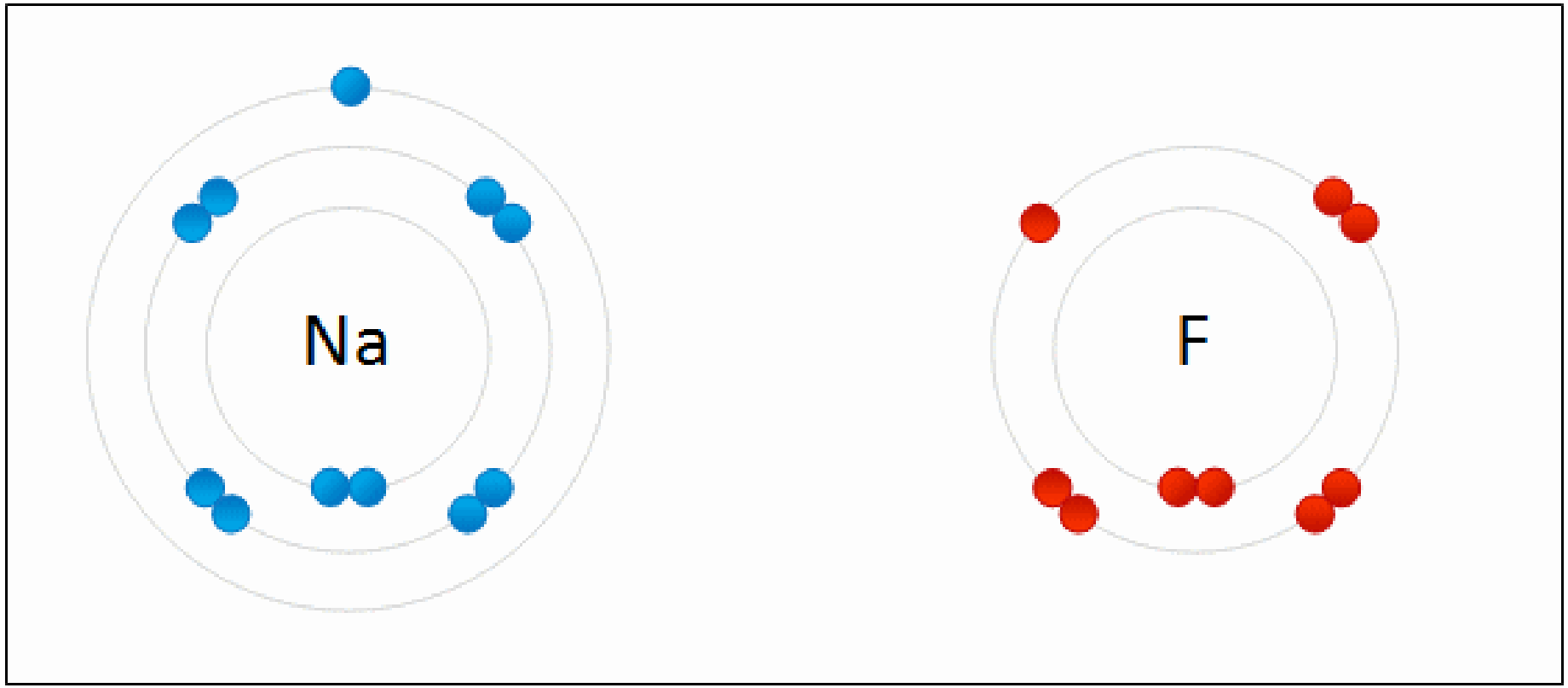
Na **F**

Step 2 : Draw arrows & move electrons to fulfill the Octet Rule



Make sure you only write the **VALENCE** e-s

Step 3: Add brackets &charges to designate ionic



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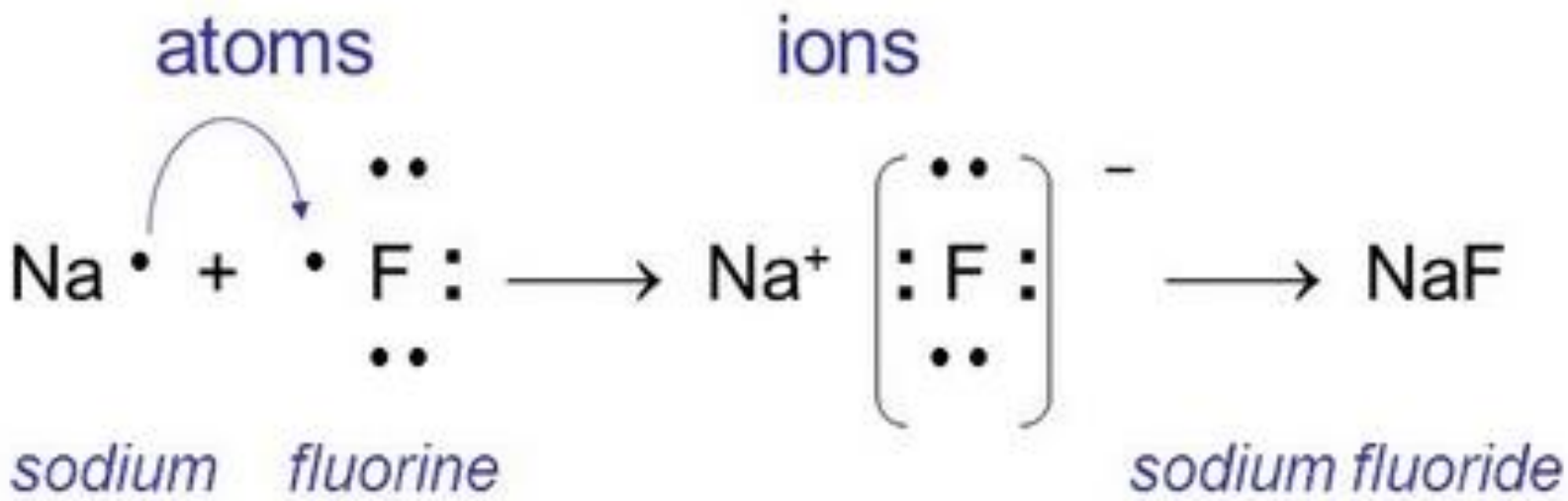
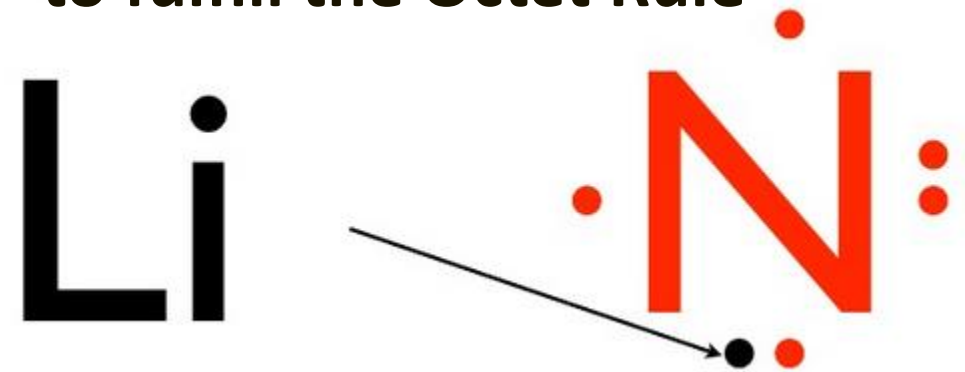

atoms
ions
Na + F
Na+ F
NaF
sodium
fluorine
sodium fluoride

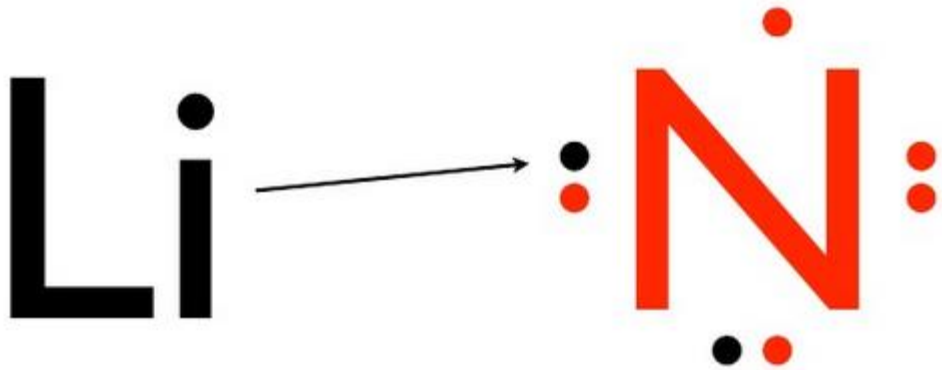
Write the chemical formula for Lithium Nitride

Step 1: Draw the Lewis Dot Structure of each atom

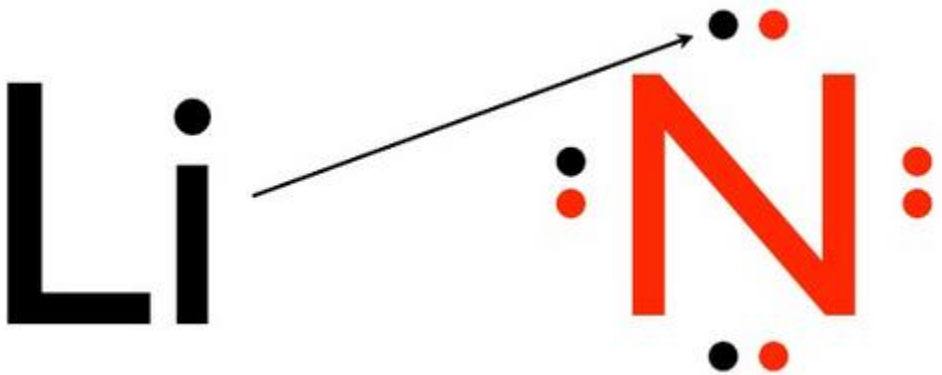
Step 2 : Draw arrows & move electrons to fulfill the Octet Rule



ANOTHER LITHIUM



ANOTHER LITHIUM

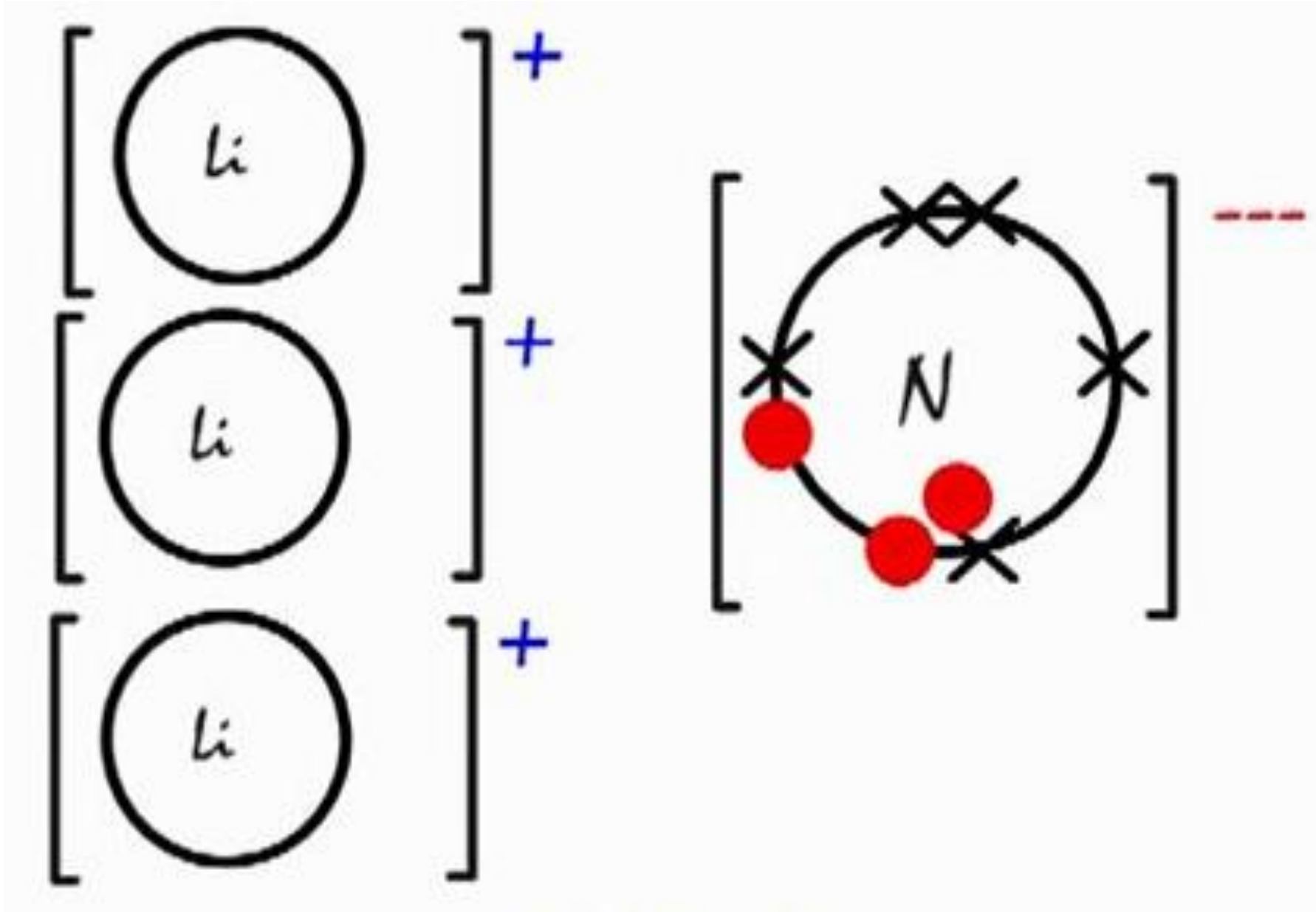


Now, show the charges on the newly formed ions. Lithium lost 1 electron to become +1, and Nitrogen gained 3 electrons to become -3.

$$Li^{+} \quad N^{3-}$$

Finally, combine the newly formed ions to make the compound.

$$Li^{+} + Li^{+} + Li^{+} + N^{3-} \longrightarrow Li_3N$$


Li
+
Li
+
Li
+
N

END OF DAY 1