

1. Oxidation #s 2. Negative ion 3. Positive ion 4. Subscript 5. Lewis Dot Diagrams	A. Show the number of atoms in a molecule. B. An atom that lost electrons. C. Shows the number of electrons commonly gained or lost. D. Way to show an atom's valence electrons to visualize bonding. E. An atom that gains electrons.	1. Metals 2. Nonmetals 3. Octet Rule 4. Noble Gases 5. Transition Metals	A. Elements in column 18A that don't combine into molecules. B. The oxidation numbers of these elements can vary. C. Elements that lose electrons. D. Elements that gain electrons. E. Atoms tend to be more stable with 8 valence electrons.								
Give abbreviations and oxidation numbers Calcium (<u>Ca</u>) <u>+2</u> Carbon (____) _____ Potassium (____) _____ Nitrogen (____) _____ Chlorine (____) _____ Hydrogen (____) _____ Helium (____) _____ Magnesium (____) _____ Aluminum (____) _____ Krypton (____) _____		Give these elements with oxidation # in ion notation Oxygen (<u>O</u>) <u>O²⁻</u> Fluorine (____) _____ Nitrogen (____) _____ Lithium (____) _____ Beryllium (____) _____ Hydrogen (____) _____ Silicon (____) _____ Calcium (____) _____ Boron (____) _____ Bromine (____) _____									
MgCl ₂ How many Chlorines? _____ Li ₂ O How many Oxygen? _____ Al ₂ O ₃ How many Aluminums? _____ C ₁₂ H ₂₂ O ₁₁ How many Hydrogens? _____ CO ₂ How many Carbons? _____ H ₂ O How many Hydrogens? _____		MgCl ₂ How many total atoms? _____ Li ₂ O How many total atoms? _____ Al ₂ O ₃ How many total atoms? _____ C ₁₂ H ₂₂ O ₁₁ How many total atoms? _____ CO ₂ How many total atoms? _____ H ₂ O How many total atoms? _____									
How many electrons are gained or lost? Na ¹⁺ <u>Lost 1</u> Cu ²⁺ _____ Al ³⁺ _____ Cl ¹⁻ _____ O ²⁻ _____ N ³⁻ _____ He ⁰ _____ Si ⁴⁺ _____		Draw the Lewis Dot Diagrams for the following. <table border="1" style="width: 100%; height: 100px; border-collapse: collapse;"> <tr> <td style="width: 25%; text-align: center;">Carbon</td> <td style="width: 25%; text-align: center;">Magnesium</td> <td style="width: 25%; text-align: center;">Oxygen</td> <td style="width: 25%; text-align: center;">Helium</td> </tr> <tr> <td style="width: 25%; text-align: center;">Aluminum</td> <td style="width: 25%; text-align: center;">Argon</td> <td style="width: 25%; text-align: center;">Lithium</td> <td style="width: 25%; text-align: center;">Fluorine</td> </tr> </table>		Carbon	Magnesium	Oxygen	Helium	Aluminum	Argon	Lithium	Fluorine
Carbon	Magnesium	Oxygen	Helium								
Aluminum	Argon	Lithium	Fluorine								
Give abbreviations and valence electrons Oxygen (<u>O</u>) <u>6</u> Silicon (____) _____ Lithium (____) _____ Nitrogen (____) _____ Bromine (____) _____ Hydrogen (____) _____ Helium (____) _____ Magnesium (____) _____ Aluminum (____) _____ Neon (____) _____		Draw 3 different Lewis Dot Diagrams for Nitrogen. 									
Which of these is incorrect? A. $\begin{array}{c} \times \\ \text{Be} \\ \times \end{array}$ B. $\begin{array}{c} \bullet \\ \text{Be} \\ \bullet \end{array}$ C. $\begin{array}{c} \bullet \\ \text{Be} \\ \bullet \end{array}$ D. $\begin{array}{c} \text{:Be} \end{array}$		Draw Lewis Dot Diagrams for Lithium and Oxygen, then put them together to find how they combine. 									
Put boxes around any electrons openings $\begin{array}{c} \bullet \bullet \\ \square \text{O} \square \\ \bullet \bullet \end{array}$ $\begin{array}{c} \bullet \bullet \\ \text{:F:} \\ \bullet \bullet \end{array}$ $\begin{array}{c} \bullet \\ \text{:C:} \\ \bullet \end{array}$ $\begin{array}{c} \bullet \\ \text{K} \end{array}$		Lithium Oxygen Combined									

Changes of Matter Review

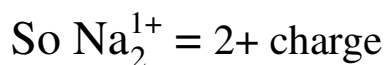
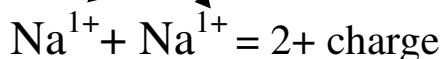
1. Transition Metals	A. Become positive ions.	1. Oxidation #s	A. Tells you that atoms are more stable with 8 valence electrons.
2. Noble Gases	B. Gain electrons, becoming negative ions.	2. Octet Rule	B. A molecule of two atoms of the same element.
3. Metals	C. Compounds formed when electrons are shared.	3. Diatomic Molecule	C. When dissolved in water, a compound that allows electricity to pass.
4. Nonmetals	D. Do not have consistent oxidation numbers.	4. Electrolyte	D. How many electrons are gained or lost.
5. Ionic	E. Do not combine into compounds.	5. Valence Electrons	E. Outermost electrons of an atom.
6. Covalent	F. Compounds formed between positively and negatively charged atoms.		
Give the symbol and atomic number of these elements. Oxygen (O) <u>8</u> Boron () _____ Nitrogen () _____ Bromine () _____ Helium () _____ Iron () _____ Sodium () _____ Mercury () _____		Give symbols and number of valence electrons for these: Aluminum (Al) <u>13</u> Beryllium () _____ Neon () _____ Sodium () _____ Chlorine () _____ Calcium () _____ Boron () _____ Sulfur () _____	
Give the symbol and number of protons for these elements. Aluminum (Al) <u>13</u> Lithium () _____ Phosphorus () _____ Magnesium _____ Argon () _____ Silver () _____ Copper () _____ Gold () _____		Give these elements with oxidation # in ion notation Oxygen <u>O²⁻</u> Boron _____ Nitrogen _____ Bromine _____ Helium _____ Potassium _____ Carbon _____ Hydrogen _____	
How many Aluminums in Al ₂ O ₃ ? _____ How many Magnesiums in MgCl ₂ ? _____ How many Sodiums in Na ₃ N? _____ How many Oxygens in Li(NO ₃)? _____		How many total atoms in Al ₂ O ₃ ? _____ How many total atoms in MgCl ₂ ? _____ How many total atoms in Na ₃ N? _____ How many total atoms in Li(NO ₃)? _____	
How many electrons are gained or lost? K ¹⁺ <u>Lost 1</u> Fe ²⁺ _____ B ³⁺ _____ F ¹⁻ _____ S ²⁻ _____ N ³⁻ _____ He ⁰ _____ Si ⁴⁺ _____		How many electrons will be gained or lost by: K <u>Lost 1</u> Ar _____ Al _____ Br _____ O _____ Ca _____ Be _____ H _____	
Draw the Lewis Dot Diagrams for the following.		Draw 3 different Lewis Dot Diagrams for Aluminum.	
Carbon	Lithium	Sulfur	Argon
Aluminum	Nitrogen	Magnesium	Chlorine
Use Electron Arrows to Combine Magnesium and Fluorine			

Ionic Compounds

Ion Charges Add

An ion is an atom with a positive or negative charge because it has gained or lost electrons.
As ions add together, so do their charges.

Oxidation Numbers

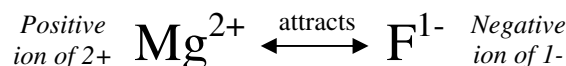


Each Sodium atom gives up 1 electron, so 2 Sodium atoms (Na_2) will give up 2 electrons and have a charge of 2+.

Opposites Ions Attract

Just as with protons and electrons: oppositely charged atoms attract. Positive ions (metals) attract negative ions (nonmetals), forming ionic compounds.

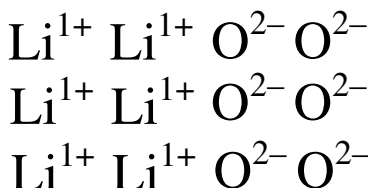
Positive ions attract Negative ions



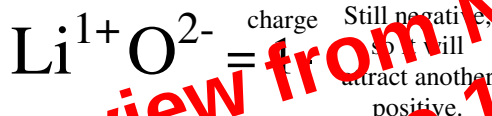
Balanced Ionic Compounds

Ionic compounds always combine in a particular ratio (same number of each atom) so that they are **balanced**. *The net charge must equal zero!*

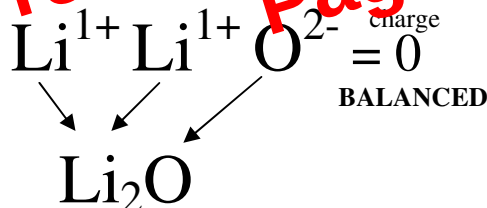
If Lithium atoms are placed near Oxygen atoms they will combine and form ionic bonds in a certain ratio.



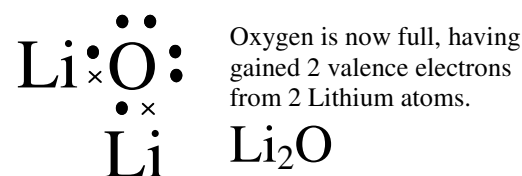
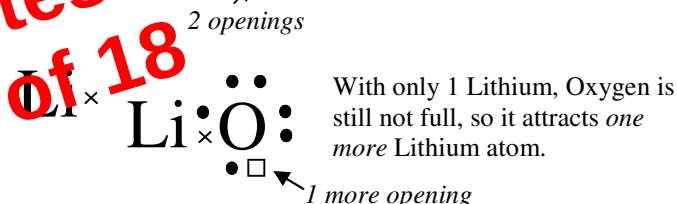
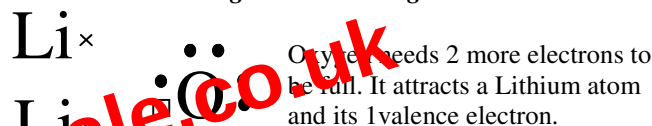
A Lithium attracts an Oxygen, but is not balanced.



Each Oxygen will attract 2 Lithium ions to be balanced.



Using Lewis Dot Diagrams



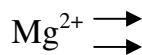
Lithium and Oxygen will **ALWAYS** combine in a 2:1 ratio.

Electron Arrows — An easy visual aid for you.

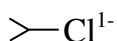
The Symbols

- $\longrightarrow$ Losing 1 electron
 $\longleftarrow$ Gaining 1 electron
 $\longrightarrow\longrightarrow$ An ionic bond

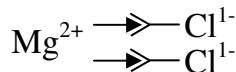
Magnesium loses 2 electrons



Chlorine gains 1 electron

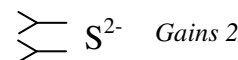
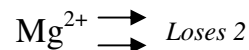


Magnesium will combine with 2 Chlorines



Magnesium Chloride:
 MgCl_2 (a 1:2 ratio)

Magnesium Sulfide: MgS



How to Balance Ionic Compounds

- Step 1: Write the symbols for each element.
Step 2: Write the oxidation numbers on each symbol.
Step 3: Balance so the # of electrons lost = # gained.
If you need to, use visual aid like Lewis Dot Diagrams or Electron Arrows to help you.

Ex. Find the balanced ionic formula for Calcium Bromide.

