Name: _____

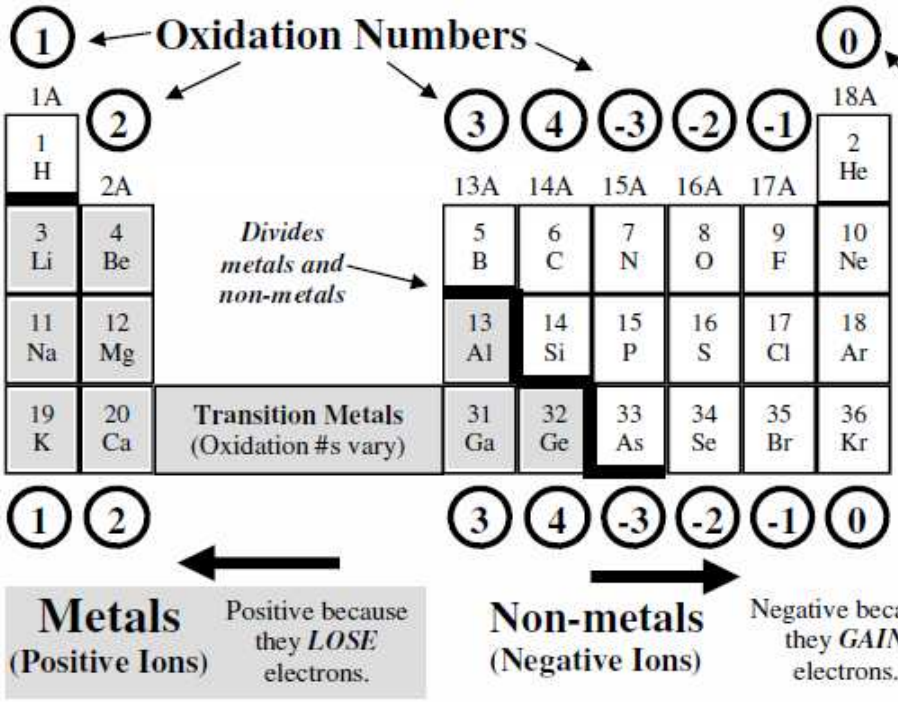
Period: _____

Oxidation Numbers, Notation, Lewis Dot Diagrams

Oxidation Numbers

The oxidation numbers tell you how many electrons an element will gain or lose. This tells you how it will combine with other elements.

Atoms gain or lose electrons when near certain other elements to fulfill the octet rule: "If I 8 I full". Full electron levels are more stable. If an atom has 1 or 2 valence electrons it will lose them to have a full inner level. If an atom has 6 or 7 valence electrons, it will gain electrons to fill an electron level.



The elements in column 18A (the Noble Gases) have an oxidation # of 0. This means they don't gain or lose electrons, so they don't react or form compounds. They are *INERT*.

Metals (Positive Ions) — Positive because they *LOSE* electrons.

Non-metals (Negative Ions) — Negative because they *GAIN* electrons.

Notation

Chemical symbol → Na $^{1+}$ ← Charge (Oxidation #)

2 ← Number of atoms

The above notation tells you that each of the Sodium atoms lost 1 electron. Since there are 2 Sodium atoms, there were 2 electrons lost (1 each). The charge is the oxidation number.

Losers of electrons become positive (a positive ion).
Electrons are negative, so losing negatives makes it more positive.

Mg^{2+} *Lost* 2 electrons

Gainers of electrons become negative (a negative ion).
Electrons are negative, so gaining negatives makes it more negative.

O^{2-} *Gained* 2 electrons

***Subscripts* tell you the number of atoms in a molecule.**

O_2 2 Oxygen atoms

No number means 1 atom

H_2O 2 Hydrogen atoms, 1 Oxygen atoms

SO_4 1 Sulfur atom, 4 Oxygen atoms

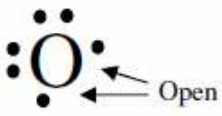
Lewis Dot Diagrams

Dot Diagrams (sometimes known as Lewis dot diagrams) are a depiction of an atom's valence electrons. They are a powerful tool in helping you understand, see, and even predict molecular bonding.

The dots represent valence electrons

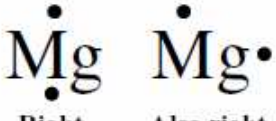
Neon has 8 valence electrons and no openings. Neon has fulfilled the octet rule and will not react with other atoms.

Openings show where electrons can be gained or shared from other atoms.



Oxygen has 6 valence electrons, so it wants 2 more to be full.

Electrons can move around for bonding.



Right **Also right**

Magnesium has 2 valence electrons. It will lose them to a non-metal and become a positive ion.

X's can be used to keep track of electrons from other atoms.

The x shows that Lithium gives its one valence electron to Chlorine. Chlorine now has 8 and is full.

1. Oxidation #s	A. Show the number of atoms in a molecule.
2. Negative ion	B. An atom that lost electrons.
3. Positive ion	C. Shows the number of electrons commonly gained or lost.
4. Subscript	D. Way to show an atom's valence electrons to visualize bonding.
5. Lewis Dot Diagrams	E. An atom that gains electrons.

1. Metals	A. Elements in column 18A that don't combine into molecules.
2. Nonmetals	B. The oxidation numbers of these elements can vary.
3. Octet Rule	C. Elements that lose electrons.
4. Noble Gases	D. Elements that gain electrons.
5. Transition Metals	E. Atoms tend to be more stable with 8 valence electrons.

Give abbreviations and oxidation numbers

Calcium (*Ca*) *+2* . Carbon (____) _____

Potassium (____)_____ Nitrogen (____)_____

Chlorine (____) _____ Hydrogen (____)_____

Helium (____) _____ Magnesium (____) _____

Aluminum (____) _____ Krypton (____) _____

Give these elements with oxidation # in ion notation

Oxygen (*O*) O^{2-} . Fluorine (____) _____

Nitrogen (____)_____ Lithium (____) _____

Beryllium (____) _____ Hydrogen (____)_____

Silicon (____) _____ Calcium (____) _____

Boron (____)_____ Bromine (____) _____

$MgCl_2$ How many Chlorines? _____

Li_2O How many Oxygen? _____

Al_2O_3 How many Aluminums? _____

$C_{12}H_{22}O_{11}$ How many Hydrogens? _____

CO_2 How many Carbons? _____

H_2O How many Hydrogens? _____

$MgCl_2$ How many total atoms? _____

Li_2O How many total atoms? _____

Al_2O_3 How many total atoms? _____

$C_6H_{12}O_6$ How many total atoms? _____

CO_2 How many total atoms? _____

H_2O How many total atoms? _____

How many electrons are gained or lost?

Na^{1+} *Lost 1* Cu^{2+} _____

Al^{3+} _____ Cl^{1-} _____

O^{2-} _____ N^{3-} _____

He^{0} _____ Si^{4+} _____

Give abbreviations and valence electrons

Oxygen (*O*) *6* . Silicon (____) _____

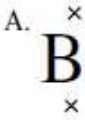
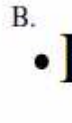
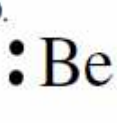
Lithium (____) _____ Nitrogen (____) _____

Bromine (____) _____ Hydrogen (____) _____

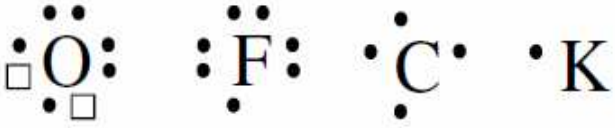
Helium (____) _____ Magnesium (____) _____

Aluminum (____) _____ Neon (____) _____

Which of these is incorrect?

A.  B.  C.  D. 

Put boxes around any electrons openings



Draw the Lewis Dot Diagrams for the following.

Carbon	Magnesium	Oxygen	Helium
Aluminum	Argon	Lithium	Fluorine

Draw 3 different Lewis Dot Diagrams for Nitrogen.

Draw Lewis Dot Diagrams for Lithium and Oxygen, then put them together to find how they combine.

Lithium Oxygen Combined