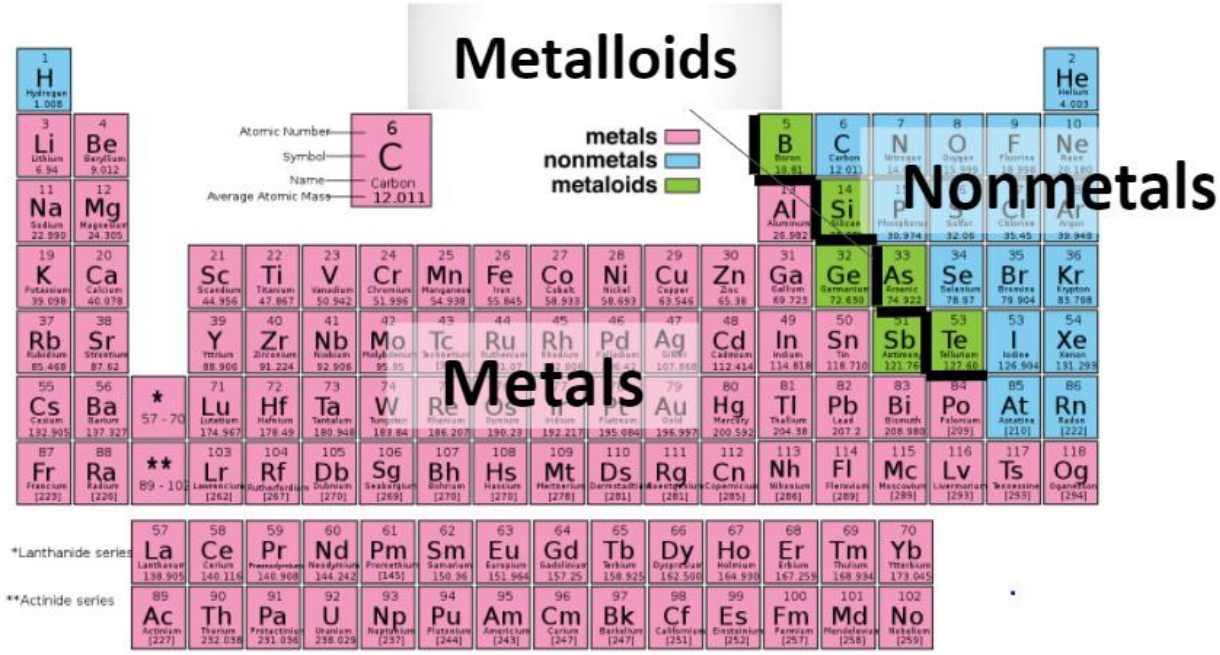
Unit 1: Periodic Table

Metals	Metalloids	Nonmetals
		
Solid at room temperature	Solid at room temperature	Can be solid, gas or (2) liquids at room temperature
High melting point High boiling point High density	Melting and boiling point varies (but higher than nonmetals)	Low melting and boiling point Low density
Ductile/Malleable	Brittle	Brittle
Lustrous/shiny	Semi-lustrous	Dull
Good conductor of heat and electricity	Semiconductors; used in circuitry	Poor conductors



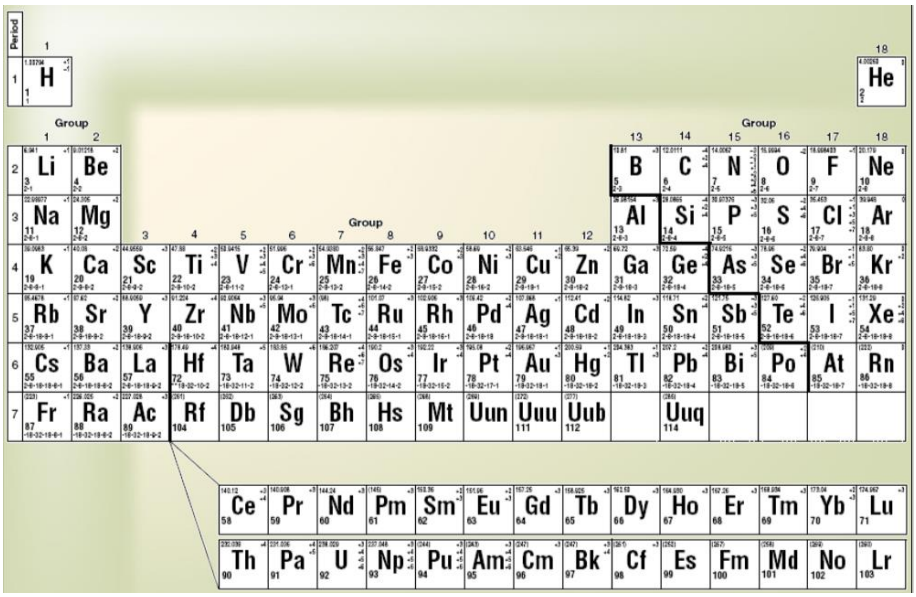
Name: _____Date: _____

The Periodic Table

Aim: How is the Periodic Table arranged and what patterns emerge among the elements?

Do Now: Please examine how the periodic table is arranged and with the person next to you, find as many patterns as you can.

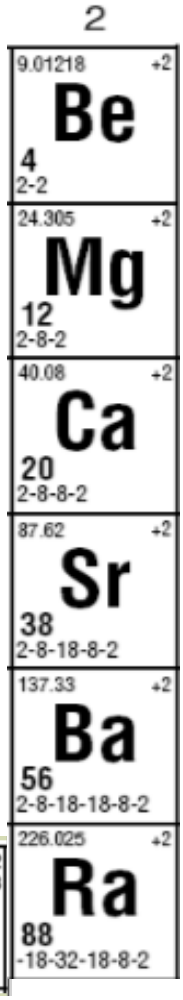
<u>Periodic Law:</u> Elements arranged by increasing atomic number show repeating patterns to the number of valence electrons.



Organization of the Table

Groups 1-18: _____

Periods 1-7: _____

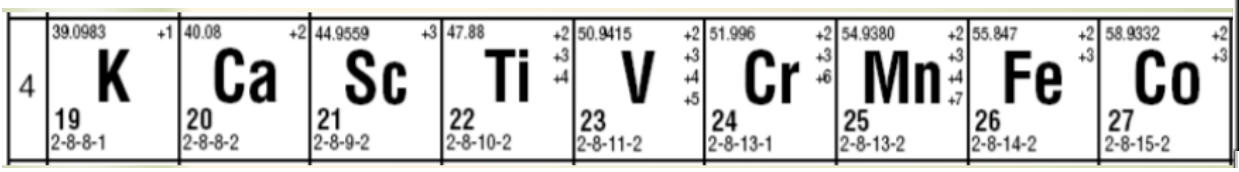


Groups

Elements in the same group have the:

- _____
- _____
- _____

Periods



Elements in the same period have the _____

_____

- _____

Name: _____Date: _____

The Periodic Table

Dmitri Mendeleev: Father of the Periodic Table

● Mendeleev organized the periodic table by listing elements in rows by _____.

●He also put them in groups _____.

Mendeleev's table was close to the table we use today.

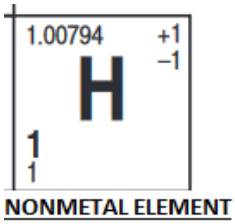
Mendeleev's Periodic Table	**Modern Periodic Table**

The boron staircase is the dividing line for metals and nonmetals.

Metals, Nonmetals and Metalloids

- Metals_____
  _____

- _____. **IT IS ONLY IN GROUP 1 BECAUSE IT HAS 1 VALENCE ELECTRON.**



- Nonmetals_____
  _____

- Metalloids _____

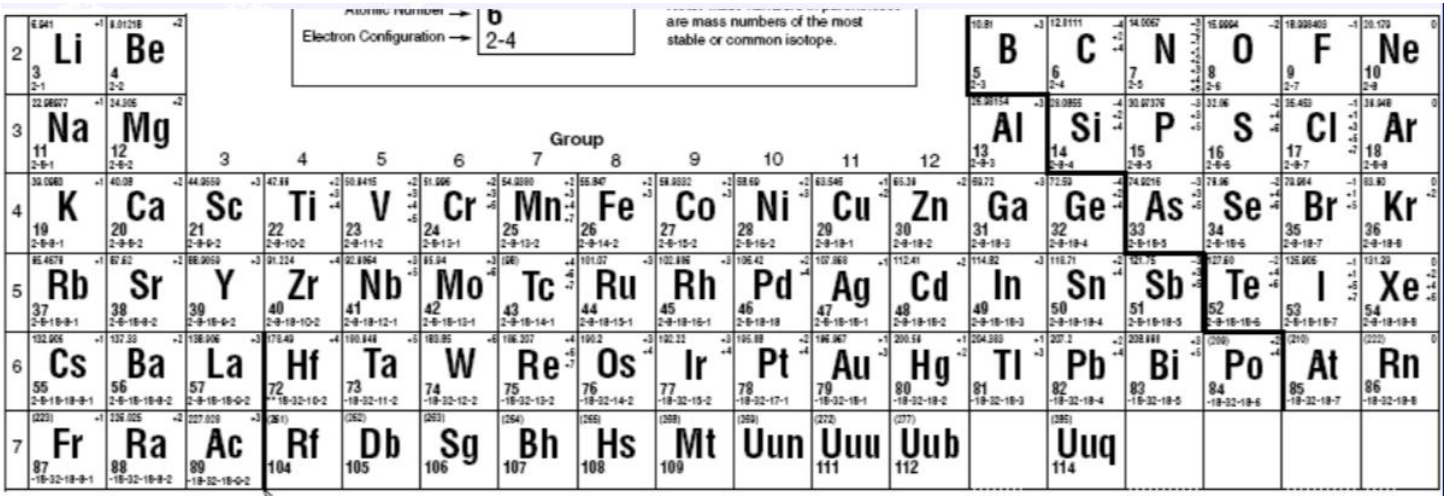
Metalloid elements: _____

Name: _____Date: _____

The Periodic Table

Properties of Metals, Nonmetals and Metalloids

Aim: How do the properties of metals and nonmetals differ?



Metal Properties

All metals are solids except for mercury which is a liquid.

1._____

2._____

3._____

4._____

5. _____

Name: _____Date: _____

The Periodic Table

Nonmetal Properties

The nonmetals exist as mostly gases, some solids and 1 liquid (Bromine)

1._____

2._____

3._____

4._____

5._____

Metalloid Properties

Metalloids can behave as a metal or a nonmetal, depending upon what type of element they are reacting with.

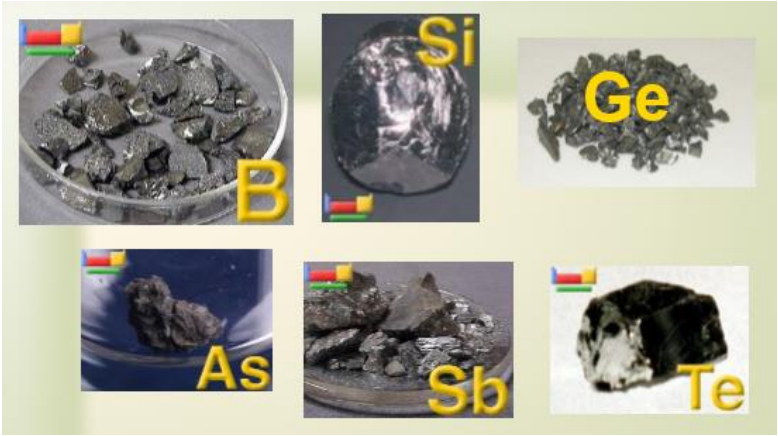
1._____

2._____

3._____

4._____

5._____



Name: _____Date: _____

The Periodic Table

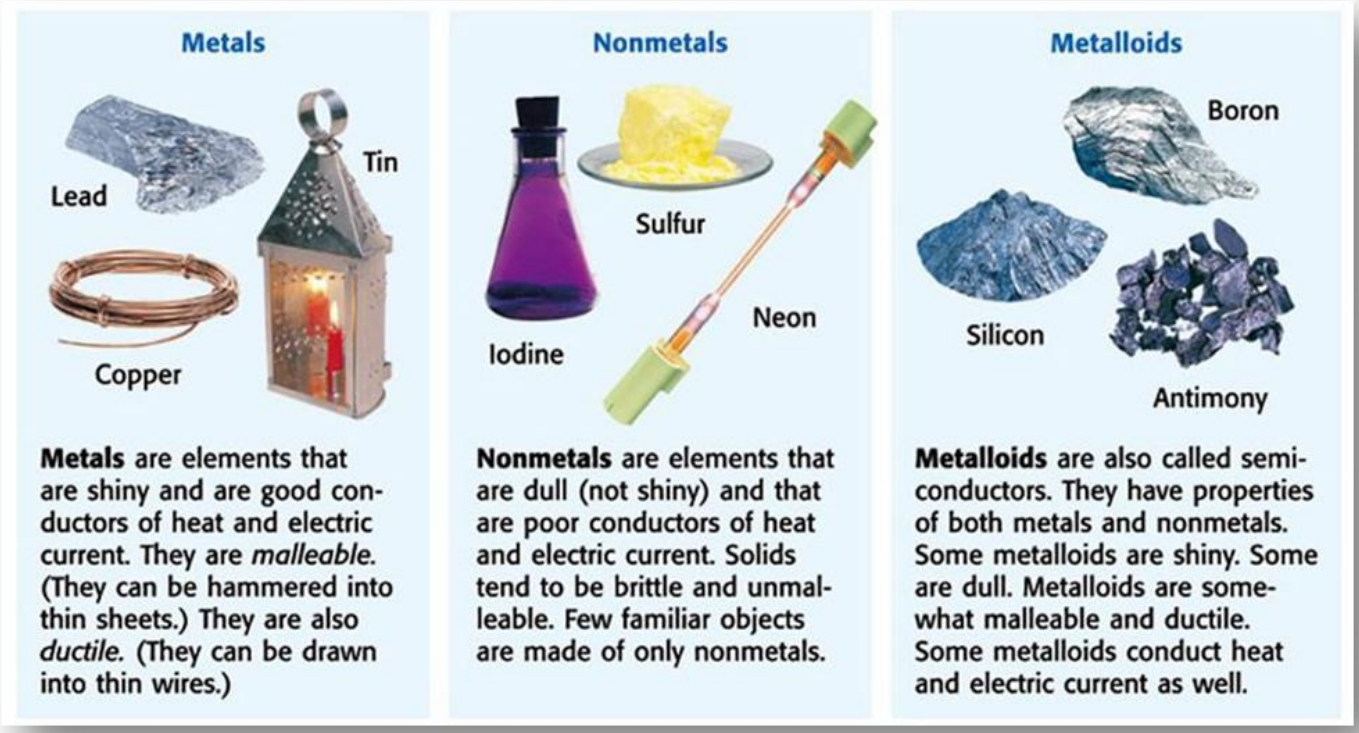
Periodic Table Coloring Activity

Materials needed:

- Thin tip markers or pen in the following colors: black, red, blue and green.
  - We will use these markers to outline the boxes of the metals, nonmetals and metalloids.
  - We will also draw the dividing line between the metals and nonmetals called the boron staircase.
- Colored pencils or crayons with the following colors: red, orange, yellow, green, blue, purple, brown, black, gray, white and pink.
  - You will be lightly shading in the different groups of the periodic table and labeling the name of each group above its column.

You will follow the directions as provided in the power point presentation and we will complete our periodic tables together.

Metals, Nonmetals and Metalloids- Read the information below.



You have been given a black and white periodic table that needs some color according to the directions we will follow together as a class. Your table can be found on the next page.

The Periodic Table

Color Key

Element Classes

Metal | Nonmetal | Metalloid

Phase at Room Temperature

☐Solid ☐Liquid ☐Gas

1 **H** Hydrogen 1.00794																	2 **He** Helium 4.003
3 **Li** Lithium 6.941	4 **Be** Beryllium 9.012182											5 **B** Boron 10.811	6 **C** Carbon 12.0107	7 **N** Nitrogen 14.00674	8 **O** Oxygen 15.9994	9 **F** Fluorine 18.9984032	10 **Ne** Neon 20.1797
11 **Na** Sodium 22.989770	12 **Mg** Magnesium 24.3050											13 **Al** Aluminum 26.981538	14 **Si** Silicon 28.0855	15 **P** Phosphorus 30.973761	16 **S** Sulfur 32.066	17 **Cl** Chlorine 35.4527	18 **Ar** Argon 39.948
19 **K** Potassium 39.0983	20 **Ca** Calcium 40.078	21 **Sc** Scandium 44.955910	22 **Ti** Titanium 47.867	23 **V** Vanadium 50.9415	24 **Cr** Chromium 51.9961	25 **Mn** Manganese 54.938049	26 **Fe** Iron 55.845	27 **Co** Cobalt 58.933200	28 **Ni** Nickel 58.6934	29 **Cu** Copper 63.546	30 **Zn** Zinc 65.39	31 **Ga** Gallium 69.723	32 **Ge** Germanium 72.61	33 **As** Arsenic 74.92160	34 **Se** Selenium 78.96	35 **Br** Bromine 79.904	36 **Kr** Krypton 83.80
37 **Rb** Rubidium 85.4678	38 **Sr** Strontium 87.62	39 **Y** Yttrium 88.90585	40 **Zr** Zirconium 91.224	41 **Nb** Niobium 92.90638	42 **Mo** Molybdenum 95.94	43 **Tc** Technetium (98)	44 **Ru** Ruthenium 101.07	45 **Rh** Rhodium 102.90550	46 **Pd** Palladium 106.42	47 **Ag** Silver 107.8682	48 **Cd** Cadmium 112.411	49 **In** Indium 114.818	50 **Sn** Tin 118.710	51 **Sb** Antimony 121.760	52 **Te** Tellurium 127.60	53 **I** Iodine 126.90447	54 **Xe** Xenon 131.29
55 **Cs** Cesium 132.90545	56 **Ba** Barium 137.327	57 **La** Lanthanum 138.9055	72 **Hf** Hafnium 178.49	73 **Ta** Tantalum 180.9479	74 **W** Tungsten 183.84	75 **Re** Rhenium 186.207	76 **Os** Osmium 190.23	77 **Ir** Iridium 192.217	78 **Pt** Platinum 195.078	79 **Au** Gold 196.96655	80 **Hg** Mercury 200.59	81 **Tl** Thallium 204.3833	82 **Pb** Lead 207.2	83 **Bi** Bismuth 208.98038	84 **Po** Polonium (209)	85 **At** Astatine (210)	86 **Rn** Radon (222)
87 **Fr** Francium (223)	88 **Ra** Radium (226)	89 **Ac** Actinium (227)	104 **Rf** Rutherfordium (261)	105 **Db** Dubnium (262)	106 **Sg** Seaborgium (263)	107 **Bh** Bohrium (262)	108 **Hs** Hassium (265)	109 **Mt** Meitnerium (266)	110 (269)	111 (272)	112 (277)	113	114				

58 **Ce** Cerium 140.116	59 **Pr** Praseodymium 140.90765	60 **Nd** Neodymium 144.24	61 **Pm** Promethium (145)	62 **Sm** Samarium 150.36	63 **Eu** Europium 151.964	64 **Gd** Gadolinium 157.25	65 **Tb** Terbium 158.92534	66 **Dy** Dysprosium 162.50	67 **Ho** Holmium 164.93032	68 **Er** Erbium 167.26	69 **Tm** Thulium 168.93421	70 **Yb** Ytterbium 173.04	71 **Lu** Lutetium 174.967
90 **Th** Thorium 232.0381	91 **Pa** Protactinium 231.03588	92 **U** Uranium 238.0289	93 **Np** Neptunium (237)	94 **Pu** Plutonium (244)	95 **Am** Americium (243)	96 **Cm** Curium (247)	97 **Bk** Berkelium (247)	98 **Cf** Californium (251)	99 **Es** Einsteinium (252)	100 **Fm** Fermium (257)	101 **Md** Mendelevium (258)	102 **No** Nobelium (259)	103 **Lr** Lawrencium (262)

Name: _____Date: _____

The Periodic Table

Instructions for Coloring your Periodic Table

Metals vs. Nonmetals

- With a black marker add the "stair step" pattern that starts under Boron and extends down to Po and At.
  - *This is the division line between metals and nonmetals.*

- Take the red marker and outline the area where nonmetals are found (don't forget about Hydrogen!)
  - Outline the color key box labeled "nonmetal" in the same red marker.
  - The nonmetals are to the right of the boron staircase.
  - Please refer to the power point slide to make sure you are outlining the correct elements as nonmetals.

- Take the blue marker and outline the metalloid elements: B, Si, Ge, As, Sb and Te.
  - Outline the color key box labeled "metalloid" in the same blue marker.
  - Refer to the power point slide to make sure you are outlining the correct elements as metalloids.

- Take the green marker and outline the remaining elements as metals.
  - Outline the color key box labeled "metal" in the same green marker
  - Refer to the power point slide to make sure you are outlining the correct elements as metals.

State of Matter at Room Temperature (solid, liquid, or gas)

- There are two elements that are liquid at room temperature: **Hg and Br.**
  - Draw a black water droplet in the upper right corner of the symbol.
  - See the powerpoint slide to be sure you draw the droplet correctly.

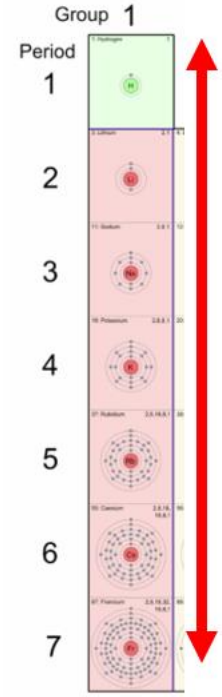
- 11 elements exist as gases at room temperature: **H, He, N, O, F, Ne Cl, Ar, Kr, Xe, Rn**
  - Draw a red balloon in the upper right corner of the symbol.

- The remaining elements are solid at room temperature – leave those alone.

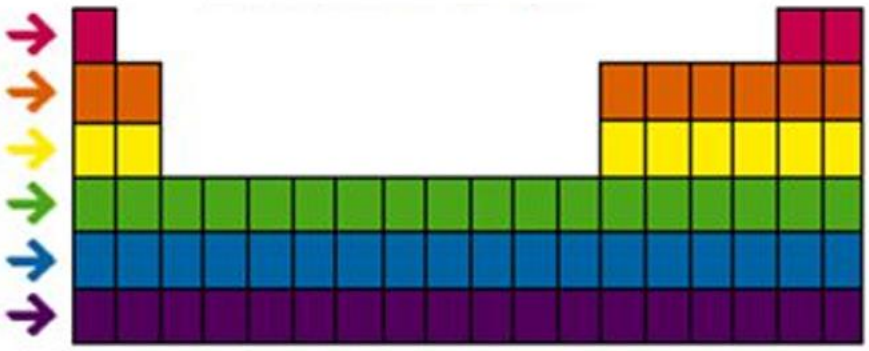
Name: _____Date: _____

The Periodic Table

Groups (columns) & Periods (Rows)



Elements are organized into families (or groups) based on the number of <u>valence electrons</u> they have, which determines their <u>reactivity</u> and other properties.



Source: http://images.slideplayer.com/18/5702901/slides/slide_1.jpg

Each row in the table is called a <u>PERIOD</u>. All the elements in a row have the <u>same number of energy levels.</u>

- You will shade each group of the periodic table according to the instructions in the power point slideshow.
- You will then label the number of each period (row).

Name: _____Date: _____

The Periodic Table

<u>Aim:</u> How do we find the number of electron shells and valence electrons for an element?

1. In the periodic table, each row is called a _____.
2. The elements in each _____.
3. Each column in the periodic table is called a _____ .
4. Each of the elements in the same _____.
5. The electrons in the outer shell _____.
6. The _____.

Symbol	Element Name	Period #	# of electron shells	Group #	Electron configuration	# valence electrons

Name: _____Date: _____

The Periodic Table

Find that Element!

Symbol	Element	Group #	Period #/ # of electron shells	Electron configuration	# of Valence electrons	Metal, nonmetal or metalloid
Fr			7			
		2	3			
	Bromine				7	
Sb			5			
		3	4			
	Calcium	2				
O					6	
			3		4	
	Polonium					
		1	5			
Xe			5			
		2	6			
		15	4			
	Strontium					
	Iron					
Ne						
Rn						
	Potassium					
F						
S						

Name: _____Date: _____

The Periodic Table

Lewis Structures (Electron Dot Diagrams)

Aim: What is a Lewis Structure and how do we draw them for different elements?

Objective: You should be able to draw a Lewis structure (Electron Dot Diagram) for an element using the number of valence electrons.

Lewis Structures

- Modeling technique to show how _____

  _____

- Dots are placed around an element's symbol to indicate the _____

  _____

In a Lewis Structure for an element dots are placed around an element's symbol.

The number of dots depends on the number of _____ the element has.

Ex: Na B Cl

Drawing Lewis Structures: *Use the following steps to draw a dot diagram for Carbon.*

- **Step 1:** _____ you are drawing the electron dot diagram for. This symbol represents the nucleus of the atom and each of the four sides represents an orbital.
- **Step 2:** Locate the element you are drawing an electron dot diagram for on the periodic table. Find the number of _____. This will be the number of electrons you draw around your symbol.
- **Step 3:** Place the first two electrons _____. This is referred to as the first PEL the electrons will fill.
- **Step 4:** Place the remaining dots in a _____ around the other sides of the symbol one dot at a time until all the electrons are used up. There should be no more than 2 electrons on each side.

Name: _____Date: _____

The Periodic Table

VALENCE ELECTRONS

- Valence electrons are the electrons in the outermost principal energy level.
- There can be no more than eight valence electrons.
- Determine the number of valence electrons in the atoms below and draw their electron dot diagram (Lewis structure)

1. Fluorine _____
2. Phosphorus _____
3. Calcium _____
4. Nitrogen _____
5. Iron _____
6. Argon _____
7. Potassium _____
8. Helium _____
9. Magnesium _____
10. Sulfur _____
11. Lithium _____
12. Zinc _____
13. Carbon _____
14. Iodine _____
15. Oxygen _____
16. Barium _____
17. Aluminum _____
18. Hydrogen _____
19. Xenon _____
20. Copper _____

Name: _____Date: _____

The Periodic Table

Lewis Structure Review: What is a Lewis Structure?

A Lewis Structure is a simplified way to represent an atom and its outer electrons. It has two parts to it: the atomic symbol for the element and dots representing the electrons surrounding it.

Getting Started:

1. Find your _____ on the periodic table.
2. Determine the number of _____ electrons.
3. This is how many electrons you will _____.

Review:

- On the periodic table, each column is called a _____.
- Each element in a _____ has the same number of _____ in their outer orbital, or _____.
- The electrons in the outer shell are known as _____ electrons.

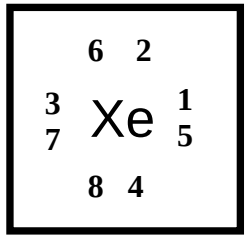
Drawing the Lewis Structure:

C

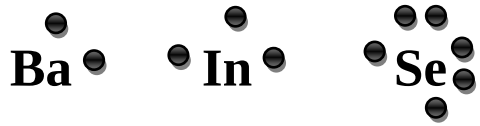
1. Write the _____ for the element.
2. How many _____ electrons?
3. Start on the _____ a draw the electrons clockwise around the element _____.
4. Check your work – did you drawing the correct number of electrons?

Lewis Structures Name:

- Lewis structures, or dot diagrams, are a simplified way to show how the valence electrons are arranged in the outer shell. This is where the chemical reactions take place. Atoms will either share or give away these electrons to form bonds.
- Using your periodic table, determine the number of valence electrons for each element.
- Draw a dot to represent each valence electron around the element symbol.
- Follow the pattern below starting with position number 1.



Examples:



H							He
Li	Be	B	C	N	O	F	Ne
Na	Mg	Al	Si	P	S	Cl	Ar
K	Ca						

Name: _____Date: _____

The Periodic Table

Directions: Use your periodic table to complete the table below.

Element	Symbol	Group #	Valence Electron #	Lewis Structure
Arsenic				
Lead				
	Kr			
Strontium				
Bromine				
	Ge			
Gallium				
	Te			
Radon				
	Fr			

Periodic Table Families PPT Notes

Directions: Choose a color and color in the names of the families. Follow along with the power point and complete the chart. Find the families on you periodic table and color them with the matching color.

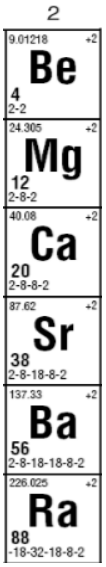
Color	Alkali Metals	Alkaline Earth Metals	Transition Metals	Boron Family	Carbon Family	Nitrogen Family	Oxygen Family	Halogen Family	Noble Gases	Rare Earth
Element Symbols	Group 1	Group 2	21 – 30, 39 – 48, 72 – 80, 104 - 112	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	57 – 71, 89 - 103
Phase(s)	S L G	S L G	S L G	S L G	S L G	S L G	S L G	S L G	S L G	————-
# of Valence Electrons			1 or 2							————
(M) Metal (NM) Non-Metal (MD) Metalloids										57 – 71 Metals 89 – 103 Radioactive
Reactivity										57 – 71 Metals 89 – 103 Radioactive

Name: _____Date: _____

The Periodic Table

Aim: What are the properties of the representative element groups in the periodic table?

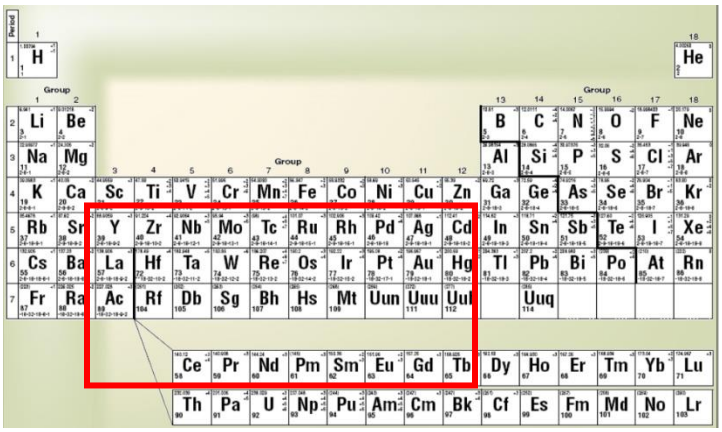
Do Now: Why do elements in the same group have similar physical and chemical properties?



Groups of the Periodic Table

- The representative elements are found in groups 1,2 and 13-18.
  - _____

    _____
  - The transition metals are a shorter block of columns.
  - These elements stand out from the other groups because they **<u>do not</u>** <u>follow the same patterns and trends with their valence electrons and reactivities.</u>



Properties of Transition Metals Groups 3-12

Electrons: _____

Ions: _____

_____

Reactivity: _____

Name: _____Date: _____

The Periodic Table

Properties of the <u>Representative</u> Element Groups of the Periodic Table

Group 1	
2	6.941 +1 **Li** 3 2-1
3	22.98977 +1 **Na** 11 2-8-1
4	39.0983 +1 **K** 19 2-8-8-1
5	85.4678 +1 **Rb** 37 2-8-18-8-1
6	132.905 +1 **Cs** 55 2-8-18-18-8-1
7	(223) +1 **Fr** 87 -18-32-18-8-1

<u>Group 1:</u> _____

Properties:

Electrons and Ions: _____

Ionization energy and Electronegativity: _____

_____

_____

Reactivity: _____

_____

<u>General Reactivity of Metals</u>

_____

_____

<u>Group 2:</u> _____

Properties:

Electrons and Ions: _____

Ionization energy and Electronegativity: _____

_____

_____

Reactivity: _____

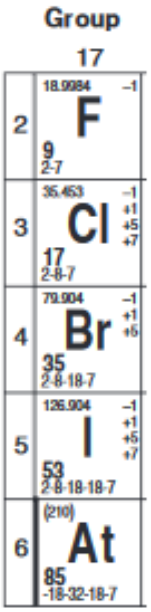
_____

Group 2	
2	9.01218 +2 **Be** 4 2-2
3	24.305 +2 **Mg** 12 2-8-2
4	40.08 +2 **Ca** 20 2-8-8-2
5	87.62 +2 **Sr** 38 2-8-18-8-2
6	137.33 +2 **Ba** 56 2-8-18-18-8-2
7	(226) +2 **Ra** 88 -18-32-18-8-2

Name: _____Date: _____

The Periodic Table

<u>Group 17:</u> _____



Properties:

Electrons and Ions: _____

Ionization energy and Electronegativity: _____

_____

_____

Reactivity: _____

_____

_____

<u>Phases:</u> _____

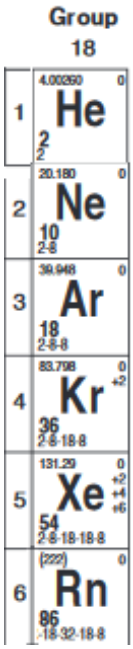
- _____

<u>General Reactivity of Nonmetals</u>

- _____

_____

<u>Group 18</u>: _____



Properties:

Electrons and Ions: _____

Ionization energy and Electronegativity: _____

_____

_____

Reactivity: _____

_____

_____