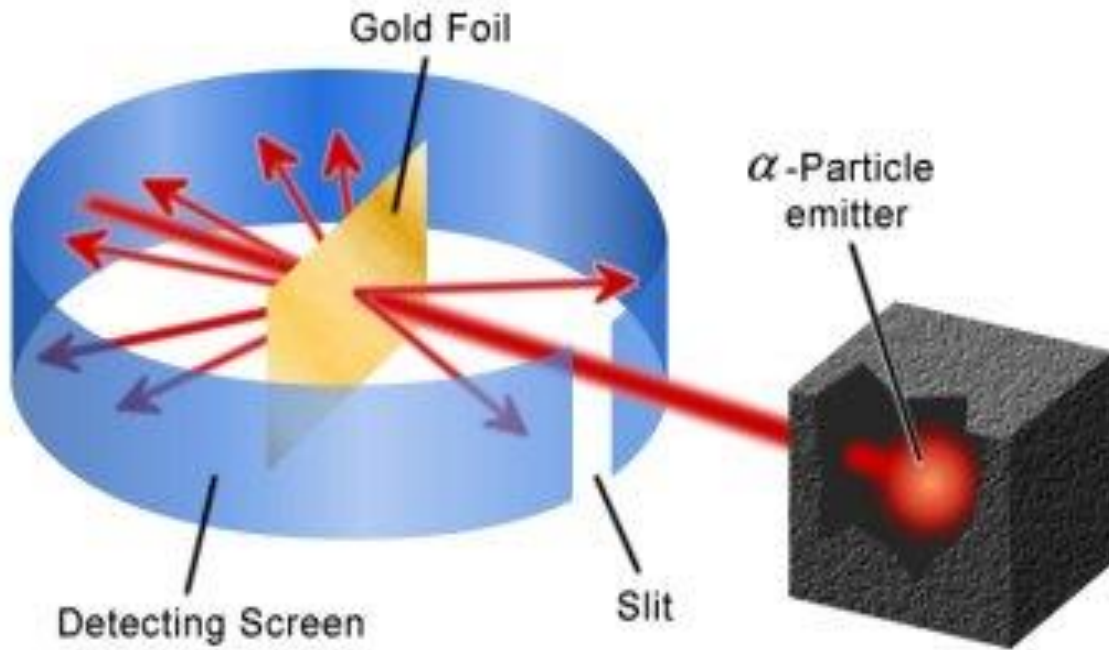


Atoms and Periodic Table Unit Notes

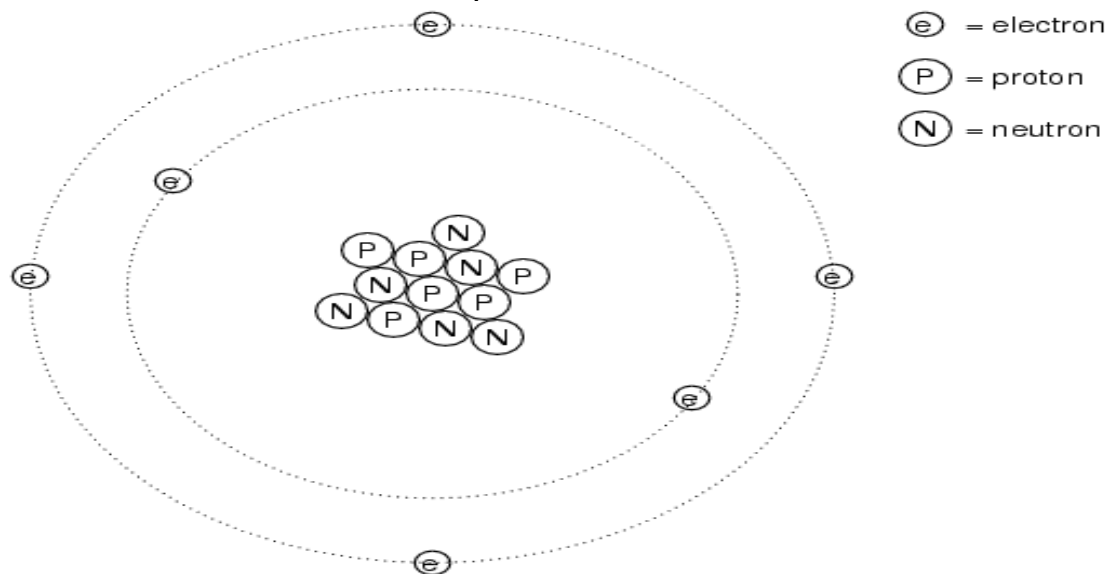
Name: _____

(DO NOT LOSE!)

■ Rutherford's _____ foil experiment



■ An **Atom** is the smallest part of an _____ which can take part in a chemical reaction



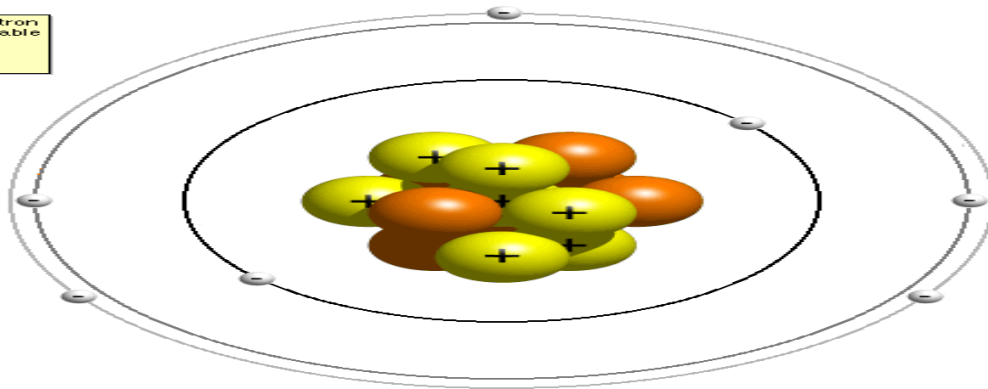
- The atom consists of three fundamental

_____.

- **Proton** + (_____ charge)
- **Neutron** 0 (_____ charge / no charge)
- **Electron** - (_____ charge)

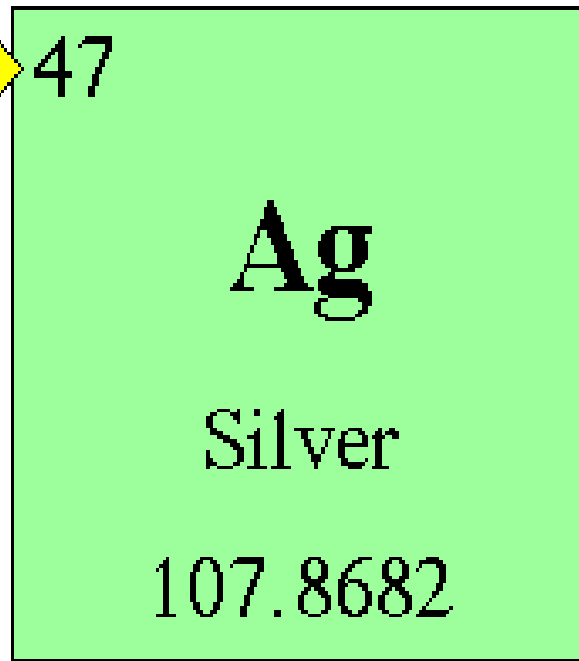
- **Nucleus** - The positively charged dense center of an atom

Nitrogen's Electron Configuration Table
 $1s^2$
 $2s^2 2p^3$



- Atoms always have the _____ number of protons and electrons, this called the **atomic number**.
-
- **APE A=P=E** (Atomic Number = # P _____ which = # Electrons)

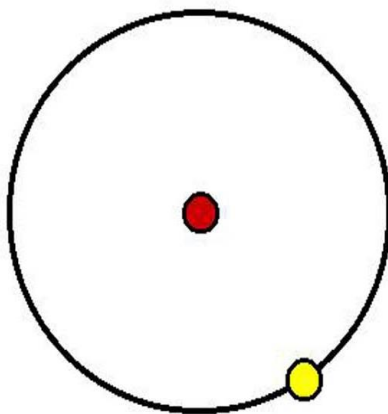
Atomic Number → 47



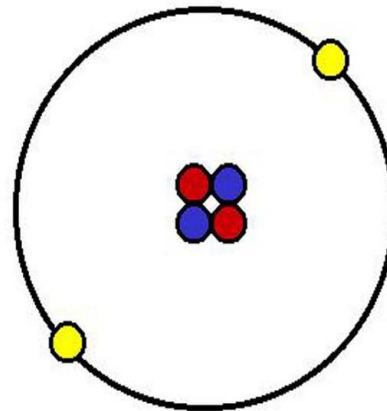
- The Nucleus has almost _____ the mass of the atom. It is made up of protons (+) and neutrons (0)

atoms

hydrogen



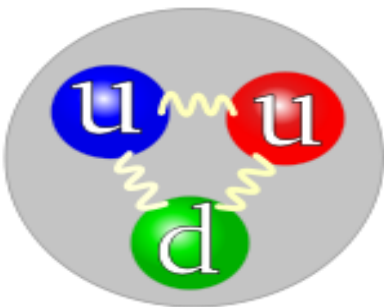
helium



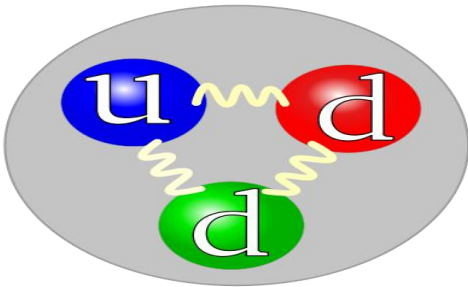
● proton (+) ● neutron ● electron (-)

- **Isotope:** atom with _____ number of protons and electrons but different numbers of neutrons.

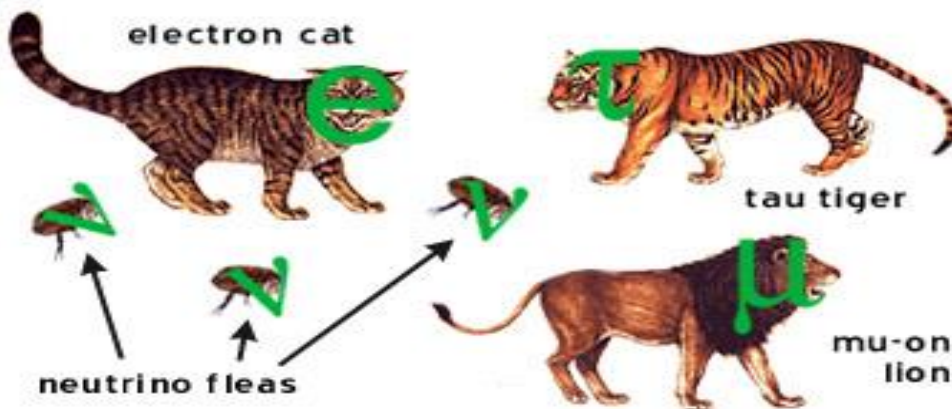
- To find the number of neutrons: _____ the atomic number from the atomic mass.
 - **MAN** (Atomic Mass – Atomic _____ + Number of Neutrons in the Atom)
- Most of an atom is _____ space, electrons orbit far away from nucleus
- 1800 Electrons = Mass of ____ proton
- 1 Neutron = little bit _____ mass than proton
- Physicists have discovered that protons and neutrons are composed of even _____ particles called **quarks**. Just bigger than an the _____.
- **Particle:** A tiny piece of _____.
 - An atom or nucleus.
 - Elementary _____, quark, gluon.
- Proton is composed of _____ up quarks, _____ down.



- A neutron is composed of _____ down quarks and ____ up quark.



- The 6 Leptons
 - E _____
 - Muon
 - Tau
 - 3 types of Neutrinos



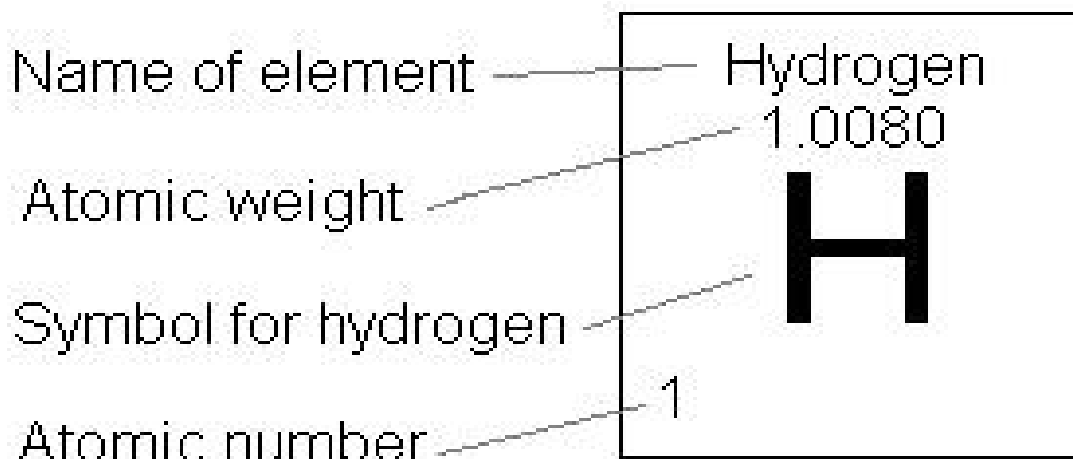
- Everything is made of...
 - 6 _____ that make Protons and Neutrons
 - 6 _____ The best-known lepton is the electron.
 - _____ **carrier particles**
- The four force carrier particles



Fermions			Bosons	
Quarks	U Up	C Charm	T Top	Force Carrier Particles
	D Down	S Strange	B Bottom	
Leptons	V_e Electron Neutrino	V_μ Muon Neutrino	V_τ Tau Neutrino	
	e Electron	μ Muon	τ tau	
			γ EM Photon	
			Z Weak Z Boson	
			W Weak W Boson	
			g Strong Gluon	
			Higgs Boson	

John Dalton's Atomic _____

- All matter is composed of _____.
 - Atoms cannot be _____ or destroyed.
 - All atoms of the same element are _____.
 - Different elements have _____ types of atoms.
 - Chemical _____ occur when atoms are rearranged.
 - Compounds are formed from atoms of the elements.
- Each Element is made up of one kind of _____. The number of Protons and Electrons.
 - Atoms are _____ on The Periodic Table of the Elements.



- Atomic Mass = AMU Atomic Mass Units, The number of protons, _____, and electrons.
- To find # of protons and electrons
 - It is the atomic number
- To find # of neutrons
- Subtract the _____ number from the atomic _____ to determine the difference.
- **Valence electrons** – Electron's in the _____ most shell.
- The number of valence electrons _____ the group placement of an element on the periodic table

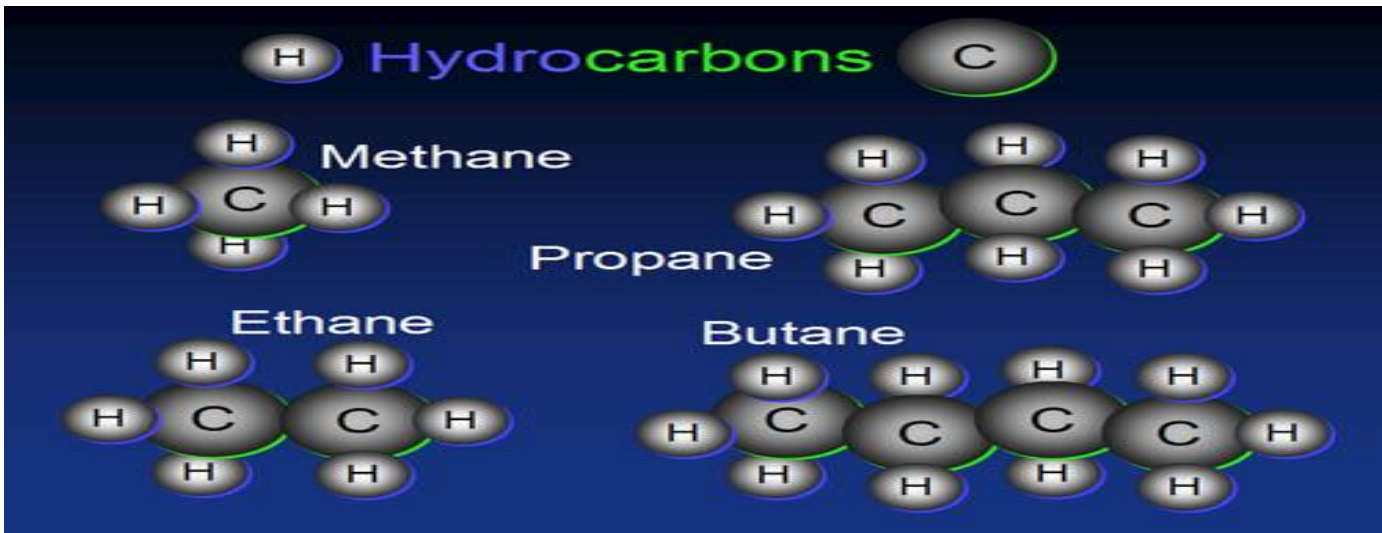
1A		2A						7A	8A
Li ·	· Be ·						· H	:He	
Lithium	Beryllium						Hydrogen	Helium	
		3A	4A	5A	6A				
		· B ·	· C ·	· N :	· O :	· F :	· Ne :		
		Boron	Carbon	Nitrogen	Oxygen	Fluorine	Neon		
		· Al ·	· Si ·	· P :	· S :	· Cl :	· Ar :		
		Aluminum	Silicon	Phosphorus	Sulfur	Chlorine	Argon		

- The rules for the first 18 elements are as follows...SPONCH included

- 2 electrons max in the _____ shell.
- 8 electrons max in the _____ shell.
- 8 electrons max in the _____ shell.
 - 18
 - 32
 - 32
 - 18
 - 2

- Most of the transition metals...
 - 2, 8, 18, 32, 32, 18, 2

- S-Sulfur
- P-Phosphorus
- O-O_____
- N-Nitrogen
- C-C_____
- H-Hydrogen
- **Hydrocarbon** is an organic compound consisting entirely of hydrogen and _____.
-



- **Alcohol** – Mostly carbon and hydrogen with a ____ group

Protein: Group of nitrogenous organic compounds that are essential parts of living _____. ONCH

New Area of Focus: Atomic Bonds

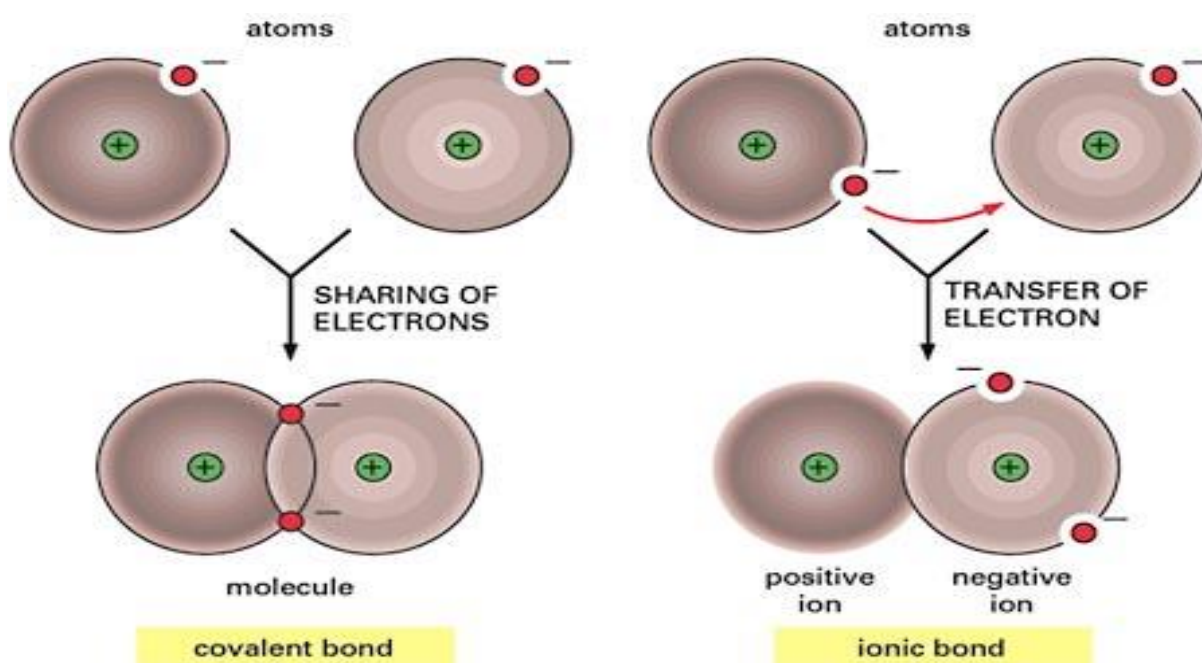
- **Chemical Bonding** – The _____ that _____ atoms close to each other.

Chemical Change: The change of substances into _____ substances through a reorganization of the _____.

The Six Types of Chemical Reactions

- Combustion: When _____ combines with another compound to form water and carbon _____.
- $\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g})$
- Synthesis Reaction: When _____ or more simple compounds combine to form a _____ complicated one. $A + B = AB$
 - $\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2(\text{g})$
- Decomposition Reaction: A complex molecule _____ down to make simpler ones.
 - Opposite of Synthesis Reaction. $AB \rightarrow A + B$
 - $2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$ (Electrolysis of Water)
- Single Displacement: When one element _____ places with another element in a compound. $BC + A \rightarrow AC + B$
- Double Displacement: When the anions and cations of two different molecules _____ places, forming two entirely different compounds.
 - $AB + CD \rightarrow AD + CB$
 - $\text{AgNO}_3 + \text{NaCl} \rightarrow \text{AgCl} + \text{NaNO}_3$

- Acid / Base: When an acid and base _____ with each other.
- Ionic, Covalent, Metallic
 - **Ionic** – Gain or _____ electrons
 - **Covalent** – S_____ electrons
 - **Metallic** - Many _____ electrons
- Covalent bonding occurs by a _____ of valence electrons (Strongest) (SPONCH)



- **Ionic bonding** (+/-) Bonds created by the _____ of opposite charges.
 - **Ionic** – Forms crystal lattice
 - Ion** – A _____ atom
 - When _____ electron, now one atom has 1+ (cation), and the other has 1 – (anion),

- **Ionization:** The process of _____ electrons from an atom to form ions.
- **Metallic** bonding is the bonding between atoms within _____. The sharing of many free electrons.
- Balancing a chemical equation refers to establishing the mathematical relationship between the quantity of _____ and _____.
 - Reactant: Starting
 - Products: Ending
- Remember the Law Conservation of Mass: Matter cannot be _____ or _____. That means we need to have the same amount of chemicals on each side of the equation.
- For this reason, put a square around the chemical formulas.



- Begin balancing chemical equations by putting numbers (c_____) in front of them.
 - Example H₂O on one side could become 2 H₂O
 - Remember that each side needs to have same number of Hydrogen and Oxygen
 - Note – Don't change the _____
 - Example H₂O becomes H₃O
 -
- Oxidation number of an element: The number of _____ lost, gained, or shared as a result of chemical bonding.

- Oxidation: An _____ in oxidation number
- Reduction: A _____ in oxidation number

OIL RIG → Oxidation is L_____ Electrons, Reduction is Gaining Electrons

LEO Says GER → Losing E_____ is Oxidation, Gaining Electrons is Reduction

NEW AREA OF FOCUS – PERIODIC TABLE OF THE ELEMENTS

- The periodic table of the elements is a...
 - A _____ of all the known elements.
 - Is in order of _____ atomic number and mass.
 - The table puts elements into groups with _____ characteristics.
 - Allows us to recognize _____ over the whole array of elements.
- **Period** is h_____
- **Group/Family** v_____

Periodic Table of the Elements

1	IA	1	H	2	O	2	He																														
2	IIA	3	Li	4		5	B	6	C	7	N	8	O	9	F	10	Ne																				
3		11	Na	12	IIIB	13	Al	14	Si	15	P	16	S	17	Cl	18	Ar																				
4		19	K	20	IVB	21	Sc	22	Ti	23	V	24	Cr	25	Mn	26	Fe	27	Co	28	Ni	29	Cu	30	Zn	31	Ga	32	Ge	33	As	34	Se	35	Br	36	Kr
5		37	Rb	38	VB	39	Y	40	Zr	41	Nb	42	Mo	43	Tc	44	Ru	45	Rh	46	Pd	47	Ag	48	Cd	49	In	50	Sn	51	Sb	52	Te	53	I	54	Xe
6		55	Cs	56	VIIB	57	*La	72	Hf	73	Ta	74	W	75	Re	76	Os	77	Ir	78	Pt	79	Au	80	Hg	81	Tl	82	Pb	83	Bi	84	Po	85	At	86	Rn
7		87	Fr	88	VIIIB	89	+Ac	104	Rf	105	Ha	106	Sg	107	Ns	108	Hs	109	Mt	110	110	111	111	112	112	113	113										

* Lanthanide Series	58	59	60	61	62	63	64	65	66	67	68	69	70	71
	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
+ Actinide Series	90	91	92	93	94	95	96	97	98	99	100	101	102	103
	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

- AMU increases from _____ to _____ and top to bottom.
- Electron negativity _____ from lower left to upper right.
- Transition Metals, found in _____
 - Metal's that are malleable and _____

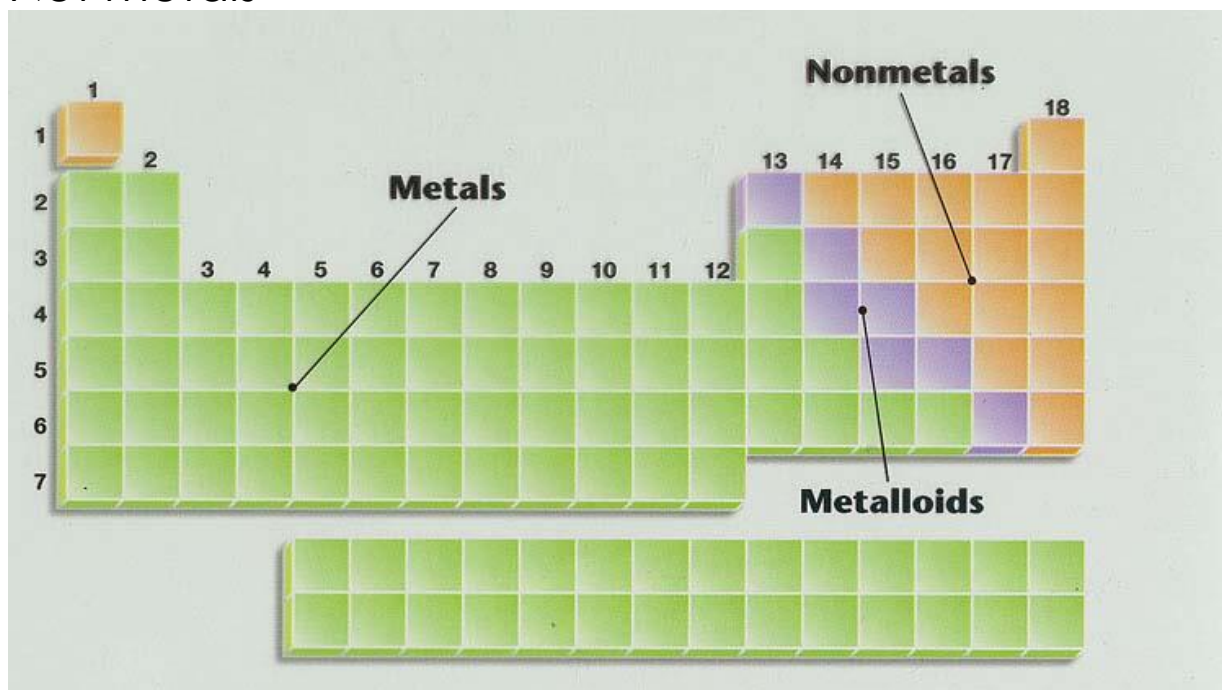
TRANSITION METALS

- **Ductile**- Made into _____
- **Malleable** - Made into _____
- **Metals** are also...
 - Good _____ of electricity.
 - Have a high luster (_____).

- Mostly _____ (Hg is a liquid).
- Most have a high d_____.

● Non-Metals

- Not metals



■ Non-Metals continued

- H and _____ are non-metals
- They are _____ conductors.
- They are _____, not ductile
- They show _____ metallic luster
- They may be transparent or t_____
- They have _____ density
- C_____ bonded.

● Percentage of SPONCH elements in living things.

● S.	Sulfur	Trace
● P.	Phosphorus	1.0%
● O.	O_____	65.0%
● N.	Nitrogen	3.3%
● C.	C_____	18.5%
● H.	Hydrogen	9.56%
●	Other (Trace)	3.0%

- Sulfur, Sodium, Magnesium, Copper, Zinc, Selenium, Molybdenum, Fluorine, Chlorine, Iodine, Manganese, Cobalt, Iron Lithium, Strontium, Aluminum, Silicon, Lead, Vanadium, Arsenic, Bromine

Metals

- **Conduction:** Metals are _____ at conducting electricity.
- **Reactivity:** Metals are very _____ (Alkali Metals)
- **Alloys:** Metals are easily _____

Metalloids/Semimetals

- Properties of _____ and non-metals
- S_____ -conductors
- Brittle
- Can have _____ (Shine)

Noble Gases (Full outer shell of electrons, Very stable and non reactive) Helium (He), Neon (Ne), Argon (Ar), Krypton (Kr), Xenon (Xe), and Radon (Rn)

SAVE THESE NOTES FOR THE HW BUNDLE AND REVIEW GAMES
DO NOT LOSE!

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