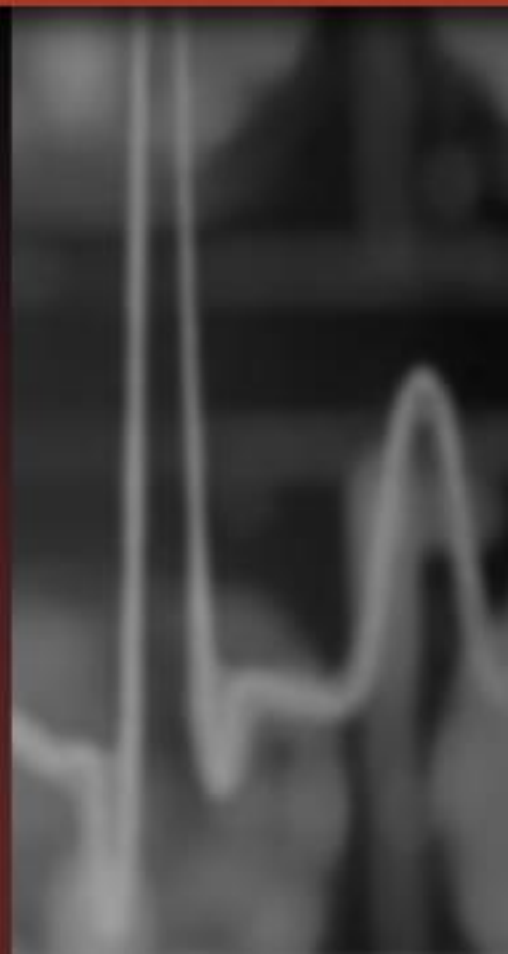


The Periodic Table

Section 5.5



The Periodic Table of Elements

- All elements can be organized into a periodic table.
- The position of elements in the periodic table provides hints about the types of compounds they form.
- [Periodic Table](#)

Elements are organized in 4 different ways:

1) **Atomic Number** - the # of protons in each atom of that element.


Ex. Carbon (C) has 6 protons so its atomic number is 6.

Atomic Number → 47

Ag

Silver

107.8682



2) **Metallic and Non-Metallic** - elements to the left of the *staircase* line are **metals**. Those to the right are **non-metals**.

- Elements that are on this staircase may have properties of both and are called **metalloids**.
- Elements in the bottom 2 rows are all metals.
- 75% of all elements are metals.

1												13 14 15 16 17						18
Metals		Metalloids										Nonmetals						
1 H																		2 He
3 Li	4 Be												5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg	3										13 Al	14 Si	15 P	16 S	17 Cl	18 Ar	
19 K	20 Ca	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	
37 Rb	38 Sr	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	
55 Cs	56 Ba	71 Lu	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	
87 Fr	88 Ra	103 Lr	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Uub	113	114	115	116	117	118	
<i>Lanthanide series</i>		57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb			
<i>Actinide series</i>		89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No			



3) Groups or Families - the vertical columns. Each group has similar chemical properties.

metalloids

Periodic Table of Elements

1A	1	2																	0
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
	H	He	Li	Be	B	C	N	O	F	Ne	Na	Mg	Al	Si	P	S	Cl	Ar	
	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	
	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	
	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	
	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe	
	55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	
	Cs	Ba	*La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn	
	87	88	89	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	
	Fr	Ra	+Ac	Rf	Ha	106	107	108	109	110	111	112	113	114	115	116	117	118	

* 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

Legend - click to find out more...

H - gas

Li - solid

Br - liquid

Tc - synthetic

Non-Metals

Transition Metals

Rare Earth Metals

Halogens

Alkali Metals

Alkali Earth Metals


Other Metals

Inert Elements

Noble Gases

Q/A

- You add Chemical A to Chemical B. When combined you notice, no odor, colour, heat/ light change has occurred. However, when you add chemical A to Chemical B over a Bunsen burner, a new substance is formed. What is the difference between the two experiments?


- 
- In experiment 1- no chemical change seems to have occurred.
 - In experiment 2- we can say what a chemical change has occurred because a new substance is formed.


- <http://ca.youtube.com/watch?v=cL6l1O1YHH0>

- 
- **The Alkali Metals** - very reactive, soft silver colored metals that react violently with water.

Note: Hydrogen is not included in this group.

- **The Alkaline-Earth Metals** - are light, reactive, react with air.

- 
- **NOTE:** As we go down groups 1 & 2 the reactivity increases so K is more reactive than Na. Francium is the most reactive metal.
 - **The Transition Elements** - wide range of chemical & physical properties.
 - **Non-Metals** - Hydrogen is classified in this group.

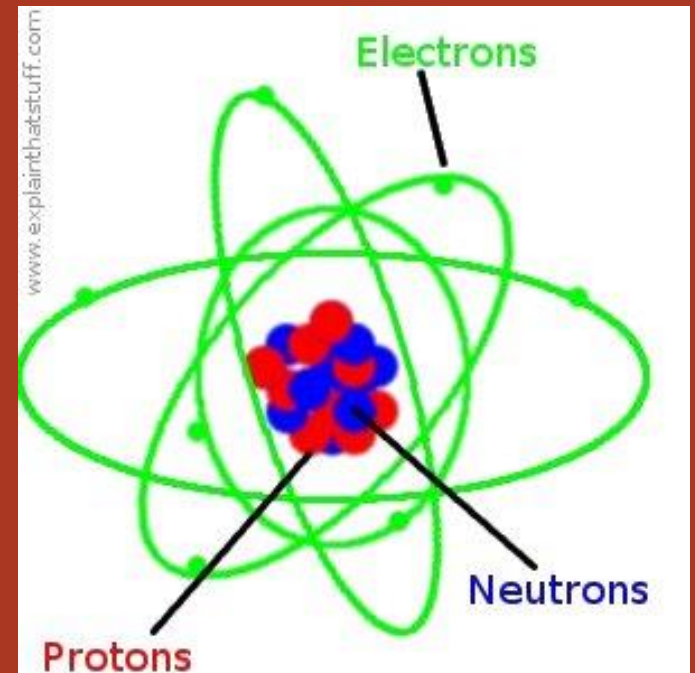
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- **The Halogens** - most reactive non-metals, they react with Hydrogen to create acidic solutions. **As we go down reactivity decreases.** Fluorine is the most reactive non-metal.
 - **The Noble Gases** - special because of their low reactivity, also called the inert gases.

- **The 2 Bottom rows in the table:**
Lanthanides (rare earth metals) & Actinides

4) **Periods** - horizontal rows. The reactive properties change as you move from left to right across a row. There are 7 periods!

Elements and Atomic Structure

- Atoms are composed of three types of subatomic particles: protons, neutrons, and electrons.
- Brain POP-Atoms



Q/A

- I'm an atom with my outer most shell full of electrons. What group would I be in and what characteristics might I have?
- The atom would most likely be in the noble gases group because they also have completed outer electron shells. Since it has no electrons to take or give away, it would be non-reactive.

Protons

- positively charged particles
- found in the nucleus of an atom
- the number of protons determines the element's atomic number
 - ex Carbon has 6 protons, its atomic number is 6

Neutrons

- neutral particles
- found in the nucleus of an atom
- the number of protons plus the number of neutrons makes up the atomic mass
 - ex Carbon has 6 protons and 6 neutrons, its atomic mass is 12

Electrons

- negatively charged particles
- “circle” the nucleus at different energy levels called orbits.

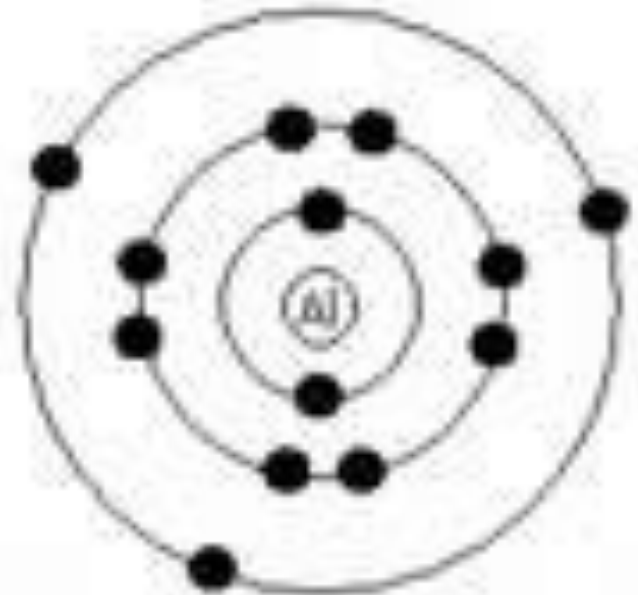
SUBATOMIC PARTICLES


	PROTON	NEUTRON	ELECTRON
ELECTRICAL CHARGE	positive 1+	no charge 0	negative 1-
MASS (amu)	1	1	0
LOCATION	in the nucleus	in the nucleus	orbits the nucleus
SYMBOLS	p p ⁺ H ⁺	n n ₀	e e ⁻

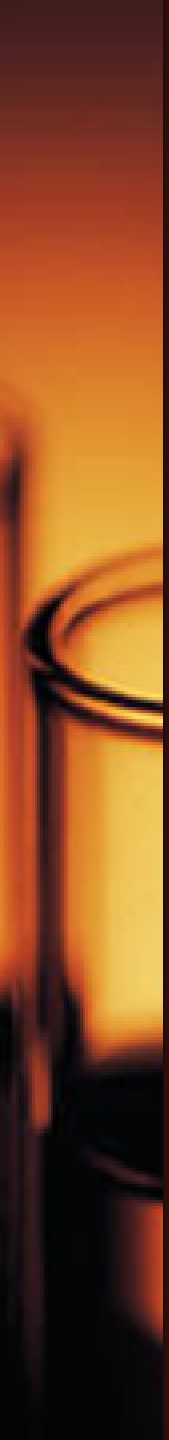
(REFERENCE)

Bohr Diagrams

- **Bohr Diagrams – represent the arrangement of electrons in the various orbits of an atom.**
 - 1st orbit – 2 electrons
 - 2nd orbit – 8 electrons
 - 3rd orbit – 8 electrons



- 
- Most atoms have a neutral overall charge; this means that the number of protons (positively charged particles) equals the number of electrons (negatively charged particles).
 - **The further away an electron is from the nucleus, the more likely the electron will be lost (chemical reaction).**

- 
- If an atom has more protons than electrons it is said to be a positively charged ion.
 - If an atom has more electrons than protons it is said to be a negatively charged ion.
 - If an atom has the same number of electrons as protons it is neutral.

Bohr Worksheet

- Due the front and back of the worksheet.
- Follow the directions, step by step!
- You may listen to your music.... ON LOW!