

Homework p. 175 #1, 2, 4, 5, 9

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Warm Up

	Element	Compound	Molecule
CH₄		✓	✓
Co	✓		✗
S₈	✓		✓

Water $\xrightarrow{100^{\circ}\text{C}}$ Steam

H_2O \longrightarrow H_2O

liquid

gas

H_2O \longrightarrow $\text{H} + \text{O}$

Atom

Element

Compound

Molecule

Periodic Table

Periodic table - a structured arrangement of elements that help us explain and predict physical and chemical properties.

Metals are generally located on the left, while the non-metals are located on the right side of the table. (staircase line)

Periodic Table of the Elements

1	IA	H																	O	2																
2		Li	IIA	Be																	He															
3		Na		Mg	III A	Al	IV A	C	V A	N	VIA	O	VII A	F	18	Ar																				
4		K		Ca	III B	Sc	IV B	Ti	V B	V	VIB	Cr	VII B	Mn	VIII	Fe	IX	Co	X	Ni	XI	Cu	XII	Zn	XIII	Ga	XIV	Ge	XV	As	XVI	S	XVII	Cl	XVIII	Br
5		Rb		Sr		Y		Zr		Nb		Mo		Tc		Ru		Rh		Pd		Ag		Cd		In		Sn		Sb		Te		I		Xe
6		Cs		Ba		*La		Hf		Ta		W		Re		Os		Ir		Pt		Au		Hg		Tl		Pb		Bi		Po		At		Rn
7		Fr		Ra		+Ac		Rf		Ha		Sg		Ns		Hs		Mt		110		111		112		113										
		* Lanthanide Series		58	59	60	61	62	63	64	65	66	67	68	69	70	71																			
		+ Actinide Series		90	91	92	93	94	95	96	97	98	99	100	101	102	103																			
				Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu																			
				Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr																			

Hydrogen, the lightest element, is the exception to almost every rule in chemistry. Although it is located on the left side of the staircase, it behaves mostly as a **nonmetal**.

Metals are normally shiny, malleable, conductors, react with acid, and are mostly solids at room temperature.

Non-metals are generally dull, brittle, good insulators, do not react with acid, and can be solid, liquids or gas at room temperature.

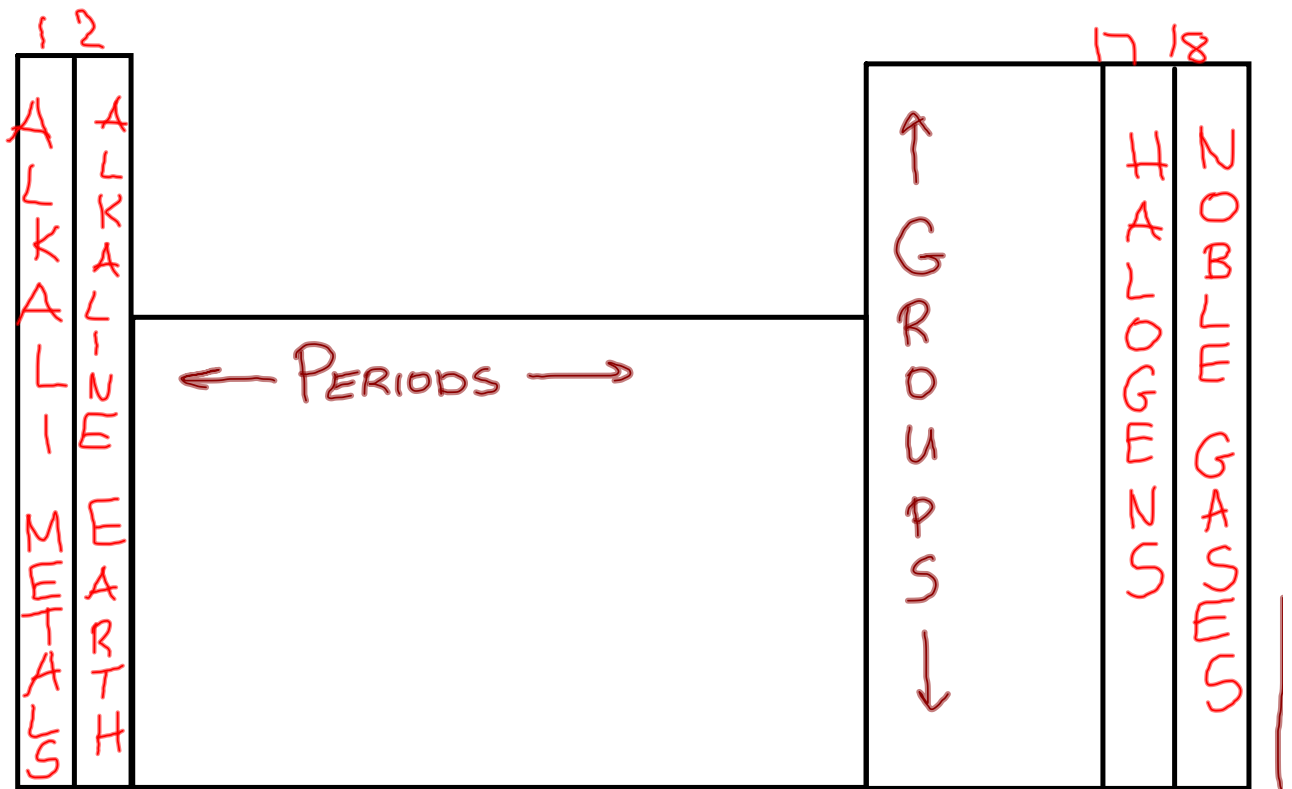
Chemical Families (groups) are vertical columns in the periodic table. They tend to have similar physical and chemical properties.

Alkali metals (group 1) are shiny, silvery metals and form compounds that are mostly white solids and soluble in water.

Alkaline earth metals (group 2) are shiny, silvery metals, but they form compounds that are not soluble in water.

The *halogens* (group 17) generally react with alkali metals.

Noble gases (group 18) generally do not form compounds.



Groups (families)

Parts of an Atom

The smallest part of an element is called the atom.

The atom is comprised of three types of subatomic particles:
protons, neutrons and electrons .

Protons: are 'heavy', positively charged (p^+) particles found in the **nucleus**

- the number of protons is equal to the atomic number

Neutrons: are neutral particles that have the same mass as a proton and are found in the nucleus.

What does neutral mean??

Electrons: are negatively charged (e^-) particles that circle or orbit the nucleus at different energy levels.

- The particles have almost no mass.
- The farther away from the nucleus an electron is, the higher the energy level.
- atoms are electrically neutral, so the number of p^+ equals the number of e^-

- Bohr diagrams can be drawn to represent the arrangement of electrons in various levels or orbits
- each orbit has a definite number of electrons

**the first level can have two
the second can have eight
the third can have eight**

Atomic Models

Draw a Bohr diagram for:

a) C

b) Cl

c) Be

d) N

**Exercise p.187
#1-4**

**Bohr Diagram
worksheets**

Ions

- elements are willing to give up or gain e^- in order to have the appearance of a filled outermost orbital
- when e^- are gained or lost, an atom is then called an **ion**
- **an ion is an atom with a positive or negative charge**
- the ionic charge is the numerical value of the electric charge with a plus or minus sign

Ex. Li atom has $3p^+$ and $3e^-$

Li ion has $3p^+$ and $2e^-$ and is written Li^{1+}

Which groups would tend to lose electrons? Gain electrons?

- metals lose electrons to become stable
Ex. magnesium will lose two e^- and become positively charged
 $Mg \text{ atom} \rightarrow Mg^{2+}$
- nonmetals gain electrons to become stable
Ex. oxygen will gain two e^- and become
 $O \text{ atom} \rightarrow O^{2-}$