

Ex. of a Chemical Change

wood burning, rusting metal, milk souring

Ex of a physical change

(change of state) - boiling water, freezing

Density formula  $d = \frac{m}{V}$

P. 42 #5 a)  $d = \frac{84.7\text{ g}}{49.6\text{ cm}^3}$

$$d = \boxed{1.71\text{ g/cm}^3}$$

b)  $1.71\text{ g/cm}^3 = \frac{7.75\text{ g}}{\boxed{V}}$   
 $V = 4.53\text{ cm}^3$

P. 60  
# 28.

$$d = \frac{5.03\text{ g}}{3.24\text{ mL}} = \boxed{1.55\text{ g/mL}}$$

# 29.  $6.72\text{ g/cm}^3 = \frac{m}{55.1\text{ cm}^3}$

$$\boxed{371\text{ g}} = m$$

# 30.  $0.824\text{ g/mL} = \frac{451\text{ g}}{\boxed{V}}$  cross multiply!

$$\boxed{V = .547\text{ mL}}$$

corrected  
↓

Unit Conversion - Dimensional Analysis P. 60 # 31-34

31)  $882\text{ }\mu\text{g} \times \frac{1\text{ g}}{10^6\text{ }\mu\text{g}} = 8.82 \times 10^{-4}\text{ g}$

33) a)  $19.39\text{ g/cm}^3 = \frac{715\text{ g}}{\boxed{V}} \quad V = 37.0\text{ cm}^3$

b) take the cubed root!

$$37^{(1/3)} = \boxed{3.33\text{ cm}}$$

#32. (sorry -out of order)

$$0.603 \text{ L} \times \frac{10^3 \text{ mL}}{1 \text{ L}} = \boxed{603 \text{ mL}}$$

#34 a  $92.25 \text{ km} \times \frac{10^3 \text{ m}}{1 \text{ km}} = \boxed{92250 \text{ m}}$

b.  $92250 \text{ m} \times \frac{10^2 \text{ cm}}{1 \text{ m}} = 9225000 \text{ cm}$

Significant Figures :

1) All non zeros are significant

32 (2 sig figs)

2) leading zeros are not significant

0.04 (1 sig fig)

3) Trailing zeros without a decimal  
are not significant.

300 (1 sig fig)

4) ~~approximate~~ trailing zeros with a decimal  
are significant.

30.0 (3 sig. figs.)

5) Sandwiched (captive) zeros are significant.

(all #'s in scientific notation are significant)

# Calculations using Sig. Figs

p60 # 38-42

38) a. 4

b. 1

c. 5

d. 3

Adding + subtracting  
least # of decimal places

39)

$$\begin{array}{r} 6.6\overline{7}8 \\ + 0.3\overline{3}29 \\ \hline 6.4\overline{1}09 \end{array} \rightarrow 6.411 \text{ g}$$

40)  $8.2 - 7.11 = 1.09 \rightarrow$   
 $1.1 \text{ cm}$

multiplication + division -  
least # of sig. fig.

41)  $0.8102 \times 3.44 = 2.79 \text{ m}^2$

42)  $3.16722 \frac{1}{\text{mL}} \sqrt[3]{94.20 \text{ g}}$

$29.749/\text{mL}$

## Scientific Notation

P. 60 # 43-44

A3. a.  $6.730 \times 10^{-4}$

b.  $5.00000 \times 10^{+4}$

c.  $3.010 \times 10^{-6}$

44. a). 007050 g

b) 40000500 \* mg

c) 23500 mL

# MOLES

AVOGADRO'S Number

$6.02 \times 10^{23}$  particles in 1 mole

Molar mass - found on the periodic table  
units are grams/mole  
carry the #'s out 2 decimal places

Conversions

P. 85 #5 a.  $2.00\text{ mol N} \times \frac{14.01\text{ g}}{1\text{ mol}} = \boxed{28.02\text{ g}}$

#5b.  $3.01 \times 10^{23}\text{ atoms Cl} \times \frac{1\text{ mole}}{6.02 \times 10^{23}\text{ atoms}} \times \frac{35.45\text{ g}}{1\text{ mol}}$

=

#6a.  $12.15\text{ g Mg} \times \frac{1\text{ mol}}{24.31\text{ g}} \approx \cancel{0.5} =$

b.  $1.50 \times 10^{23}\text{ atoms F} \times \frac{1\text{ mol}}{6.02 \times 10^{23}\text{ atoms}} =$

7-a.  $2.50\text{ mol Zn} \times \frac{6.02 \times 10^{23}\text{ atoms}}{1\text{ mol}} =$

b.  $1.50\text{ g C} \times \frac{1\text{ mol}}{12.01\text{ g}} \times \frac{6.02 \times 10^{23}\text{ atoms}}{1\text{ mol}} =$

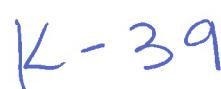
# Atomic Structure

p. 87 #11 a atomic # = 2 , mass # = 4.



b. atomic # = 8 ) mass # = 16  
 $\text{O-}^{16}$        ${}^{16}\text{O}$

c. Atomic # 19 ; mass # 39



#	Particle	symbol	mass #	Actual mass	Relative charge
25	Electron	$e^-$ , ${}^0\text{-e}$	0	$9.109 \times 10^{-31}$	-1
	Proton	$p^+$ , ${}^1\text{H}$	1	$1.673 \times 10^{-27}$	+1
	Neutron	$n^0$ , ${}^1\text{n}$	1	$1.675 \times 10^{-27}$	0

## Electromagnetic Spectrum

Wavelength  $\lambda$  meters

Frequency  $\nu$  Hz or  $s^{-1}$

Speed of light  $3.00 \times 10^8 \text{ m/s}$  c

Flame test + gas spectrum lab electrons  
 jump from "ground state" to "excited state" When  
 absorb energy

# Quantum #'s

1.) Principal - Energy level ; n

Honors  $\rightarrow$  1, 2, 3, 4 etc.

2.) Angular Momentum - shape of the ; l orbital

Honors  $\rightarrow$

s = 0

(the max value

p = 1

is  $n-1$  for a

d = 2

given energy

d = 3

level)

3.) Magnetic - the orientation of the orbital about the nucleus; m<sub>e</sub>

Honors  $\rightarrow$  from -l to +l for a given orbital shape

4.) Spin - direction of spin ; m<sub>s</sub>

Honors  $\rightarrow$   $+\frac{1}{2}$  or  $-\frac{1}{2}$

s, p, d, f blocks (know where they are)

Electron configuration  $1s^2$

for any element through Barium  
Know the noble gas shortcut

Orbital Notation - Filled (arrows)  
Understand the rules.

Periodic Table Group Names -

Group 1A - Alkali metals

Group 2A - Alkaline Earth Metals

D-block - Transition Metals

Group 3A -

Group 4A

5A

6A

we don't name  
specifically

7A - Halogens

8A - Noble Gases

Groups - up + down

Periods - left to right

Ions - understand the # of valence electrons = group #

What ion will any atom in groups 1-8 form.

+1 Grp 1	+2 Grp 2			+3 Grp 3	+/-4 Grp 4	-3 Grp 5	-2 Grp 6	-1 Grp 7	0 Grp 8
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## Periodic Trends

- Know the definition
- Know how they change across and down
- Know why

Ionization Energy - The energy required to remove an electron. Increases across, decreases down

Across - ~~Atoms~~ electrons are pulled more strongly to the nucleus, more difficult to take away.  
Down - Electrons further from the nucleus - removed more easily.

Atomic Size - (Radius) Decreases across, increases down

Decreases because the nucleus is more positive + pulls the electrons closer.

Decreases down  
Increases because there are more energy levels and the electrons are farther from the nucleus.

Electronegativity - the ability to attract electrons to form a bond / within a bond

Increases across, decreases down.

## Electro negativity cont. (Why?)

Across -

Increases because the nucleus has more protons, the radius is smaller. Pulls electrons in very easily.

Down

Decreases - electrons too far away to be pulled into the nucleus.

## Electron Affinity - the energy gained when an atom gains an electron.

Across

Increases - Atoms become more stable as they get closer to full outer shell

down

Decreases - atoms are so big, not as stable

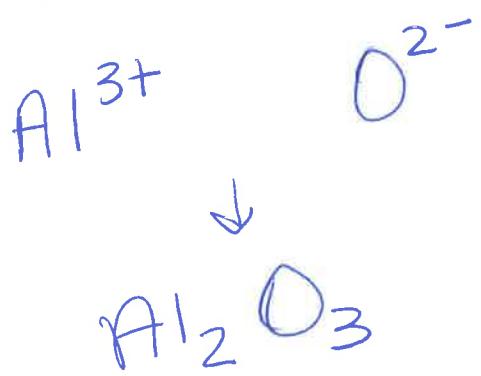
## Shielding effect

the core electrons block the attraction of outer electrons from the nucleus decreases across, increases down.

## Chemical Bonding

Ionic - transfer electrons

metal + nonmetal  
cation + anion  
name ends  
in  
-ide  
name stays same



Electronegativity Difference  $> 1.7$

Covalent - Share electrons  
2 nonmetals

Nonpolar  
 $< 0.3$  Electronegativity  
Difference  
equal sharing of  $e^-$

Polar  
 $1.7$  to  $0.3$  Electronegativity  
Difference  
Unequal sharing

metallic Bonds - between metals  
Electrons delocalize  
and move between  
atoms

(why metals are  
good conductors of  
electricity)

Lewis Structures -

Octet Rule - everyone wants 8  
exceptions H + He (2)

Chem I - only responsible for Lewis Dot

Ex.  
Nitrogen       $\ddot{\text{N}}^{\ddagger}$       R, L, V, D

Honors - All Lewis Structures, expanded +  
incomplete octets etc.

# Nuclear Chemistry

Decay - Alpha  ${}_{2}^{4}\alpha$  or  ${}_{2}^{4}\text{He}$

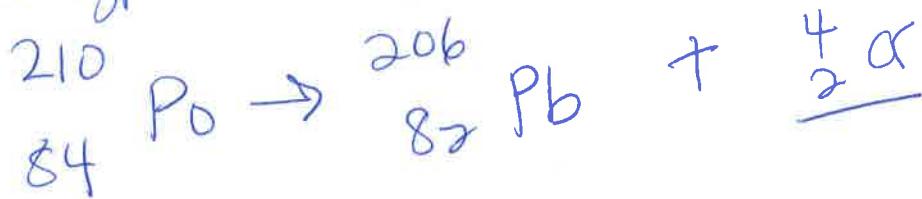
Beta  ${}_{-1}^{0}\beta$  or  ${}_{-1}^{0}e$

Gamma  ${}_{0}^{0}\gamma$

Positron  ${}_{+1}^{0}\beta$  or  ${}_{+1}^{0}e$

Balance Nuclear Eq.

What type of decay?



Alpha

Honors - half life problems