

## Unit 2 - Compounds

- Introduction
- Ionic Compounds
- Molecular Compounds
- Acids and Bases

**NAMES  
&  
FORMULAS**

## Unit 2 - Compounds

COMPOUNDS are conventionally divided into three classes:

(1) **metal - nonmetal** (ionic compounds)

Ex. salt **NaCl**

(2) **nonmetal - nonmetal** (molecular compounds)

Ex. sulfur dioxide **SO<sub>2</sub>**

(3) **metal - metal** (intermolecular compounds)

Ex. brass Cu - Zn

**we will not  
be studying  
metal-metal**

**"tested"**



Empirical Definitions

Ionic Compounds - solids at SATP

- when dissolved in water they conduct electricity
- no change in litmus paper

Molecular Compounds - solids, liquids and gases which, when dissolved in water, do not conduct electricity

- no change in litmus paper

ACIDS - when pure, resemble molecular substances

(can be solids, liquids or gases at SATP)

- in solution, their conductivity suggests a separate third class. (do conduct electricity, but strength varies)
- in solution, make blue litmus turn **red**.

BASES - compounds whose aqueous solutions make red litmus turn **blue**.

FOUR STATES OF MATTER SUBSCRIPTS

(s) - solids

(l) - liquids

(g) - gases

(aq) - aqueous (dissolved in water)

Ex. H<sub>2</sub>O<sub>(l)</sub>

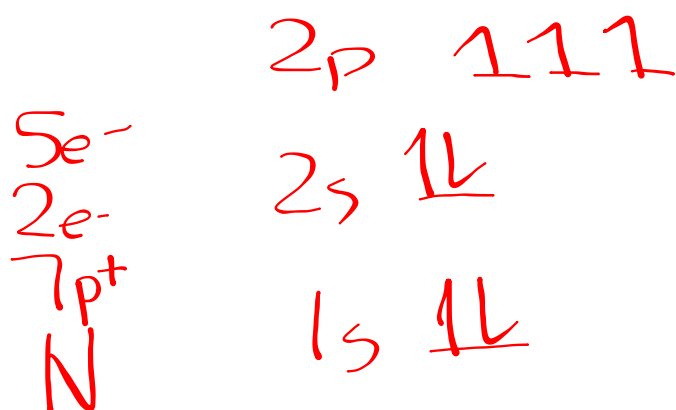
DIAGNOSTIC TESTS : [A] Conductivity Test  
[B] Litmus Test

## Periodic Table of the Elements

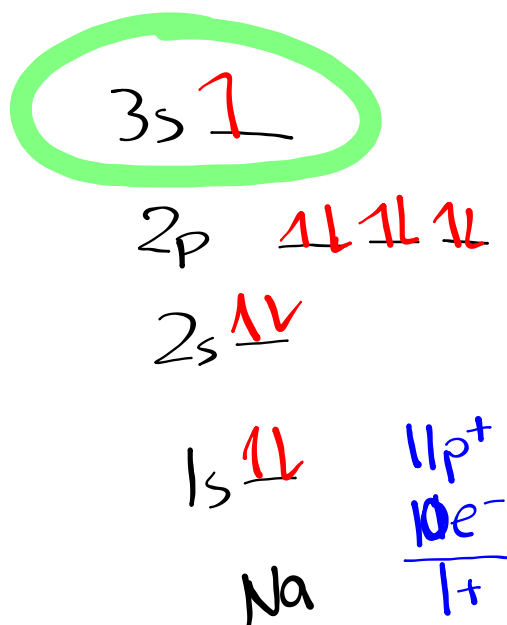
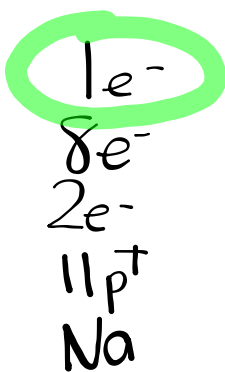
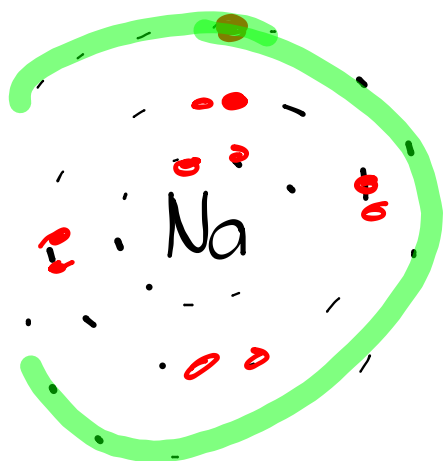
1 1 H 1.00794	2 2 He 4.0026																
3 3 Li 6.941	4 4 Be 9.01218											5 5 B 10.811	6 6 C 12.011	7 7 N 14.0067	8 8 O 16.00	9 9 F 18.9984	10 10 Ne 20.1797
11 11 Na 22.98976928	12 12 Mg 24.304											13 13 Al 26.9815386	14 14 Si 28.0855	15 15 P 30.973762	16 16 S 32.065	17 17 Cl 35.453	18 18 Ar 39.948
19 19 K 39.0983	20 20 Ca 40.078	21 21 Sc	22 22 Ti	23 23 V	24 24 Cr	25 25 Mn	26 26 Fe	27 27 Co	28 28 Ni	29 29 Cu	30 30 Zn	31 31 Ga	32 32 Ge	33 33 As	34 34 Se	35 35 Br	36 36 Kr
37 37 Rb 85.4678	38 38 Sr 87.62	39 39 Y	40 40 Zr	41 41 Nb	42 42 Mo	43 43 Tc	44 44 Ru	45 45 Rh	46 46 Pd	47 47 Ag	48 48 Cd	49 49 In	50 50 Sn	51 51 Sb	52 52 Te	53 53 I	54 54 Xe
55 55 Cs 132.90545196	56 56 Ba 137.327	57 57 La	72 72 Hf	73 73 Ta	74 74 W	75 75 Re	76 76 Os	77 77 Ir	78 78 Pt	79 79 Au	80 80 Hg	81 81 Tl	82 82 Pb	83 83 Bi	84 84 Po	85 85 At	86 86 Rn
87 87 Fr	88 88 Ra	89 89 Ac	104 104 Rf	105 105 Ha	106 106 106	107 107 107	108 108 108	109 109 109	110 110 110								

- Lanthanide Series
- + Actinide 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
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







# Ionic Compounds

## one atom!

Monatomic ions - single atoms that have gained or lost electrons

Ex.  $\text{Na}^+$  or  $\text{F}^-$        $\text{Ca}^{2+}$

Binary ionic compounds - are composed of monatomic ions.

Ex.  $\text{Na}^+ + \text{Cl}^- \rightarrow \text{NaCl}$

## many atoms!

Polyatomic ion - a cation or anion that is composed of a group of atoms with a net positive or negative charge.

Ex.  $\text{NO}_3^-$

(back of periodic table)

Multivalent ion - some atoms (transition elements) can form more than one ion, each with its own particular charge.

Ex.  $\text{Fe}^{2+}$  and  $\text{Fe}^{3+}$

Hydrate - compounds that decompose at relatively low temperatures to yield water and another associated compound (usually ionic)

- the water is loosely held to the ionic compound.

Ex.  $\text{Cu}^{2+}\text{SO}_4^{2-} \cdot 5\text{H}_2\text{O}$

$\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$

Anhydrous - the form of a hydrate with the water removed.

Ex.  $\text{CuSO}_{4(s)}$

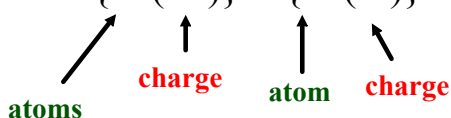
## Ionic Formulas

" The net electrical charge in a theoretical chemical formula is zero (see Table 3.3)

Therefore the sum of the charges on the positive ions (cations) must equal the sum of the electrical charges on the negative ions (anions)

Ex.  $\text{Na}_2\text{O}$

$$\{2*(+1)\} + \{1*(-2)\} = 0$$



## CHEMICAL NAMES AND FORMULA'S

### Type I Binary Ionic Compounds

Binary Compounds - are compounds containing only two elements. In naming binary compounds, place the name of the **cation (metal)** followed by the name of the **anion (nonmetal)** with the suffix -ide added.

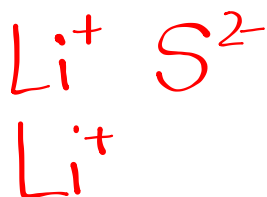
Ex.  $\text{AlCl}_3$



aluminum chloride

*Writing the chemical symbol from the name*

Ex. lithium sulfide





# Homework

Chapter 9 p. 252 - 285

p. 256 #1, 2

p. 258 #3,4,6,8