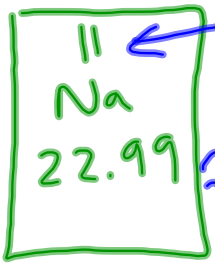
Lewis Diagrams

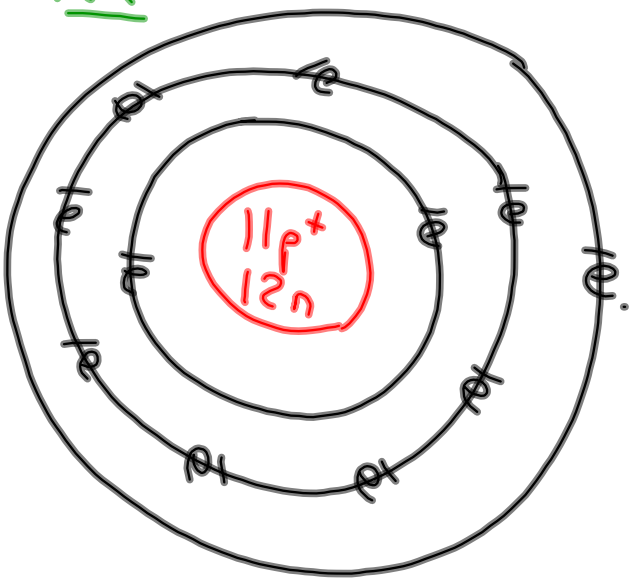
A Lewis diagram shows the element symbol and the number of valence electrons that the element has.



atomic # = # p^+ = # e^-

= # p^+ + # n

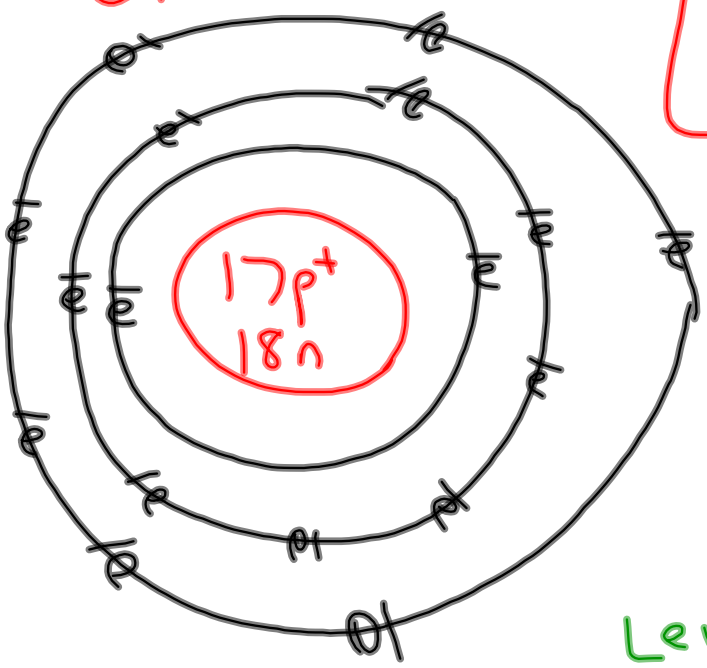
Na



$2\bar{e}$ $8\bar{e}$ $1\bar{e}$

v = 1

Lewis Diagram : $Na^{\bullet}$



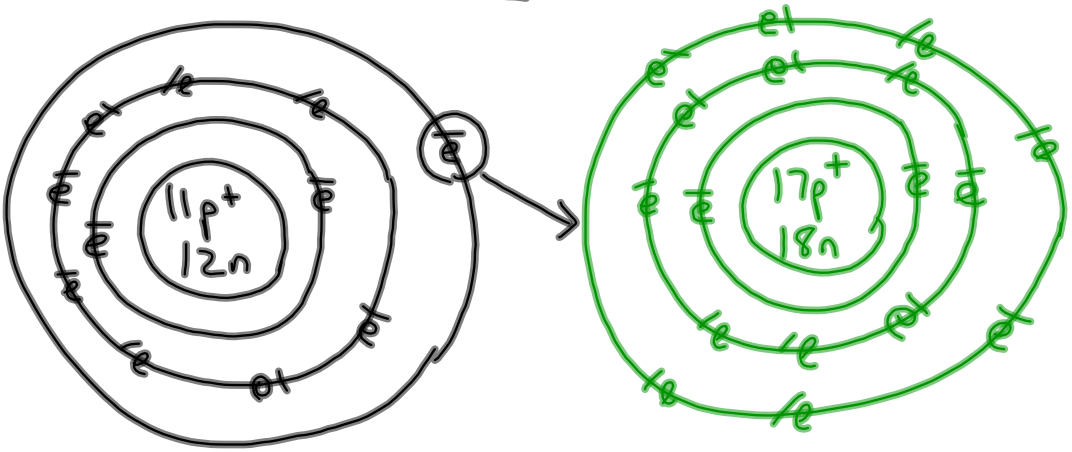
17
Cl
35.45 ≈ 35

2e⁻ 8e⁻ 7e⁻
↑
v = 7

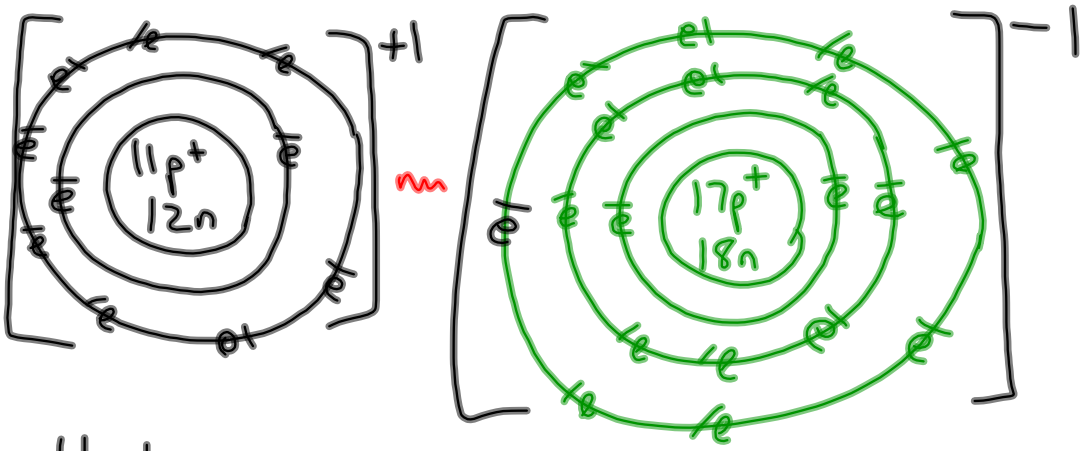
Lewis Diagram:

:Cl:

Na Before Cl



After



$11p^+ = +11$

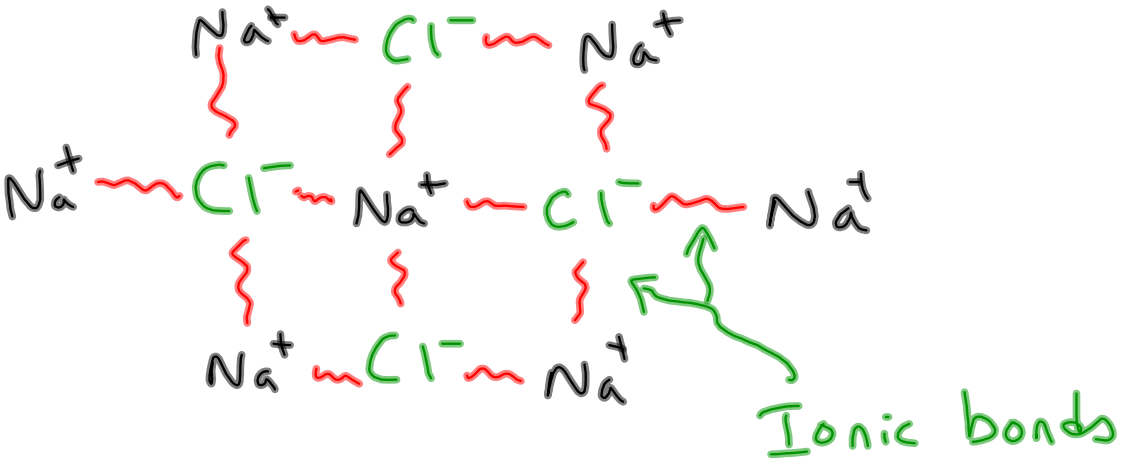
$10\bar{e} = -10$

$+1$

$17p^+ = +17$

$18\bar{e} = -18$

-1



Crystal Lattice: the regular 3-D arrangement of cations and anions in a sample of an ionic compound.

* Any Metal - Nonmetal (either could be replaced by a polyatomic ion) Combination will give you a crystal lattice.

Let's look at that process using Lewis diagrams: (L.D.)

Na + Cl

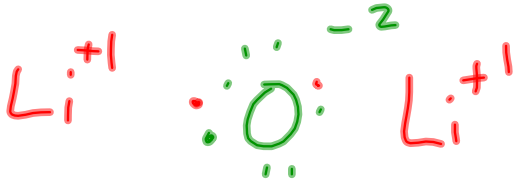
L.D for Elements

L.D. for Compound

Li + O

L.D. for Elements

L.D for Compd.



Chemical formula is

Li_2O

Aluminum nitride

L.D. elements

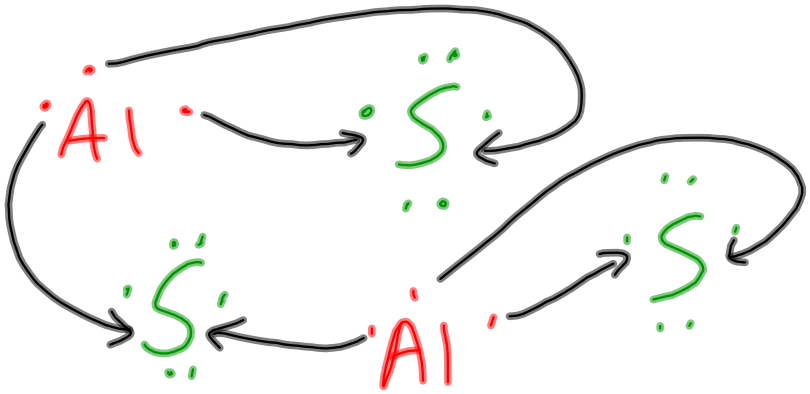
L.D. compound

Chem form

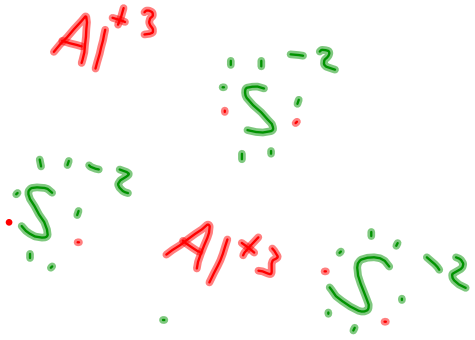
AlN

Aluminum Sulfide

L.D. Elements



L.D. Compound



Chem formula:

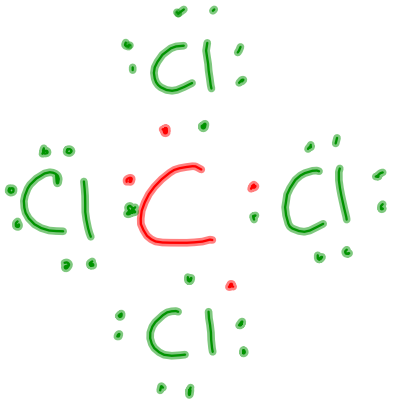
Al_2S_3

All of this happens for ionic compounds ONLY

For Covalent Compounds

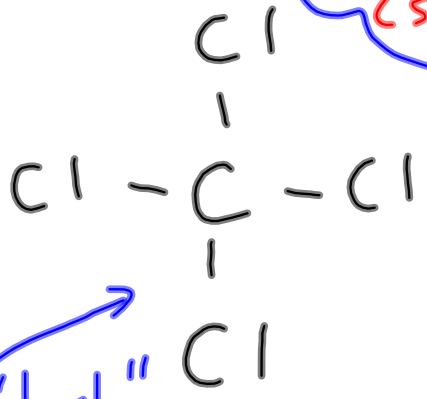
(2 nonmetals): it's this story:

Carbon + Chlorine



CCl_4

structural formula representation (s.f.r)

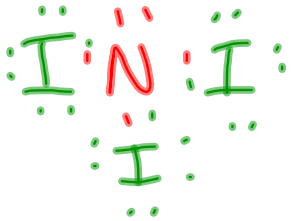


s.f.r

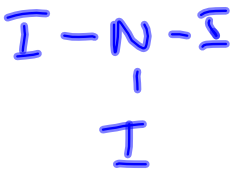
Shows the number + arrangement of the atoms in each molecule of the compound.

each "dash" represents a shared pair of electrons; a "single bond"

N and Iodine



s.f.c.



NI_3

We use electronegativity differences to determine whether a compound is Ionic or Covalent.

Ionic : The electronegativity difference is greater than 1.7.

e.g. Na Cl
0.9 3.0

3.0 − 0.9 = 2.1

Since 2.1 > 1.7
It's ionic compound

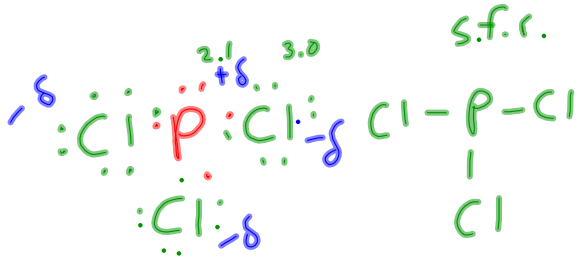
e.g. Ca and I
1.0 2.5

2.5 − 1.0 = 1.5

Covalent

e.g. P and Cl
2.1 3.0

e.d = 0.9



Polar Covalent Bond : When e.d. is between 0.4 − 1.7.

→ the electrons spend more time around the more electronegative atom, so that end of the bond takes on a slightly negative charge.

Nonpolar Covalent : when e.d. is less than 0.4.

→ $\bar{e}$'s are shared equally

12. Lithium (1.0) + chlorine (3.0)

② a) Ionic

① b) 3.0 − 1.0 = 2
Since electronegativity difference is greater than 1.7.

c) 

d) 

① S.f.r. N/A for ionic cmpd.

Nitrogen (3.0) and Fluorine (4.0)

a) Polar Covalent

b) $4.0 - 3.0 = 1.0$

Since electronegativity difference is between 0.4 - 1.7.

c)

S.f.c

d) L.D. for cmpd.

12. Rubidium (0.8) and Bromine (2.8)

a) Ionic

b) $2.8 - 0.8 = 2$ Since e.d. > 1.7

c) $Rb^{\cdot}$ $:\ddot{B}r^{\cdot}$

d) Rb^{+1} $:\ddot{B}r:^{-1}$

s.f.r is N/A for ionic cmpds

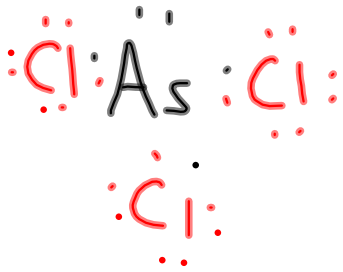
12. Arsenic (2.0) and chlorine (3.0)

a) Polar Covalent

b) 3.0 - 2.0 = 1.0

Since e.d. is between 0.4-1.7

c) 

d) 

s.f.r.