

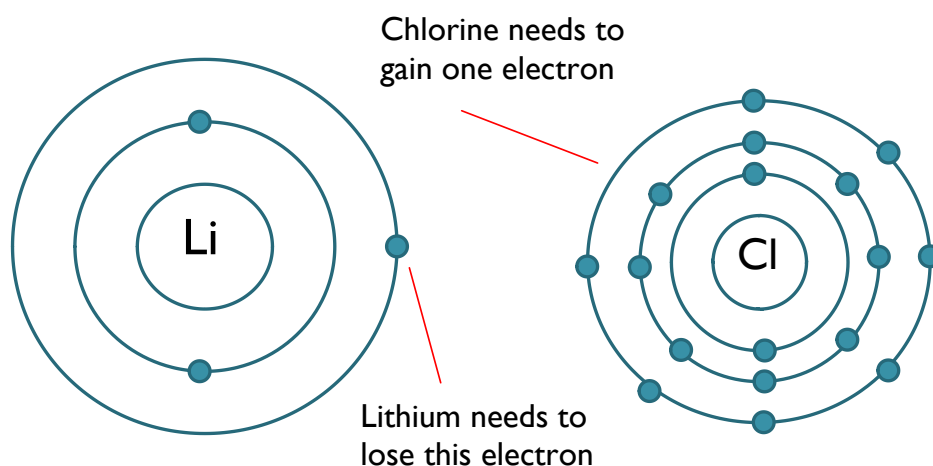
THE FORMATION OF COMPOUNDS

- Atoms, as they appear on the periodic table are not stable because they do not have a full outer shell, and therefore, are not following the octet rule.
- Last day we learned that atoms will gain or lose electrons in order to become stable by having a full outer shell

Questions: Where do these electrons come from and where do they go?????

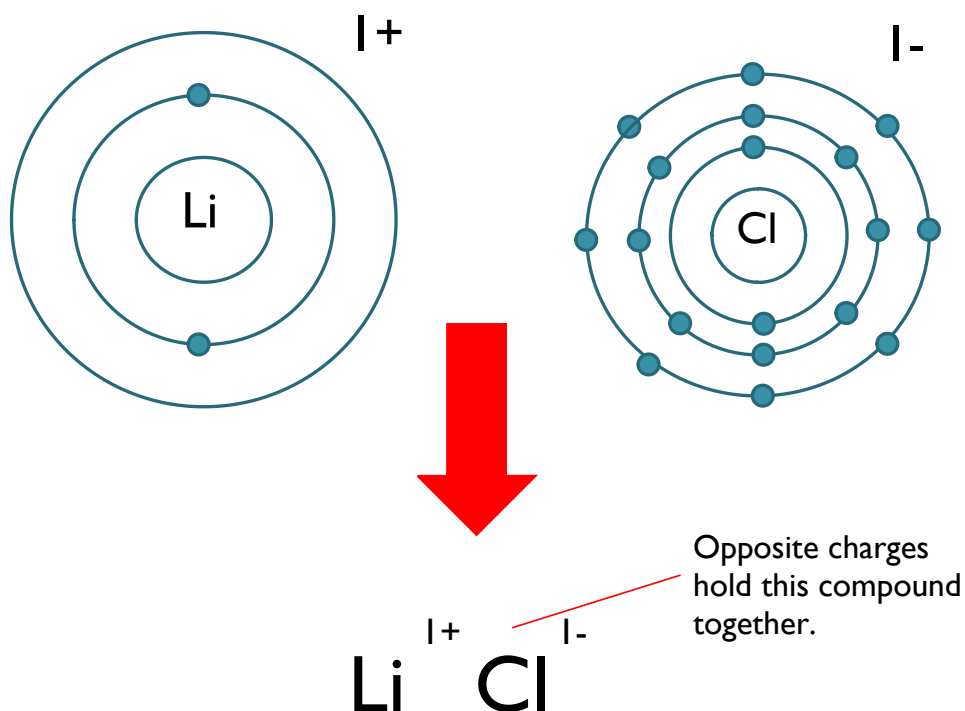
For Example:

- In our examples last day we looked at the lithium atom and chlorine atom.
- We discovered that lithium would need to lose one electron in order to have a full outer shell and that chlorine would need to gain one electron in order to be full.
- Let's take a look.



Do you see the connection???

- Lithium is going to give it's electron to chlorine.
- Chlorine will accept the electron from lithium.
- Both atoms have now become ions (charged atoms).
- The opposite charges on the atoms hold them together as a compound.



Types of Compounds

- The example between lithium and chlorine shows the formation of an ionic compound.
- There are two different types of compounds:
 1. Ionic Compounds
 2. Covalent Compounds

Ionic Compounds

- Forms between a **METAL** + **NONMETAL**.
- Results from a **transfer** of electrons from one atom to another.
- Opposite charges of the ions **hold** the compound together.

Periodic Table of the Elements

1 IA H Hydrogen 1.008	2 IIA 2A Li Lithium 6.941	3 IIIB 3B Be Beryllium 9.012	4 IVB 4B Na Sodium 22.990	5 VB 5B Mg Magnesium 24.305	6 VIB 6B K Potassium 39.098	7 VIIB 7B Ca Calcium 40.078	8 VIII 8 Sc Scandium 44.956	9 VIII 9 Ti Titanium 47.88	10 VIII 10 V Vanadium 50.942	11 IB 1B Cr Chromium 51.996	12 IIB 2B Mn Manganese 54.938	13 IIIA 3A Fe Iron 55.845	14 IVA 4A Co Cobalt 58.933	15 VA 5A Ni Nickel 58.693	16 VIA 6A Cu Copper 63.546	17 VIIA 7A Zn Zinc 65.39	18 VIIIA 8A He Helium 4.003
19 K Potassium 39.098	20 Ca Calcium 40.078	21 Sc Scandium 44.956	22 Ti Titanium 47.88	23 V Vanadium 50.942	24 Cr Chromium 51.996	25 Mn Manganese 54.938	26 Fe Iron 55.845	27 Co Cobalt 58.933	28 Ni Nickel 58.693	29 Cu Copper 63.546	30 Zn Zinc 65.39	31 Ga Gallium 69.723	32 Ge Germanium 72.64	33 As Arsenic 74.922	34 Se Selenium 78.972	35 Br Bromine 79.904	36 Kr Krypton 83.80
37 Rb Rubidium 84.468	38 Sr Strontium 87.62	39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molybdenum 95.94	43 Tc Technetium 98.907	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.906	46 Pd Palladium 106.42	47 Ag Silver 107.868	48 Cd Cadmium 112.411	49 In Indium 114.818	50 Sn Tin 118.71	51 Sb Antimony 121.760	52 Te Tellurium 127.6	53 I Iodine 126.905	54 Xe Xenon 131.29
55 Cs Cesium 132.905	56 Ba Barium 137.327	57-71 Lanthanide Series	72 Hf Hafnium 178.49	73 Ta Tantalum 180.948	74 W Tungsten 183.85	75 Re Rhenium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.22	78 Pt Platinum 195.08	79 Au Gold 196.967	80 Hg Mercury 200.59	81 Tl Thallium 204.383	82 Pb Lead 207.2	83 Bi Bismuth 208.980	84 Po Polonium [209]	85 At Astatine [210]	86 Rn Radon [222]
87 Fr Francium 223.028	88 Ra Radium 226.025	89-103 Actinide Series	104 Rf Rutherfordium [261]	105 Db Dubnium [262]	106 Sg Seaborgium [266]	107 Bh Bohrium [264]	108 Hs Hassium [265]	109 Mt Meitnerium [268]	110 Ds Darmstadtium [271]	111 Rg Roentgenium [272]	112 Cn Copernicium [285]	113 Uut Ununtrium [288]	114 Fl Flerovium [289]	115 Uup Ununpentium [290]	116 Lv Livermorium [293]	117 Uus Ununseptium [294]	118 Uuo Ununoctium [294]
57 La Lanthanum 138.905	58 Ce Cerium 140.115	59 Pr Praseodymium 140.908	60 Nd Neodymium 144.24	61 Pm Promethium 144.913	62 Sm Samarium 150.36	63 Eu Europium 151.966	64 Gd Gadolinium 157.25	65 Tb Terbium 158.925	66 Dy Dysprosium 162.50	67 Ho Holmium 164.930	68 Er Erbium 167.26	69 Tm Thulium 168.934	70 Yb Ytterbium 173.04	71 Lu Lutetium 174.967			
89 Ac Actinium 227.028	90 Th Thorium 232.038	91 Pa Protactinium 231.036	92 U Uranium 238.029	93 Np Neptunium 237.048	94 Pu Plutonium 244.064	95 Am Americium 243.061	96 Cm Curium 247.070	97 Bk Berkelium 247.070	98 Cf Californium 251.080	99 Es Einsteinium [252]	100 Fm Fermium 257.085	101 Md Mendelevium 258.1	102 No Nobelium 259.101	103 Lr Lawrencium [262]			

Alkali Metal

Alkaline Earth

Transition Metal

Basic Metal

Semimetal

Nonmetal

Halogen

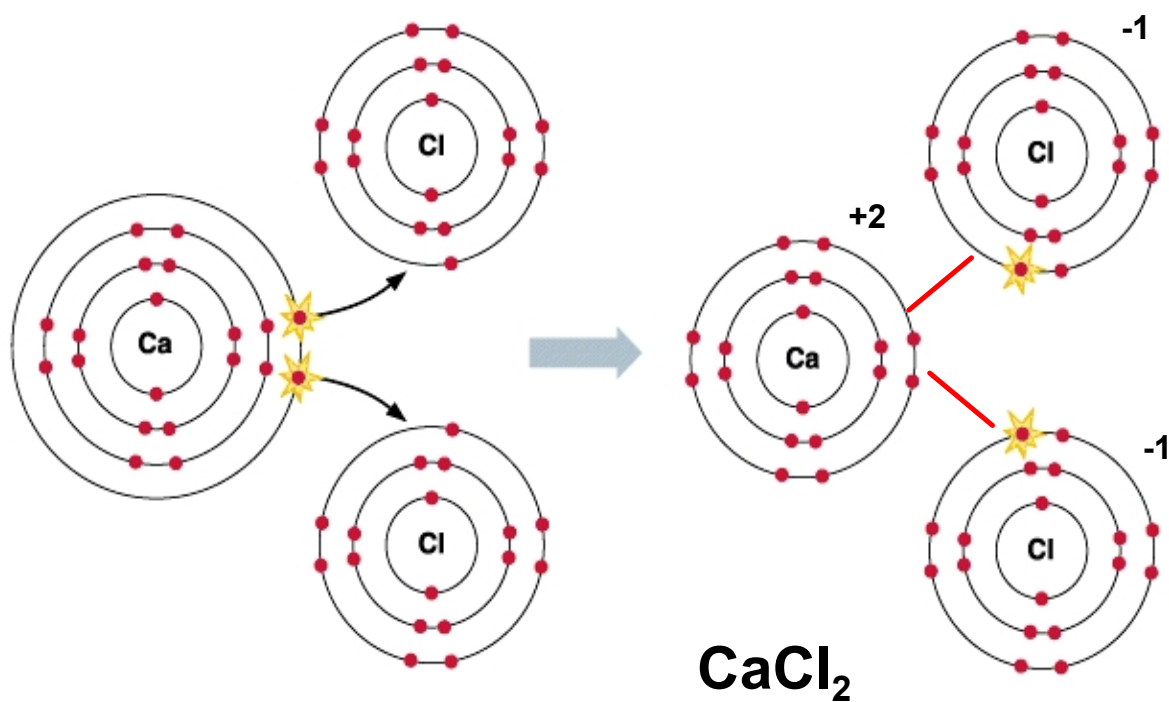
Noble Gas

Lanthanide

Actinide

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Illustration: Calcium and Chlorine bonding



For Example:

Show the formation of an ionic compound between the following:

A. Lithium and Fluorine



B. Lithium and oxygen

C. Magnesium and Chlorine

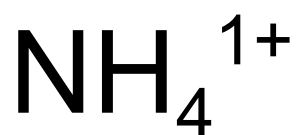
HINT: You may need more than one atom of each element in order to reach a full outer shell!!

Ions can be single atoms



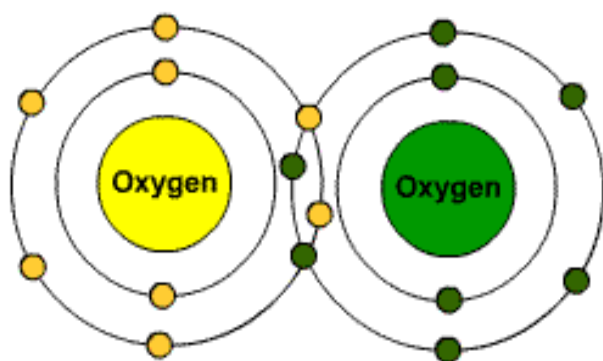
or

they can be group of atoms that have an unbalanced charge, called **polyatomic ions**.



Covalent Compounds

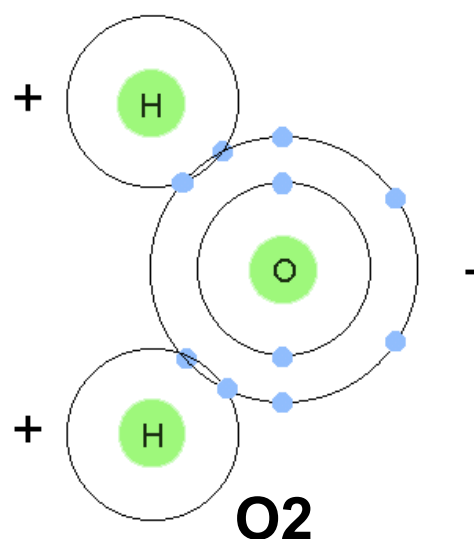
- Form between **TWO NON-METALS**.
- Results from a **SHARING** of electrons between atoms.
- There are two types of covalent compounds:



Pure Covalent Compound

2 e- pairs
2 covalent bonds

Two bonds

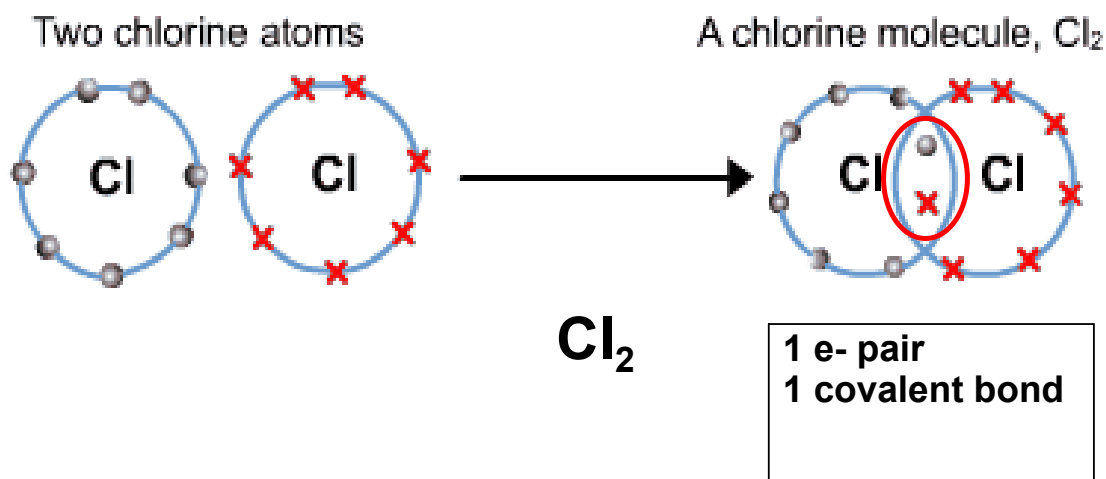


Polar Covalent Compound

Two bonds

Between non-metal atoms:

1 e- pair = 1 covalent bond = single bond
 2 e- pairs = 2 covalent bonds = double bond
 3 e- pairs = 3 covalent bonds = triple bond

Illustration: chlorine + chlorine**Note:**

There are **7** non-metals that naturally exist as molecules:

- H_2 (g)
- O_2 (g)
- Br_2 (g)
- F_2 (g)
- I_2 (g)
- N_2 (g)
- Cl_2 (g)

These elements are referred to as **diatomic elements**

Try the following:



3. Write the chemical formula for a compound containing 4 phosphorus atoms and 10 oxygen atoms.

