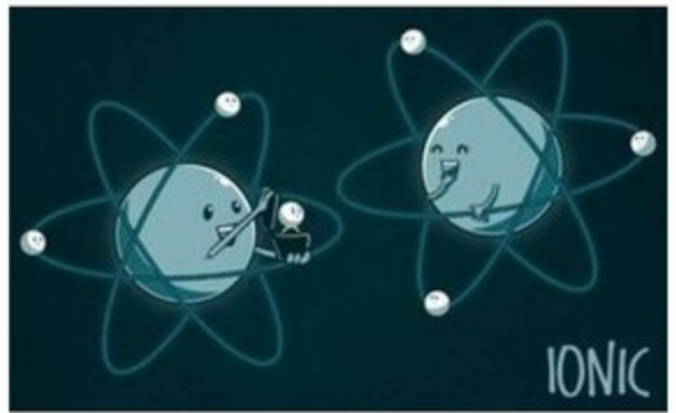
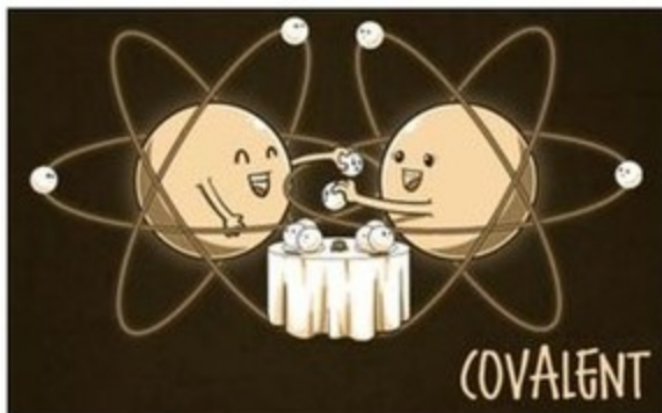
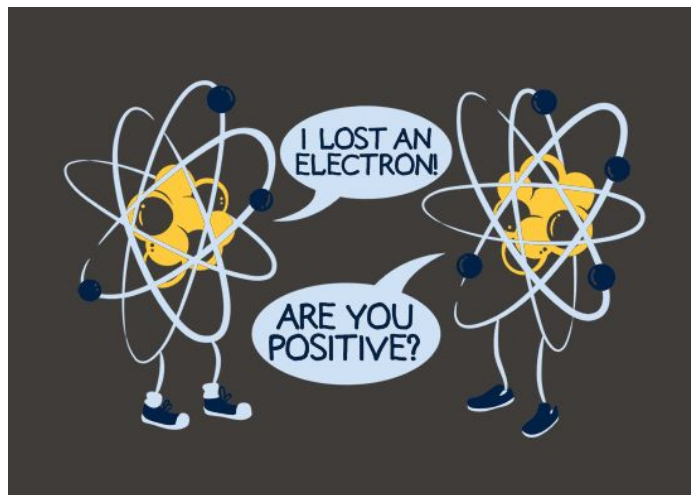


Science 9

Unit 2: Chemistry (Part 2)



BOOK 1: IONS & CHEMICAL BONDING

name: answer key block: _____

PART A: FORMING COMPOUNDS

RECALL that matter can be classified as a pure substance or a mixture.

Pure Substance: A type of matter that contains only 1 type of particle. This particle can be an element or a molecule (2 or more atoms).

- **Element:** A type of matter that contains only one type of atom.

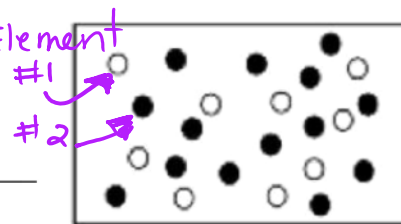
○ Examples:

Hydrogen, oxygen, carbon, copper, etc.

- **Compound:** A type of matter that contains 2 or more types of atoms. These elements are in definite amounts (ratios) (chemically bonded together).

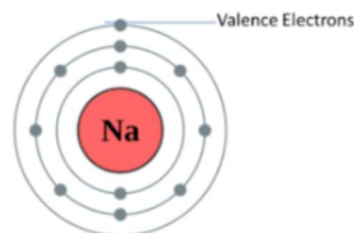
○ Examples:

O₂, H₂O, CH₄, NaCl.



RECALL that valence electrons are the electrons in an atom's outermost shell, these are the only electrons involved in chemical bonding.

When two atoms move close together, their valence electrons interact.



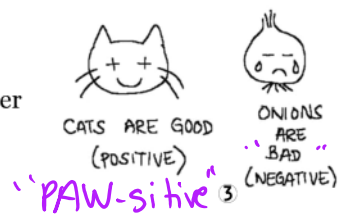
A chemical bond forms between the atoms if the new arrangement of atoms and electrons is stable.

The stability of an atom, ion, or compound is related to its energy; lower energy states are more stable.

The **lowest energy** is achieved when the atoms in the compound have the same arrangement of valence electrons as a noble gas (full electron shell) to which they are closest in the periodic table. Think "all atoms want to be like a Noble Gas"

When an atom forms a compound, forms a valence shell like its closest noble gas in one of three ways:

- ionic bonds {
1. Atoms of metals may lose electrons to other atoms, forming cations.
 2. Atoms of non-metals may gain electrons from other atoms, forming a ANION.
 3. Atoms may share electrons. (*covalent bonding*)



PART B: WHAT IS AN ION?

RECALL that **ATOMS** are neutral, meaning they have no charge. The number of protons (positive charge) is equal to the number of electrons (negative charge)

$$\text{atomic charge} = \text{number of protons} - \text{number of electrons}$$

ATOMIC CHARGE

- The overall charge of an **atom** is \emptyset (**the # of protons = the # of electrons**)
- The charge of an atom can be changed (become \oplus or \ominus)
 - If electrons are gained, there is a negative charge more e^- > less p^+
 - If electrons are lost, there is a positive charge less e^- < more p^+
 - When there is a charge the atom is called an ION
 - If the overall charge of an **ion** is negative, then you have more electrons than protons
 - If the overall charge of an **ion** is positive, then you have more protons than electrons
- Protons are NEVER added or removed from an atom in a chemical reaction!!!
↳ only electrons!

PRACTICE

Symbol	Atom or Ion?	# of Protons	# of Electrons	Atomic Charge
Li	Atom	3	3	\emptyset
Li ⁺¹	ion	3	2	+1
Cr ⁺³	ion	24	21	+3
I ⁻¹	ion	53	54	-1
Ar	atom	18	18	0
Kr	atom	36	36	0
Gd	atom	64	64	0
Cs	ion	55	54	+1
P ⁻³	ion	15	18	-3