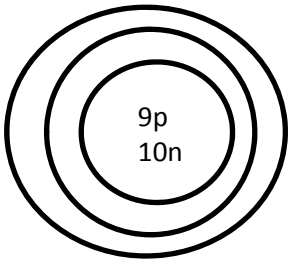
G.E.M. Forces

→ non-contact forces: Gravity (G), Electrostatic (E) and Magnetic (M)
- These are force fields = an area over which a force is felt
- Vector math ie: ID – use +/- integers, 2D – use components

→ TRIUMF – particle accelerator in Canada! (Vancouver). We will look at during unit to explain how it accelerates its particles using electric and magnetic forces.

8.1 – 8.3 Review

Atom – Bohr Rutherford models - be able to draw simple ones.



**draw 2 electrons on inner orbit
Draw 7 electrons on outer orbit

Atomic number of fluorine is 9 - so 9 protons
Atomic mass of fluorine rounds to 19 – so most common isotope has 10 neutrons
Isotopes – versions of an element with different # neutrons.

Halogens – have a high affinity for electrons – high 'grabbiness' for electrons
Alkali metals – have a low affinity for electrons – low 'grabbiness' for electrons.
So..put halogens near alkali metals and the halogens grab electrons and become –ve charged. Alkali metals give away an electron and become +ve charged.

Electron Affinity

Ramp this idea up to materials made of many elements. Some materials have a high affinity for electrons (based on their composition) and become –ve charged. Others have a low affinity and become +ve charged.
See Affinity Table in your textbook pg. 375

Charging Materials

- ➔ By friction – rub 2 materials together. If one has a high affinity for electrons and one has a low affinity, electrons will move from low → high.
- ➔ Classically if you rub an ebonite rod with fur, the ebonite rod takes electrons and becomes –ve charged. The fur gives away electrons and becomes +ve charged.
- ➔ Remember: The charge on the object is the net charge. It reflects the excess of electrons (-ve charge) or the deficit of electrons (+ve charge)

Laws of Charges

1. Opposite charges attract
2. Like charges repel
3. Charged objects attract some neutral objects

Insulators – don't get charged. Don't allow for electron movement. ie: rubber
Conductors – get charged. Allow for electron movement ie: metals.

Formula
We can quantify the excess/deficit of charges.

$$q = Ne$$

*****Put on formula sheet!**

Where: q = charge - unit is Coulombs (C)
N = number of electrons in excess (therefore conferring –ve charge)
or in deficit (therefore conferring +ve charge)
e = elementary charge
$= 1.6 \times 10^{-19}$ C

What is a Coulomb?

Well, electrons are very small and carry a very small charge. So we lump a whole bunch of electrons together and call that large number of electrons a 'Coulomb' of electrons. It is not unlike a 'dozen' eggs.
We know a 'dozen' = 12. But what does a 'coulomb' means?

1 coulomb = 6.24×10^{18} electrons!

…or 6.24×10^{18} electrons/Coulomb …now flip this or find the reciprocal

…or $1/6.24 \times 10^{18}$ is # coulombs/electron $= 1.6 \times 10^{-19}$ C/electrons!

6.24×10^{18} electrons/Coulomb	(# electrons in 1 coulomb of charge)
1.6×10^{-19} Coulombs/electron	(# coulombs of charge on 1 electron)

**** Put on formula sheet!**