The Transfer of Electric Charges and Electric Forces

In an atom, the charge of an electron (-e) = -1.60 x 10-19

The charge of a proton (+e) = +1.60 x 10-19

The charge of a neutron = 0

**Charging objects**

1. Insulators and conductors can be charged by Contact.

Electrons can be transferred from one item to another when they touch (i.e. friction caused by rubbing a balloon on your hair. Some electrons from your hair move to the balloon so your hair becomes more + while the balloon becomes more -).

\*Note – the total charge between two objects is conserved. NO CHARGES ARE CREATED OR DESTROYED! FOLLOWS THE LAW OF CONSERVATION OF CHARGE.

1. Conductors can be charged by Induction (pg 552, Fig 1.6)

In this case the objects do NOT touch and electrons are NOT transferred between the objects. Charge from one object pushes or pulls electrons in the 2nd object so the electrons are redistributed or polarized. The 2nd object can also be grounded so electrons escape to the Earth, making that object more positively charged.

**Electric Forces (measured in Newton’s). Can be attraction or repulsion forces.**

Coulomb’s Law. F = k (q1 q2)

 r2

q1 = charge of 1st object in Coulombs

q2 = charge of 2nd object in Coulombs

r = distance between the charges

k = constant 8.99 x 109 Nm2/c2

nC = nano Coulomb’s. Nano is 10-9

uC = micro Coulombs. Micro is 10-6

**Math example:** Calculate the Electric force that exists between an object with a charge of 4.87nC and an object with a charge of 1.5uC that are 0.27m apart. (answer should be 0.090N)