Mass of electron is 9.109 x 10^{-31} kg *Charge of electron is 1.602 x 10^{-19} C*

Electric Charge & the Electrical Structure of Matter

1. The Bohr-Rutherford model of an atom consist of a positively charged nucleus with a negatively charged orbit about the fixed nucleus. The nucleus and orbit being two separate entities is somehow kept together by a force of attraction. Describe this force of attraction and comment on what happens when the nucleus and orbit is equally charged, when the orbit is more charged and when the orbit is less charged.

2. Describe the laws of Electric Charges.

3. Explain the phenomenon of electricity conduction outlining how metals are excellent conductors, and air and water are good insulators. Brief on how air and water can become conductors of electricity.

4. Explain the operation of electronic ink for printing and the photocopier for copying.

5. In the electrostatic series, silk has a weaker hold on its electrons than ebonite. What would happen to the overall charge of each substance if they were rubbed vigorously together? If the charged ebonite is brought close to a neutral pith ball, describe what would happen. What is the term used to describe this?

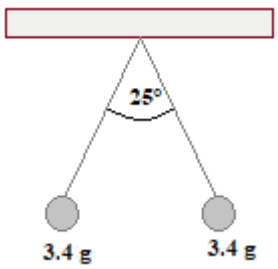
Electric Forces & Coulomb's Law

$K = 9.0 \times 10^{9}\ Nm^2C^{-2}$

1. Calculate the electric force on two identical negatively charged spheres with charges 3.7×10^{-7} C, separated by a center to center distance of 42 cm.

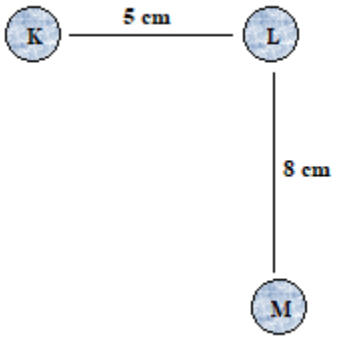
2. A positively charged sphere experiences a force of 2.3 N when placed a center to center distance of 5 cm away from a 5.9×10^{-4} mC negatively charged sphere. What is the charge of this sphere?

3. Two 3.4 g charged spheres suspended by 48 cm long strings are repelling each other as depicted in the illustration below. If the repulsion causes a 25° angle, determine the charge of each sphere.



4. Three point charges: K, L and M, are arranged in a straight line. K has a charge of 6.6 x 10^{-8} C and is 3 cm left of L which has a charge of 4.1 x 10^{-8} C. M is 7 cm right of L and has a charge of 1.1 x 10^{-7} C. Determine the net electric force if:
    a. K is positive, L is positive and M is negative
    b. K is negative, L is positive and M is negative
    c. K is negative, L is positive and M is positive

5. If the three point charges in *Question 4* were arranged as shown in the illustration, determine the net electric force if:
    a. K is positive, L is positive and M is negative
    b. K is negative, L is positive and M is negative
    c. K is negative, L is positive and M is positive



6. Four identical spherical charges: A, B, C and D are arranged in a square of length 28 mm. A and D are positively charged; B and C are negatively charged. If the magnitude of their charges is 1.2 x 10^{-6} C, determine the net electric force on each charge.