

# Electric charge

Electric charge is an intrinsic property of matter. An object can have positive or negative charge, or it can be neutral. In the international system of units (SI), the unit of charge is the “Coulomb”.

Nowadays, we believe that the fundamental unit of charge is that of the electron, which has a negative charge of  $1.6 \times 10^{-19}\text{C}$ .

$$e^- = 1.6 \times 10^{-19}\text{C}$$

## Coulomb's Law

Coulomb's law describes the force between charged particles. Coulomb found that it is given by:

$$F_{q_1q_2} = k \frac{q_1q_2}{r^2}$$

In this context, a positive force is a repulsive one, whereas a negative force is an attractive one. As a consequence,

Equal charges repel each other  
Opposite charges attract each other

# Homework

## Problem 1.

The number of atoms in a penny is about  $10^{22}$  and the total number of electrons is of the order of  $10^{24}$ . The charge of each electron is  $-1.6 \times 10^{-19}$  C. If you could possibly separate the electrons from all the nuclei in a single penny, how much total charge would you get from the electrons?



## Problem 2.

Two identical pieces of dust at distance  $d=5\text{cm}$  repel electrostatically with the force  $F=10^{-6}$  N. Find the electric charge on each of them.