

Lecture 1

Electric Charge

Chapter 22

Electric Charge (1)

- Electric charge is a fundamental property of atomic particles
 - such as electrons and protons
- Two types of charge: **negative** and **positive**
 - Electron is negative, proton is positive
- Usually object has equal amounts of each type of charge so **no net charge**
- Object is said to be **electrically neutral**

Electric Charge (2)

- Object has **a net charge** if two types of charge are **not** in balance
- Object is said to be **charged**
- Net charge is always small compared to the total amount of positive and negative charge contained in an object
- **The net charge of an isolated system remains constant**

Electric Charge (3)

- Charged objects interact by exerting forces on one another

- **Law of Charges:**

Like charges repel, and
opposite charges attract

- The standard unit of charge is the Coulomb (C)

Electric Charge (4)

- Electrical properties of materials such as metals, water, plastic, glass and the human body are due to the structure and electrical nature of atoms
- Atoms consist of protons (+), electrons (-), and neutrons (electrically neutral)
- Electrically neutral atoms contains equal numbers of protons and electrons

Electric Charge (5)

- Atoms combine to form solids
- Sometimes outermost electrons move about the solid leaving positive ions
- These mobile electrons are called **conduction electrons**
- Solids where electrons move freely about are called **conductors** – metal, body, water
- Solids where charge can't move freely are called **insulators** – glass, plastic

Electric Charge (6)

- Only the conduction electrons can move
- The positive ions are fixed in place
- Electric charge transfer is a transfer of electrons
- **Charging positively**: Removal of electrons from an object
- **Charging negatively**: Addition of electrons to an object