Source: [[KBPHYS250MasterIndex]]

1 | Experiments

Basically, we just rubbed a bunch of things on each other and checked the resulting charge with an electrometer.

1.1 | Interesting results

- Combs are great for static electricity
- Rubbing some objects on others caused similar charges, while other object caused different charges
- These notes are in hindsight so I legit don't remember too much

2 | Explanation

- Opposite charges attract; similar charges repel
- When charged object is brought close to a conductor, electrons in the conductor will flow and polarize the conductor
- When charged object is brought close to an insulator, atoms inside the insulator will be polarized. With small objects, this can make the whole object be basically polarized.
- When a charged object makes contact with a conductor, the electrons will be shared between objects.

3 | Homework

3.1 | Lecture Notes

3.1.1 | Electrostatics Basics

- There are Insulators and Conductors
    - Insulators: Don't share electrons
    - Conductors: Share electrons
    - Learn why this is in solid state physics
- List of charges when rubbed
    - Plastics usually become negative
    - Fur, elastics usually become positive
- Electrons can be shared between materials
- Electrons can move somewhat freely (depending on the material) within an object
    - Especially when close to another charged object!
- Even in materials where electrons can't move freely (e.g. paper, other insulators), polarization can cause a "chain reaction" and "polarize" the object as a whole

3.1.2 | **Quantification**

- Coulomb's Law
  - Given two point charges, Q1 and Q2, and a distance r
  - $F = k\frac{q_1 q_2}{r^2}$
    - k is 8.99 * 10^9 Nm^{2C}-2
    - r is in meters
    - q1, q2 in Coulombs (C)
    - if F>0: force is repulsion
    - if F<0: force is attraction
  - Sample Problem $q_1 = 50uC = 50\times10^-6C\ q_2 = 1uC = 1\times10^-6C\ F_12 = 2N$ () k = 8.99***10^{9Nm}2C^-2 F = k*** (q1q2/r^2) r^2 = k * (q1q2/F) = 8.99***10^{9Nm}2C^-2*** 50***10^{-12C}2 / 2N = 224.75*** 10^-3 m r = sqrt(224.75 * 10^-3)m = 474*10^-3m
  - In more complicated setups, certain things such as acceleration won't be constant because it is determinant on force, which is determined by distance from other charges.
    - This complicates things so don't expect it to be simple.