Static Electricity Unit Notes

Ms. Robbie's Pictorial Notes

Basic Chemistry

- Atoms are the building blocks of matter
    - Atoms have a core called the **nucleus**, which is made of **protons** and **neutrons**
        - Protons have a positive charge
        - Neutrons have no charge
    - The nucleus is orbited by tiny negatively charged particles called **electrons**
    - Protons and neutrons are tightly bound in the nucleus, and cannot move
    - Electrons can move easily, as long as they have a "motive" and a pathway of low resistance
- If an object has gained extra electrons, it has a negative charge
- If an object has lost electrons, it has a positive charge

Conductors and Insulators

- **conductor**: electrons flow freely from atom to atom, molecule to molecule
    - if charge is transferred to conductor, it distributes evenly over surface (repulsive forces minimized)
    - example: salt water, graphite, metals, water, human body
- **insulator**
    - charge stays at original location; not usually distributed
    - example: plastic, rubber, glass, styrofoam, paper, dry air (winter)

Charging by Friction

- When objects are rubbed together, the object with the greater electron affinity gains electrons, and will have a negative charge

Charging by Conduction

- In a charged object, the electrons are packed more tightly than normal, and are all repulsing each other
- When touched to an uncharged object, electrons will move to the uncharged object so that they can space themselves more widely

Ground

- Ground refers to the Earth, which can act as an infinite source for electrons or an infinite "sink" for electrons
- If a positively charged object is touched to ground (either directly or through a wire), it will gain electrons until it is neutrally charged
- If a negatively charged object is touched to ground (either directly or through a wire), it will lose electrons until it is neutrally charged

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Charge Interactions

- Like charges repulse each other
- Opposite charges attract each other
- Neutral objects are attracted to both positively and negatively charged objects because of **polarization**
    - Example: when a negatively charged object (extra electrons) comes close to a neutral object, the electrons in the neutral object are driven away from the surface, leaving the surface with a positive charge, which is then attracted to the negatively charged object
- negative - negative (repulsive)
- positive - positive (repulsive)
- positive - negative (attractive)
- positive - neutral (attractive)
- negative - neutral (attractive)
- neutral - neutral (nothing)