Electricity

Electric charges are not created - they already exist.

protons → + electrons ⇒ −

Rubbing two objects against each other does not create ***electrical charges***, they were already there. The rubbing causes the objects to become positively or negatively charged because the electrons move. Depending on where they move determines the charges received.

When two uncharged substances are rubbed together (i.e. a comb is rubbed against a woolen sweater) one becomes positively charged and the other becomes negatively charged.

Static electricity occurs when the charge stays in the area where the rubbing occurred

Electrostatics

*

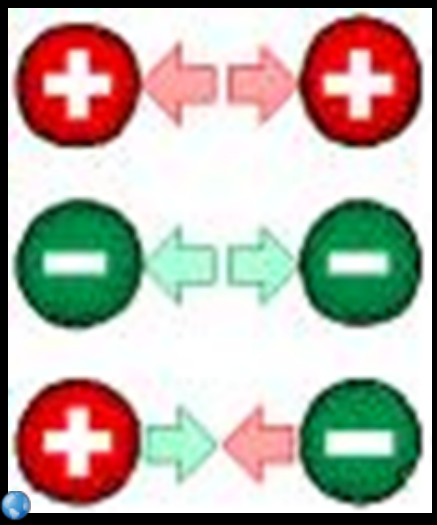
Electrostatics is the study of static electric charge.

There are two kinds of electric charge:

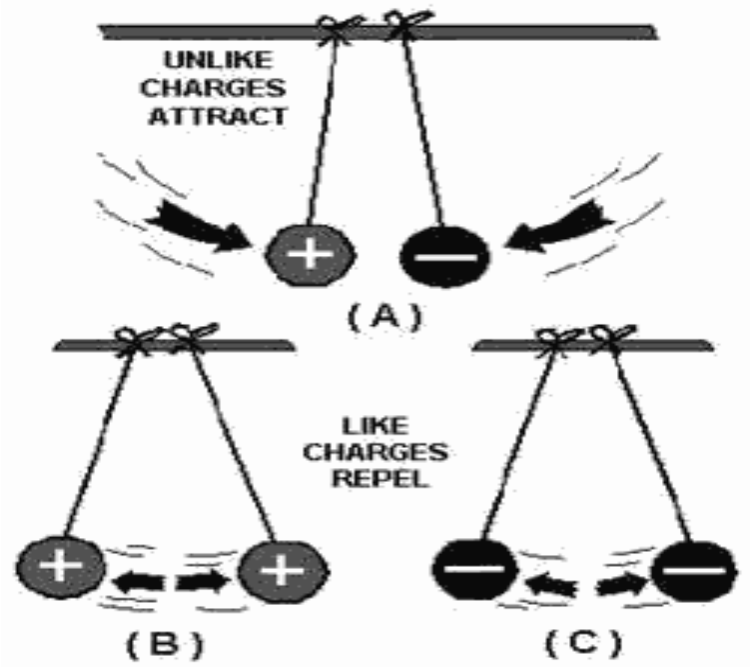
Negative and Positive

Law of Electric Charges

" like charges repel one another, and unlike charges attract one another"



Na^+ Cl^-


UNLIKE
CHARGES
ATTRACT
(A)
LIKE
CHARGES
REPEL
(B)
(C)

In Chemistry you studied matter. Recall all matter is made of atoms which are in turn made of three subatomic particles; protons, neutrons, and electrons.

Using this knowledge, a **Model for the Electrical Nature of Matter** was developed. It can be found in table 1 on page 273.

Electrically Charging Objects

There are three ways to electrically charge an object:

- By friction
- By contact
- By induction

Charging by Friction

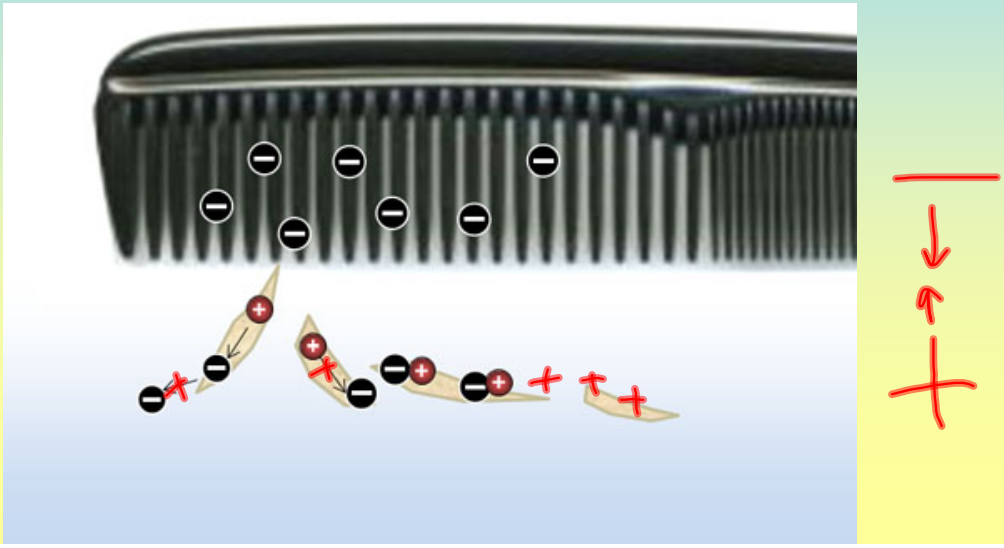
Occurs when two objects are rubbed together to create an electrical charge.

Static electricity can build up through friction by clothes rubbing together in a dryer, walking on carpet, combing your hair and many other situations.

Example

Combing your hair with a plastic comb:

When a comb is rubbed against your hair, the comb becomes negatively charged and your hair becomes positively charged Why?



Triboelectric series

- Human Hands (if very dry)
- Leather
- Rabbit Fur
- Glass
- Human Hair
- Nylon
- Wool
- Fur
- Lead
- Silk
- Aluminum
- Paper
- Cotton
- Steel (neutral)
- Wood
- Amber
- Hard Rubber
- Nickel, Copper
- Brass, Silver
- Gold, Platinum
- Polyester
- Styrene (Styrofoam)
- Saran Wrap
- Polyurethane
- Polyethylene (scotch tape)
- Polypropylene Vinyl (PVC)
- Silicon
- Teflon

MORE POSITIVE

MORE NEGATIVE

Hair ⊕

Rubber ⊖

Attracts

The Electrostatic Series (p. 275)

This list determines the kind of electric charge produced on each substance when rubbed together.

In the following example, if cat's fur is rubbed on polyethylen (plastic) which one will be positive and which one will be negative?

Cat's fur - positive Plastic- negative

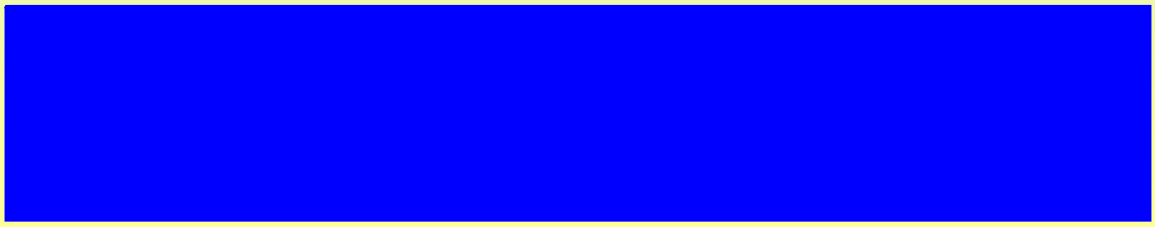
Why?
The fur has a weaker hold and the plastic has a stronger hold on electrons.

The Electrostatic Series

the substance higher on the list will always lose electrons and become positive

the substance lower on the list will always gain electrons and become negative

Try another one:
If your hair was rubbed against a cotton sweater. Which one would become postively charged? Negatively Charged?



Homework

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