ELECTROSTATICS

Electrostatics is the study of static electric charges. A **static** charge means a **non-moving charge**. The **three ways** to make a static charge are:

a) charging by **friction**
b) charging by **contact**
c) charging by **induction**

A) CHARGING BY FRICTION

When 2 substances are rubbed together, **one substance loses electrons and the other substance gains electrons.** Remember only electrons can move. To figure out which substance will lose electrons use a **triboelectric series table**. Sometimes this is called an electrostatic series. (p 398 Pearson text)

TRIBOELECTRIC SERIES TABLE

In this table, the substance at the top always loses electrons to the substance at the bottom when they are rubbed together. If cotton is rubbed on plastic the cotton loses electrons and has a positive charge. The plastic gains electrons and has a negative charge.

Table 10.1 A Triboelectric Series

Tend to lose electrons	(+)
	human hands (dry)
	glass
	human hair
	nylon
	cat fur
	silk
	cotton
	steel
	wood
	amber
	ebonite
	plastic wrap
Tend to gain electrons	Teflon®
	(–)

Weak hold on electrons

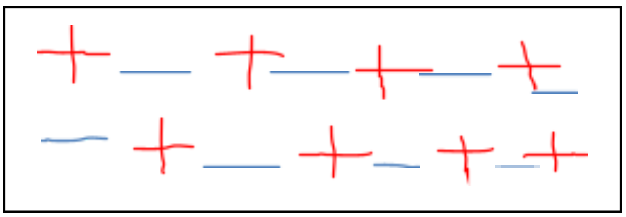
Strong hold on electrons

Electrostatic Series
acetate
glass
wool
fur, human hair
calcium, magnesium
silk
aluminum, zinc
cotton
paraffin wax
ebonite
polyethylene (plastic)
carbon, copper
rubber
sulfur
platinum, gold

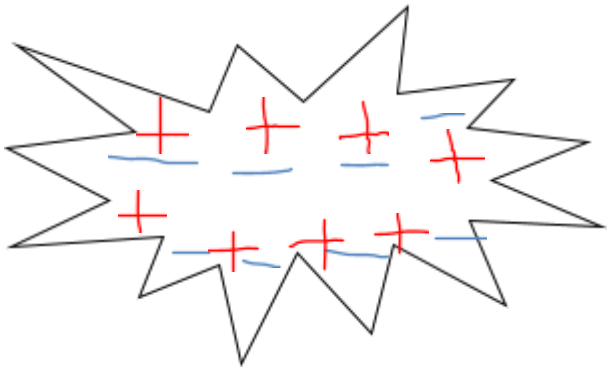
ELECTROSTATIC DIAGRAMS

Electrostatic diagrams are drawn to show how 2 objects are charged by friction. Here is the diagram showing a neutral plastic ruler rubbed with a neutral piece of cotton. Write down **how many** electrons and protons for each object. We will use 8 protons and 8 electrons for neutral objects. All diagrams should have WORDS, PICTURE and COUNT.

A) **Before** Friction



Neutral polyethylene



8+ 8 -

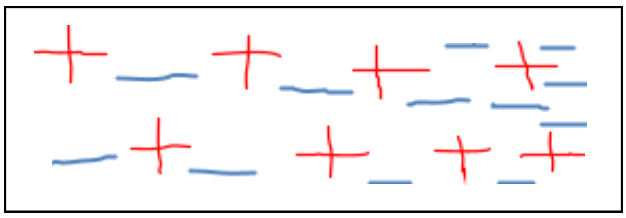
8+ 8 -

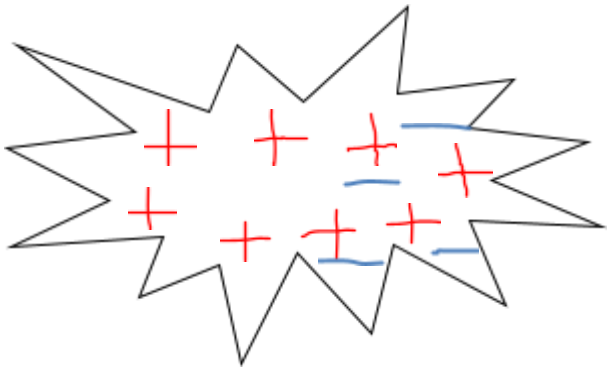
Neutral plastic

Neutral cotton

FRICTION

Move half the electrons





8+ 12 -

8+ 4 –

Negative plastic

Positive Cotton

B) **After** Friction

- the objects have <u>unlike</u> charges and are <u>attracted</u> to each other

- note only electrons moved. Draw the protons in the same locations

Electrostatics

Electrostatics is the study of _____. A static charge means a _____.

The three ways to make a static charge are:

1. _____
2. _____
3. _____

Charging by Friction

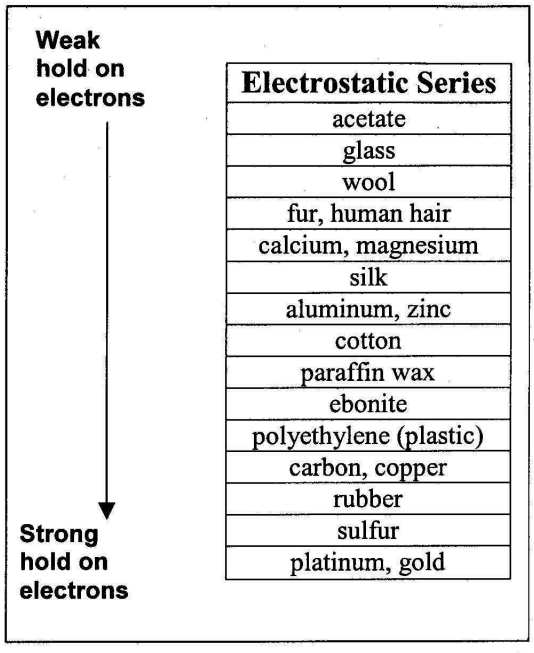
When 2 substances are rubbed together, one substance _____ electrons and the other substance _____ electrons. Remember only _____ can move. To figure out which substance will lose electrons use a _____ _____table. Sometimes this is called an _____ series. (p 398 Pearson text)

TRIBOELECTRIC SERIES TABLE

In this table, the substance at the _____ always loses electrons to the substance at the _____ when they are rubbed together. If cotton is rubbed on plastic the cotton loses electrons and has a _____charge. The plastic gains electrons and has a _____charge.

Table 10.1 A Triboelectric Series

Tend to lose electrons	(+)
	human hands (dry)
	glass
	human hair
	nylon
	cat fur
	silk
	cotton
	steel
	wood
	amber
	ebonite
	plastic wrap
Tend to gain electrons	Teflon®
	(–)



ELECTROSTATIC DIAGRAMS

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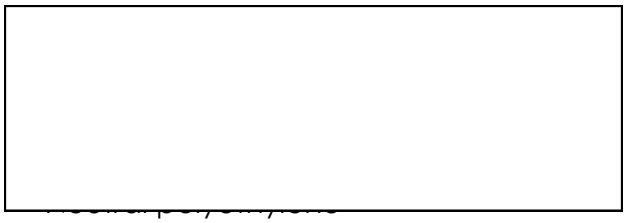
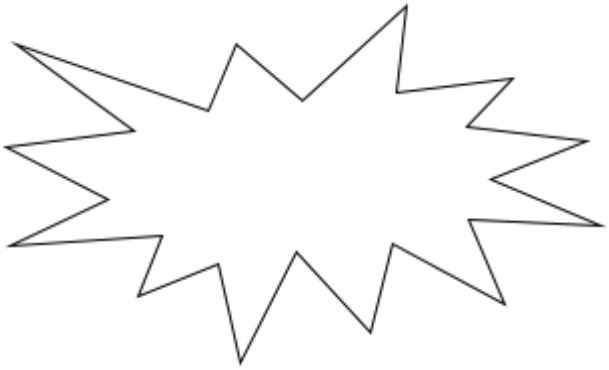
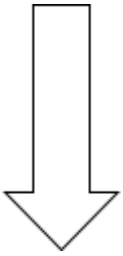




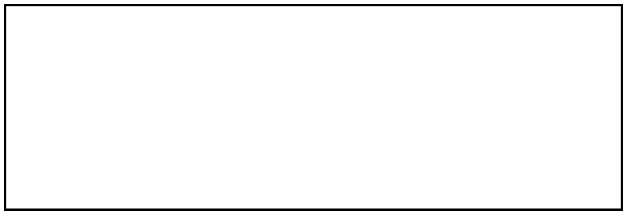
Neutral plastic

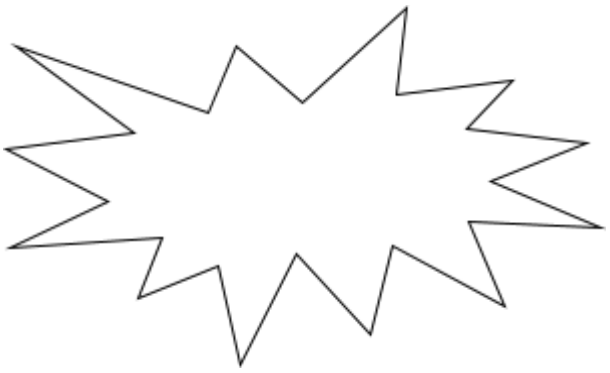
Neutral cotton

FRICTION



Move half the electrons





Negative plastic

Positive Cotton

B) **After** Friction

- the objects have unlike charges and are attracted to each other

- note only electrons moved. Draw the protons in the same locations.