

Oct 18, 2011

answers textbook questions  
insulators and conductors

## *Warm-up*

1. A dog's fur is combed using a plastic comb. The dog's fur becomes positively charged. What charge will you get if you then rub the dog?
2. Why are antistatic products (i.e. bounce sheets) used in the dryer?

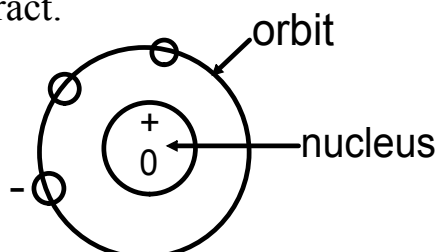
## Answers pg 273 #1,2a,4

1. a) The word static means having no motion. Therefore, the term static electricity is used to describe the behaviour of electric charges on some objects because the charges tend to stay in the same place or region on the object.

b) If you comb your hair in dry weather, both the hair and the comb become charged. If you then bring the charged comb toward your hair again, the hair is attracted to the comb because the charges remain “static” on both objects.

2. a) The law of electric charges states that like charges repel and unlike charges attract.

4.



# pg 275 # 1b, 3a,4,5

1. b) The two factors that affect the amount of static charge transferred when you rub two different substances together are **how tightly the two substances are held together** and **how much rubbing done**, and the relative **positions of the two substances on the electrostatic series**.

The firmness with which you rub the substances controls how many molecules of each substance come close enough to allow electron transfer to take place. The farther apart they are in the electrostatic series, the stronger the attraction force acting on the electrons.

3. a) i. acetate will become + and fur will become -  
ii. cotton will become + cotton will become -

4. The silk blouse will become negatively charged (-) and the wool sock will become positively charged (+). The reason this happens is because when two objects rub together friction occurs and one object will become (+) and the other (-). We know which gets which charge because of the electrostatics series.

An anti static product can help by preventing the clothes from rubbing together.

5. An aluminum comb would be better to use to comb your hair because it is closer to hair on the electrostatics series.

## Answers Pg 279 #2,3,4

2. The same charge. The charge gets transferred to the object through contact.

3. The electrons move from the charged object to the uncharged object, creating a conductive path through the air, the charges are the same and will therefore repel each other (ie the spark).

Even if you move your hand quickly, the electrons still move faster than your hand.

4. Look at the electrostatics series to see which would become positive and negative. The cat will be positive the ebonite comb will be negative. Therefore if you touch the positive cat you will receive the positive charge through contact.

# pg 287 #1-3

1. The neutral dust particle is attracted to a charged object because the charged object has the ability to induce a charge on the dust particle causing it to have the opposite charge as the object and the dust particle to be attracted to the charged object. (unlike charges attract).

2. When a neutral object is charged by **induction** it only remains charged while that object is nearby, if the charged object is moved away the neutral object will return to neutral. This type of charging is called **induced charge separation**.

**Charging by induction** occurs when the object is permanently charged by the charged object.

3. When an object is charged by induction the object has the opposite charge compared to the object inducing the charge.

The object inducing the charge is able to take electrons from the uncharged object causing its charge to change from neutral to positive and be attracted to the object inducing the charge.

## Insulators Page 280-281

**Electrical Insulator:** a substance in which electrons cannot move freely from one atom to another.

Some elements have a tight hold on their electrons. Therefore, electrons cannot flow freely through them.

This property makes them good insulators.

These materials can protect us from electric shock. Ex. rubber, paint or wax.

Look at Table 1 pg 280.

# Conductors Page 281

**Electrical Conductor:** a substance in which electrons can move freely from one atom to another.

Some elements allow electrons to flow freely through them, making them good conductors. Ex. copper

For example, you can not charge metal taps because the charge is conducted away to the ground.

