

CHARGE INTERACTIONS

It is a well-accepted belief that objects are composed of atoms and that these atoms contain protons, electrons and neutrons. Objects can become charged by gaining or by losing electrons. This gain or loss can occur by a variety of methods. Perhaps the most common method involves rubbing one object against another object. The process of rubbing two different materials together often results in the transfer of electrons. Electrons are transferred from the less electron-loving object to the more electron-loving object. Protons are never transferred since they are tightly bound within the nucleus of atoms.

Electrons are charged negatively and protons are charged positively. So while an electrically neutral object has a balance of protons and electrons, a charged object possesses an imbalance of these two types of subatomic particles. Positively charged objects contain more protons than electrons. Negatively charged objects contain more electrons than protons.

The charge that an object possesses can often be determined by observing how it interacts with objects of known charge. Two like-charged objects will be observed to repel or push away from each other. Two oppositely charged objects will be observed to attract or draw towards each other. And a charged object - whether positive or negative - and a neutral object will also attract each other.

A group of physics students rub several different objects with the same sample of synthetic animal fur. They then test their interactions with one another. Table 1 shows the results of the various tests. Object A is a negatively charged balloon.

Table 1: Interactions of Six Different Objects

Object A	Object B	Object C	Object D	Object E
Repels Object B	Attracts Object C	Repels Object D	Attracts Object E	Attracts Object B

Use this information to answer the following questions. Before doing so, it might be helpful to identify the type of charge - positive, negative or neutral - of each of the six objects.

	Object A	Object B	Object C	Object D	Object E
Charge Type					

Questions:

- Based on this passage, which statement is true of a positively charged object?
 - Positively charged objects do not contain any electrons.
 - Positively charged objects do not contain neutrons or electrons.
 - There are more protons than electrons on a positively charged object.
 - The protons and the electrons are both positively charged on such objects.
- It is stated in the passage that Object A is negatively charged. What can be concluded about any object that is observed to attract Object A?
 - The object is positively charged.
 - The object is negatively charged.
 - The object is electrically neutral.
 - The object is either neutral or positively charged.
- Which observation is the most important observation for determining the charge on Object B?
 - Object B attracts Object C.
 - Object E attracts Object B.
 - Object B was rubbed with animal fur.
 - Object A and Object B repel each other.
- There are two observations listed in Table 1 regarding Object C. They are:
 - Object B and Object C attract each other.
 - Object C and Object D repel each other.

Which conclusion does the second observation allow one to make that cannot be made with just the first observation?

- Object C is neutral.
- Object D is neutral.
- Object C is charged.
- Object B and C cannot be like charged.