Separation of charge If you rub two neutral objects together, each object can become charged.For instance, when you rub rubber shoes on a wool rug, the energy from the rubbing removes outer electrons from atoms in the wool, and they transfer to the rubber shoe, as shown in Figure 3.Effects of Separation of Charge Processes inside a thundercloud can cause the cloud bottom to become negatively charged and the cloud top to become positively charged.These include plasma, which consists of negative electrons and positive ions, and graphite.The strips of tape that you charged earlier in this chapter acted as insulators because the charge that accumulated on them did not move; it stayed localized.Figure 4 contrasts how excess charges behave on a conductor and on an insulator.Electric charge can be transferred from a road to the car traveling on it. The rubbing of your MP3 player in your pocket can sometimes cause your earbuds to become charged and shock you.Conductors and Insulators Hold a plastic rod or comb at its midpoint and rub one end on your clothing.Electrons move and thus conduct electric charge through the metal.Copper and aluminum are both excellent conductors and are used commercially to carry electric charge.Some nonmetal materials also are good conductors.The combined total charge of the two objects remains the same.Charge is conserved, which is one way of saying that individual charges are never created or destroyed.Glass, dry wood, most plastics, cloth, and dry air are all good insulators.A material that allows charges to move about easily is called an electric conductor.Metals From past experience, we know that most metals are good conductors.This is because at least one electron of each atom of a metal can be removed easily.These electrons no longer remain with any particular atom, but move through the metal as a whole.The extra electrons on the shoe result in a net negative charge on the shoe.The electrons missing from the wool rug result in a net positive charge on the rug.A net positive or negative charge means that electrons have been transferred.You will find that only the rubbed end becomes charged.In other words, the electrons that transferred to the plastic object stayed where they were; they did not move.A material through which a charge will not move easily is called an electric insulator.Suppose you support a metal rod on an insulator so that it is completely surrounded by the insulator.When you touch a charged comb to one end of the metal rod, you will find that the charge spreads very quickly over the entire rod.In all of these cases, charges are not created, but separated.