

Quiz #7
Physics 221

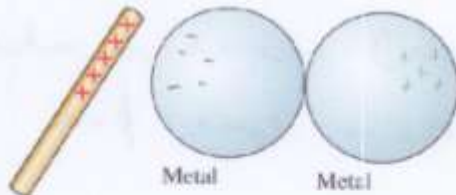
Name: Solution

1. A piece of metal receives a negative charge, does it gain mass, lose mass or stay the same mass? Why?

It gains mass because electrons are what moves when something becomes charged. Since it received a negative charge it gained electrons.

2. Two neutral metal spheres are touching. A positively charged plastic rod is brought near, but does not touch, the left sphere.

While the plastic rod remains near the left sphere, the right sphere is moved away. Then the rod is moved away.



- a. In the third diagram, what, if any, is the charge on the left sphere?

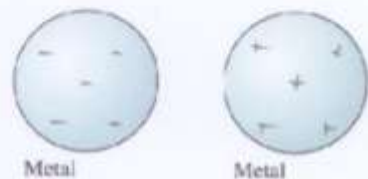
Negative

- b. In the third diagram, what, if any, is the charge on the right sphere?

Positive



- c. On all three diagrams given show the charge distribution on the spheres for that situation.
d. Explain clearly how your answers to a and b came about using your diagrams from c.



There are electrons in conductors that are free to move. In the first diagram you can see that electrons are attracted to the positive rod. When these electrons move towards the rod, they leave a net positive charge behind.

When the spheres are separated there is no longer a conducting path for the electrons to travel back to the right hand sphere.

(over)

Once the rod is removed the charge on each sphere distributes itself evenly over each sphere. Since there's no conducting path leading away from either sphere, they both remain charged with the same charge they had in figure 2. Each sphere now has equal amounts of charge (one + one -) because they were neutral to begin with and there's nowhere else charge could have come from.

