Positive and Negative Charges

Physics Concept
Static electricity can be produced by rubbing objects together. This is called triboelectricity (electricity produced by friction). When the two objects rub, electrons from one object jump to the second object. The second object becomes negatively charged and the first, since it has lost electrons, becomes positively charged.

How do you know which object has the positive charge? Which combinations of objects produce large amounts of charge?

The charge transfer depends upon how strongly the electrons are bound to the object. Some materials give up electrons easily and are more likely to be left with a positive charge. Some materials hold strongly to electrons and are more likely to be left with a negative charge.

If you rub two pieces of the same material together neither piece becomes charged because they hold onto their electrons with the same strength.

If you rub a piece of styrofoam in your hair, the styrofoam picks up electrons from your hair and becomes negatively charged. Your hair becomes positively charged and after a few rubbings the hairs stand out and repel each other.

Some other combinations include: Glass (+) and silk (-), hair (+) and rubber balloon (-), and wool or fur (+) and hard plastic (-)

Materials
PVC pipe and nylon stockings, pieces of silk, glass beakers, sweaters, and Styrofoam blocks. Styrofoam is available in large sheets for house insulation (hardware store or home supply store). Cut the sheet into 4 inch by 6 inch pieces.

Method
Rub various objects together and see what kind of charges are produced. You can check the sign of the charge by seeing if they attract or repel a piece of Styrofoam or a rubber balloon that has been negatively charged by rubbing in your hair.

Questions
Do the charges move on the balloon or Styrofoam? Does the entire piece of Styrofoam become charged or only a part of it?