Make a Hot Air Balloon

A hot air balloon can be used to demonstrate how hot air rises in the atmosphere by buoyancy. This document describes how to make a hot air balloon. There are hazards associated with making the balloon including a burn hazard with a heat gun and outgassing from melting plastic. The balloon should be made prior to class. The balloon is sturdy and can be used many times.

Materials

- Hot air gun (heat gun)
- Painters tarp, ~0.3 mil thick plastic sheet
- Meter sticks
- String
- Permanent marker
- Hair dryer (with hot and cool settings)

Instructions for Making the Balloon

1 Cut a piece of the painter's tarp about twice the size of the finished balloon that you want to make.
2 Lay the plastic sheet flat on a large table and fold in half. You will have a rectangular shape where one of the edges is the fold. The other three edges will need to be sealed. Since a heat gun will be used to seal the edges, the table top must be protected and noncombustible.
3 Fold one of the unfinished edges about 1 inch from the edge and secure with a meter stick.
4 IT IS IMPORTANT THAT THIS STEP BE DONE IN A SPACE WITH GOOD VENTILATION. With the heat gun on high, seal the edge that you just folded and secured with the meter stick by quickly moving the heat along the edge. The plastic sheet will quickly melt and seal the edge. It is important to keep the heat gun moving so that you don't overheat or burn the plastic.
5 Repeat with the other two unsealed edges. In one of the edges, leave a section about 3-4 inches unsealed in a corner so that the hair dryer may be inserted to inflate the balloon.
6 Mark the unsealed corner with a marker to make it easy to find to inflate.
7 Tie a string around one of the corners as a tether so that the balloon does not fly away when you fill it.

To demonstrate how hot air rises, it is good to have two balloons so that you can fill one with room temperature air and the other with hot air. Have students predict what will happen before you fill each balloon. It is important to fill the balloons with a hair dryer – do not use the heat gun since that will melt your balloon.

When the air is heated, the average kinetic energy of the air molecules increases. The energy of the collisions between the molecules causes the distance between the molecules/atoms to increase and result in the expansion of the gas. The higher volume of the gas results in it having a lower density than the surrounding air and the balloon rises buoyantly.