

10.4 Plastic bag as hot air balloon

Subjects: Gaseous properties, ideal gas law, thermodynamics

Description: A heat gun or hair dryer is used to inflate a large plastic garbage bag. The hot air in the bag will have more energy than the air in the outside of the bag, increasing the collisions on the inner surface of the bag and thus increasing the pressure causing it to float in air.

Materials:

Heat gun*

Large plastic garbage bag

Binder clips

*Shared item: located in the 2nd drawer from the top opposite the chemical storage cabinets

Procedure:

1. Attach the binder clips to the opening of the bag at regular intervals for weight.
2. Turn on the heat gun.
3. Use the heat gun to fill a garbage bag full of hot air. Choose some volunteers from the audience to help hold the bag upright.
4. Observe the garbage bag rise.

Discussion:

Pressure is directly proportional to temperature. When the temperature of a gas increases the gas particles become more energetic, and thus exert a higher pressure on the inner walls of the container, in this case a plastic garbage bag. This allows the bag to inflate with hot air and then float in the cooler air. The expansion of the hot air in the balloon is performing work on the surface of the garbage bag and surrounding air allowing it to rise.

Safety: None

Disposal: None

References: None