



Curiosity Guide #601

Collisions

Accompanies Curious Crew, Season 6, Episode 1 (#601)

Mystery Bouncy Balls

Investigation #1

Description

Do all bouncy balls bounce the same? Find out!

Materials

- 1 ball of polyneoprene rubber
- 1 ball of polynorbornene rubber
- Digital scale
- A friend

Procedure

- 1) Have a friend observe the two balls and describe their similarities.
- 2) Weigh each of the balls to show that their weight is similar.
- 3) Drop each ball at the same time from a similar height.
- 4) How did the balls behave?

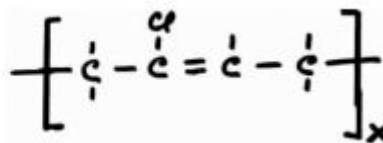
My Results

Explanation

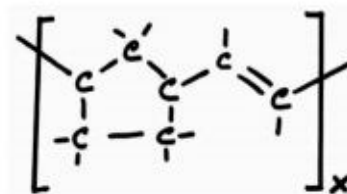
The balls are very similar to each other with respect to size, color, and density. However, the two balls do behave differently when dropped. Neither one bounces all the way up to the starting height, so neither is perfectly elastic, but one bounces much higher than the other. The ball that bounced higher is made of polyneoprene rubber. Polyneoprene balls are often called superballs because they can bounce so high. If we could look at this ball microscopically, we would see long chains of crosslinked polymers that cannot move very easily. Because there is so little movement in the chains, very little of the kinetic energy gets transferred into heat on impact, so the polyneoprene ball bounces high.

The less bouncy polynorbornene ball has a different pattern, with 5 carbon atoms linked into a series of connected rings. When the ball collides with the floor, the molecular rings can flex. The kinetic energy gets transferred into heat as the ball is compressed, causing the ball not to bounce very much. This is called an inelastic collision. The Polynorbornene ball will also transfer some of its kinetic energy into a thud sound. Placing the inelastic ball into the freezer will stabilize the molecular rings, and the ball will have a small bounce when dropped.

Neoprene Rubber



Polynorbornene Rubber



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