



a WOW Lab

BLUEPRINT

Polymer Bouncy Balls

Additional Information

Explanation of the Results

If the collisions between the balls and the floor were perfectly elastic, the balls would keep bouncing back to the same height from which they were dropped. The balls made in this activity do not undergo perfectly elastic collisions when bounced and the rebound height noticeably decreases with each bounce.

The decrease in rebound height is more pronounced for the PVA/cornstarch ball compared to the latex ball. The PVA/cornstarch ball loses more energy to friction with each bounce since the polymer chains are more loosely packed and deform to a greater extent upon impact. The energy lost to friction is transformed into heat and the decreased elastic potential energy causes the ball to bounce to a lower height. In terms of size, smaller balls will lose less height with each bounce when compared to larger balls since a smaller surface area is deformed and less energy is lost to heat.

Polymers in this Activity

Latex is usually plant-derived and is composed of an emulsion of polymer microparticles in a liquid medium. Liquid latex uses ammonia or a similar preservative to prevent it from coagulating. However, in this activity, the preservative is neutralized by the addition of vinegar, which allows the rubber to coagulate into a solid compound.

White glue contains the polymer PVA (polyvinyl acetate). PVA is a strong polymer that is used to give the ball strength. Cornstarch is a branched polymer called amylopectin. The branches give the ball elasticity. Borax reacts with the PVA and amylopectin to form a cross-linkage, creating the rubbery end product.