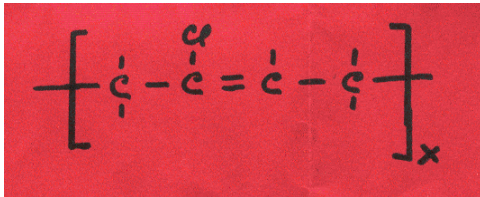


Elastic/Inelastic (Choositz) Balls

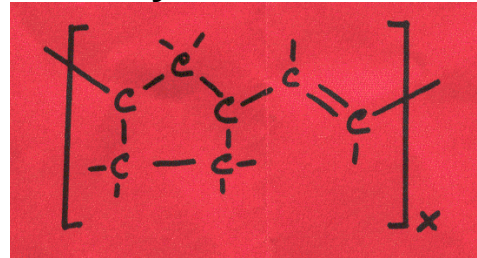


Choositz Balls (EI, Inc.)

Neoprene



Polynorbornene



Purpose: Demonstrates the difference between elastic and inelastic collisions.

These two rubber balls look and feel the same. One is made of polyneoprene (superball material) and bounces very well. The other is made from a different polymer (polynorbornene). When it is dropped, it hits the floor with a thud and stays (*not* sticks!) with no discernible rebound. The difference is pretty dramatic and can be heightened with a sneaky ball substitution or some other tricks.

Note: According to the manufacturer, the difference in behavior lies in how free the polymers are to rearrangement. The neoprene has chlorine links that produce a fairly inflexible structure. The

polynorbornene, on the other hand, has large carbon-ring links with many degrees of freedom and can twist and distort around easily converting the kinetic energy into heat.

This may be a good time to introduce the Coefficient of Restitution (COR). Inelastic collisions play a larger part in our lives than the students might think. The prime example is the common softball: every (ASA approved) softball has a COR marked right on the ball. Mine says "MAX COR 0.44." Apparently, the ASA is only worried about balls being too lively and does not care how dead it will play.

See ASA standards.

Recall that the COR for an object colliding with an infinitely massive target is the ratio of rebound-to-incident velocity. Thus, an easy way to estimate CORs is to observe the rebound height after a drop from rest: $COR = (h_2/h_1)^{1/2}$

ADDENDA: There is an article in *The Physics Teacher* (42(6) 2004, 332) about measuring baseball COR.

Extra Equipment: None.

Location: Shelf A2.