

THE SHRINKING BALLOON

A. Question: *Can air slip through rubber?*

B. Materials Needed:

1. A balloon for each of the students.
2. Flexible measuring tapes or strings.
3. Meter sticks.

C: Procedure:

1. Divide the class into three groups A,B and C; distribute the balloons.
2. Have group A blow the balloon up and let about half of the amount of air out, have group B blow the balloon up and then let about $\frac{1}{4}$ of the air out, and have group C leave the balloon blown up fully, and tie a knot.
3. Have each student measure the diameter and length of his or her balloon with the measuring tape or place a length of string around the balloon and measure the string with a meter stick.
4. Let each student record these measurements and mark their balloons with their names, and put them away for the next day. They can be stored in cupboards or stuck to the walls.
5. The next day, have students measure the diameter and length of their balloons and compare these with those of the day before.

D: Anticipated Results:

Students should expect to observe a shrinkage in the balloon after one day of performing the experiment.

E: Thought Questions for Class Discussion:

1. What made the balloon shrink in size?
2. Which of the three groups has the fastest shrinking balloon?
3. Were there any leaks in the balloons?
4. What would the balloon do if kept for another day?
5. Where do we find applications of this principle in daily life?

F: Explanation:

The air molecules in the balloon are much smaller in size than the rubber molecules of the balloon itself. Although many layers of rubber molecules are contained in the balloon membrane, the tiny air molecules can slowly slip through these bigger ones that hold them inside the balloon. As the pressure inside is larger than outside, the air molecules move faster inside and push through the rubber. Over time, so many air molecules diffuse through the rubber that the pressure inside decreases, thus decreasing the size of the balloon. The rate of losing air molecules is greater for the larger balloon, because of the higher pressure.