Gases Move Faster When Warm

Materials

2 identical bottles of unopened carbonated beverage (pop, etc.)
2 identical balloons, with mouths big enough to fit over the mouths of the bottles

Procedure

1. Place one beverage bottle (unopened) in the refrigerator and leave overnight to cool. Leave the other in a warm place.

2. When there is a significant difference in temperature between the two bottles, you are ready to try the experiment.

3. First open the warm bottle and notice the formation and movement of bubbles in it. Pour some in a clear glass, if you cannot see around the label.

4. As soon as possible, slip one of the balloons over the mouth of the bottle, to trap escaping gas (carbon dioxide).

5. Repeat this process with the cooled bottle, noticing air bubble movement and sealing the mouth with a balloon.

6. Compare the movement of bubbles between the two bottles. Are they moving more rapidly in one of the bottles? Try to form a hypothesis to explain the difference.

7. Watch the balloons on the two bottles. Does one seem to be more upright and stiff, or even larger than the other? Form your hypothesis to explain this phenomenon. How can we use this knowledge in our everyday lives?

The gas escaping from the bottles is carbon dioxide. All gases move much more quickly, and are thus more quickly lost into the air by diffusion, when heated or kept warm, in comparison to being cooled or kept cool. We can make use of this knowledge by keeping carbonated beverages cool to prolong the desired "fresh" state made by the content of carbonated gas (carbon dioxide). Carbonated beverages go "flat" when too much of the carbon dioxide has diffused into the surrounding air.