Curiosity Guide #510
Diffusion and Osmosis
Accompanies Curious Crew, Season 5, Episode 10 (#510)

Vanilla Balloon
Investigation #3

Description
Find out how vanilla becomes an escape artist when it is all tied up!

Materials
- Deflated latex balloon
- Vanilla extract
- Funnel
- Box with lid
- Friend

Procedure
1) Insert the small end of the funnel into the neck of the balloon.
2) Pour a small amount of vanilla extract into the balloon.
3) Blow up the balloon and tie the balloon's neck shut.
4) Wait a moment, then place the balloon into a box with a lid.
5) Leave the balloon inside the box for several minutes.
6) Open the lid of the box in front of your friend.
7) What does your friend notice?

My Results

Explanation
Your friend should be able to smell the vanilla, even though the vanilla was tied shut in the balloon and sealed in the box. Although balloons seem solid, they actually have very tiny holes in them. That explains why balloons deflate when they sit out for a long time. Although there are holes in the balloon, the liquid vanilla particles are too big to go through them and are held inside the balloon. When you blow into the balloon, your hot breath quickly begins to interact with the vanilla and its vapors. As the particles collide, the scent fills up inside the balloon. At the same time, some of the smallest particles pass through the tiny holes in the balloon and begin to fill up the air space in the box. The process of particles spreading out from where they started is called *diffusion*. There is a higher concentration of smelly particles inside the box than there is outside the box. Once the lid is lifted off the box, the smelly particles inside the box start moving out into the air, and you can smell the vanilla, even though it is still in the balloon.

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