



California State University of Bakersfield, Department of Chemistry

DIY Thermometer



Standards:

2-PS1-4. Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.

MS-PS1-4. Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

Introduction:

Have you ever wondered how thermometers work? Most thermometers contain alcohol (old ones may contain toxic mercury). As the temperature of the alcohol increases, it expands and causes the level to rise. The level of the alcohol corresponds to printed numbers indicating the temperature. You can create your own thermometer to demonstrate the effects of heat on the expansion of alcohol.

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Materials:

- Erlenmeyer flask or empty glass bottle
- Water
- Rubbing Alcohol
- A clear glass or plastic straw
- Rubber stopper with hole or modeling clay
- Marker
- Food coloring (any color)

Safety:

- Always have an adult with you to help you during your experiment.
- Always wear eye protection and gloves when doing chemistry experiments

Procedure:

1. Fill bottle about $\frac{1}{4}$ full of water.
2. Add an equal amount of alcohol into the bottle.
3. Add food coloring to bottle.
4. Place straw inside the bottle and hold it close enough as to where the straw does not touch the bottom.
5. Wrap the modeling clay around the straw at the top of the bottle and make sure the straw is securely in place.
6. Mark on the outside of the bottle how far up the straw the liquid travels using a marker (shows temperature of the surrounding room in which the bottle is).
7. Move around to different places where the temperature is significantly different and observe the change of the level in which the liquid is in the straw.
8. This activity can also be done with an Erlenmeyer flask, stopper and glass straw (as shown in the picture).

Questions:

1. What happened to the liquid in the straw when you went somewhere warmer than the initial room?

2. What happened to the liquid in the straw when you went somewhere colder than the initial room?

References:

1. Kid Science: Homemade Bottle Thermometer. Blog Her: Life Well Said.
<http://www.whatdowedoallday.com/2013/07/homemade-thermometer-for-kids.html>
(Accessed: July 24, 2014).