

## ***Fool-proof Yogurt***

Want to work with smaller organisms, without a high powered microscope? All you'll need is a little more time. What makes the milk thicken to make yogurt? During biblical times, people in the Middle East discovered yogurt. They found that when milk was left in a warm place, it thickened and developed a different, tart flavor. More importantly, it kept better than fresh milk. It was centuries later that scientists discovered that tiny bacteria made yogurt. Most yogurts are made from either *Lactobacillus bulgaricus* or *Streptococcus thermophilus*. However, not all processors process yogurt the same. Live active cultures will be necessary for this bacteria experiment. Making yogurt in the classroom is best done as a demonstration—unless you can get several small “incubation” coolers for each group or team of students.

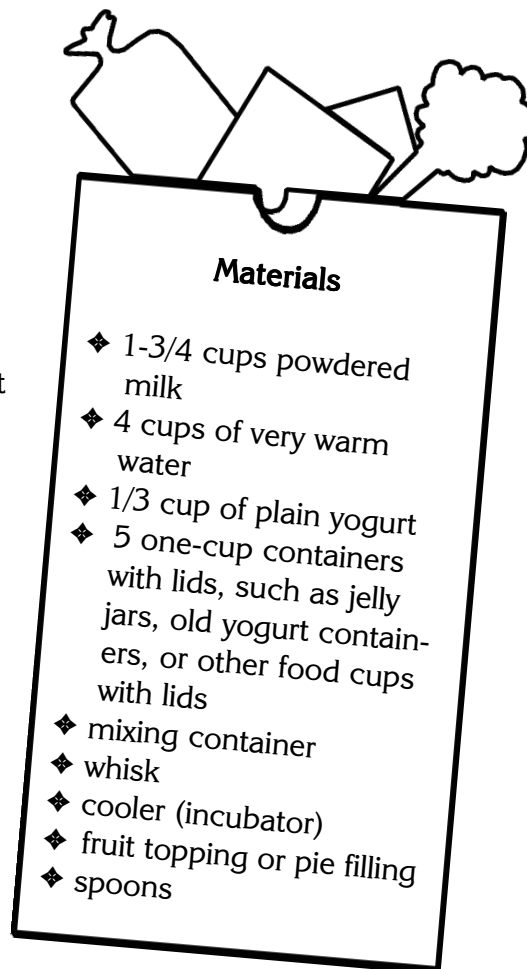
Before you begin, make sure you have all the necessary ingredients: containers with lids (you can use previously used yogurt containers, or purchase 2 oz. cups with lids from any restaurant supply store or possibly your school cafeteria), and a small insulated “cooler” that will be used as the incubator. Small “lunch tote” coolers work well and many come with a container that you can fill with hot water that will surely keep your yogurt warm for the 6-8 hours it will need to incubate. Be sure to use a plain yogurt that contains active cultures. Taste the plain yogurt you plan to use as the starter culture. Your yogurt will have the same taste (Dannon works well). Making yogurt in your classroom is easy, and really “fool proof” if you follow the recipe and procedures.

Mix in a deep mixing bowl:

1-3/4 cups powdered milk

4 cups very warm water (between 110-125° F)

1/3 cup plain yogurt with active culture and no additives.



Whisk the first two ingredients until dissolved. Add the yogurt and whisk until most of the clumps are dissolved. Work quickly, you don't want the mixture to cool. Pour the mixture into the cups, cover and place the containers in the insulated cooler (incubator) for 6-8 hours. During this "incubation time" the bacteria will multiply, ingest the milk sugar (lactose), and thicken the milk turning the mixture into yogurt. Refrigerate, add fruit or other flavorings and enjoy.

Try some real world science. Manipulate the recipe to see how bacteria thrive best. Students should be making observations and predictions during the processing and incubation period. One word of caution, yogurt will not thicken or will separate if disturbed or bumped during the incubation period. Coagulation (thickening) changes the chemical makeup of protein so it is no longer water soluble (does not dissolve in water). Heat or acid at the proper temperature coagulates protein. In yogurt, protein is coagulated because acid is produced in a warm environment. If yogurt is moved during incubation (before yogurt is set), liquid and solid will separate. So, when making observations during the incubation period, care should be taken not to jostle all of your cups of yogurt so that some will complete their incubation period and set up. The yogurt will only taste as good as the starter you use. For more information about yogurt check out these two web sites: <http://www.dannon.com> and our AITC best yogurt pick, <http://www.yaourt.org>.

