

Is It Solid, Is It Liquid, Is It Both? – Shake Up Some Butter

The following activity was designed accompany the states of matter unit, as well as a fresh way to tie science to a food that many students are familiar with seeing. The students were given a short refresher lesson on the states of matter and mechanisms that cause matter to change states. I also provided some background that explained the definition of butter, history of butter, and what must occur for the students to make butter.

This lesson plan was designed for a fifth grade class with 18 students. The lesson takes one 90 minute science period. The materials written are for each student to make their own supply of butter.

Materials:

- 18 – 1 Quart Mason Canning Jars with Lid, Seal, and Ring
- 9 Quarts of Heavy Whipping Cream
- Disposable Gloves
- Strainer
- 18 Small Marbles
- 36 Jar Labels with Markers

Activity:

First, I reviewed the three major states of matter and the processes by which the states can change. I focused mainly on solids and liquids as they are the states seen in the activity. Students were familiar with the two states as we had recently made Oobleck in the classroom.

We transitioned into butter by the simple question of “what is butter?” After the students answered, I continued on by explaining that butter is produced by churning cream until the fats/proteins (solid) separate from the buttermilk (liquid) and the butter is in a semi-solid state. Therefore, butter is essentially the fat of the milk. I asked the students what animals can produce butter, and we discussed for a few minutes.

I went over a little of the history of butter and focused on the process of using animal skin as the container. We talked about how butter is mostly made in factories today to save on cost of production. I transitioned into the activity by telling the students about how their container will be a glass jar.

I concluded the intro talk by talking about emulsion. I explained that the heavy cream used today is an emulsion that it is possible to separate the fat from the liquid by exerting enough force. I explained the importance of continuing to shake until they could see the solid.

I passed out a jar to each student and asked him/her to go wash it out with soap and water. I kept the heavy cream in the refrigerator until this point. Each student received a marble and a pint of heavy whipped cream in his/her jar and noted the color, consistency, and states of matter inside the jar. The students noted the time and then began shaking their jar. Once each student has completed the separation of solid butter and liquid buttermilk, I separated the butter from the milk by using a strainer. The student washed out the jar, and I placed

the butter back in so they could take it home for Thanksgiving. I allowed the students to drink their buttermilk if they wanted.

During down time during the activity, students filled out an instruction label for their butter that their family member could read and repeat to make their own butter and another label with a creative name for the butter.