TEACHER'S

Scientific Investigation Worksheet: Is shaking necessary to make butter?

We've made solids (sugar, salt) disappear in water. Today..can we make a solid appear from a liquid?

How is butter made? How did they make it in the old days? Is shaking really necessary?

Step 1 – Question – What do you want to know . . . .

Is shaking necessary to make butter?

Variables I will keep the same

- Amount of cream, temperature of cream, marble in container

Variable I will change: amount of shaking

Variable I will measure: is butter formed or not?

Step 2 – Prediction – What I think will happen . . .

If I _____SHAKE the container with cream_____
refer to changed variable

then I predict __butter will form_____
refer to measured variable

Step 3 – Materials – What I will use . . .

- cream
- marbles
- 2 small containers

Step 4 – Procedure – The steps I will take . . .

1. pour cream in both containers so that each is one third full
2. add a marble to each
3. when your teacher says "GO", shake one of the containers but not the other (but hold other in your hand as well (to control for temperature))
4. trade shaking (and holding the non-shake container) with your partner
5. when you notice a change in the sound and feel of the container that you're shaking, note the time and check it for butter. You can continue shaking it (and continue NOT shaking the other one) if it doesn't seem quite solid enough, or you can stop.
6. When butter has formed, note the time.
7. If there's time, go ahead and make butter in your second container!

Next page on student's worksheet:

Step 5 – Data collection (my observations during the experiment):

What did you notice about the sounds and the feel of the container you were shaking?

Compare the contents of both containers at the end of the experiment:

If butter formed, how long did it take to form?

Overall Results (What was observed using multiple trials from the class.)
Were the results consistent?

Why do you think it took longer for some groups to make butter?
Some had more cream than others, some shook harder than others…

Step 5 – Conclusion
My prediction _____
(state prediction)
was _____
(Supported or not supported by the data)
Concluding statement: _____

_____

Questions for discussion: What is the liquid called that is left after making butter? This is buttermilk! Some people love to drink it or put it on granola instead of milk. Because all the fat went into the butter, buttermilk is actually low fat and very good for you!
Do you think it would take a longer or shorter amount of time to make butter without the marble in the container? Why? How could you test this?
Were you convinced that shaking was necessary to make butter? What would happen to the cream if left in the container overnight?
Milk= emulsion of butterfat in water-based fluid. (also sugars and proteins in this water). Shaking it makes the fat globules and some of the protein hit each other and then they stick together…making butter! If you didn't shake it, they would stay separated.
What is the difference between these words: Solution, suspension, emulsion?
Suspension: solid particles dispersed in a liquid (by eye or microscopically visible particles)-not dissolved. Particles will settle out over time.
Emulsion: liquid particles dispersed in a liquid (example: milk fat droplets are dispersed in the water based milk)
Solution: one substance dissolved in another (technically can refer to gases as well) (example: sugar in water). You cannot see what is dissolved; will not settle out.
If you shook and shook your solution of sugar water last week…would the sugar ever lump together like the butter did? no