**Homemade Butter**

Whip up a fresh batch of homemade butter to spread the science love, learning a little kitchen chemistry, getting physical, & satisfying all the senses with a delectable whipped concoction open to a variety of flavoring & mix-in options.

**Suitable for: All Ages**

**Materials:**
- Heavy Cream
- Container or Jar with Secure Lid
- 2-3 Marbles (optional)
- Flavoring, Herbs, or Mix-Ins (optional)

**Vocabulary:**
- Cream
- Fat
- Solid
- Liquid
- Gas
- Colloid
- Suspension
- Emulsion
- Surface Tension
- Membrane
- Lipid
- Phospholipid
- Hydrophilic
- Hydrophobic
- Fatty Acid

**Directions:**
1. Choose a container with a secure lid so it won’t pop off. Lids that screw on or clamp on are the safest bet, but snap on lids can work with a little care taken to hold both the lid & container when mixing. Glass jars work well, too, but if children will be mixing, supervise closely & maybe skip the marbles since they help speed it up, but if shaken too vigorously can crack a thinner glass jar.
2. Fill jar or container halfway with cream.
3. Add marbles if using them, then secure lid & SHAKE!
4. After a minute or two, the cream will thicken & you’ll notice you don’t hear the sloshing of liquid. You can carefully open, observe, & even sneak a taste of the whipped cream.
5. Secure the lid again & shake some more to make butter & buttermilk. You’ll start to hear sloshing again when this happens. Keep shaking for another minute or so until the butter forms a solid mass.
6. Open the jar to see smell, feel, & of course taste the results!
7. You can pour off the buttermilk to save for baking (MMM, pancakes, anyone?)
8. If making a larger quantity to save, you can rinse your butter with cold water, kneading & compressing to get all of the buttermilk & water residue, to help prevent it from going rancid too quickly, storing in the fridge.

**The Science Behind the Experiment:**
Milk fat works its magic! Milk is a colloid, with solid fat particles suspended in the liquid. When left to sit, the cream is the fat-enriched portion of the milk that rises to the top, with a high proportion of solid fat globules, creating a colloidal substance with a lot of solid particles suspended in a small amount of liquid. When shaken or whipped it incorporates air into the cream. The trapped gas bubbles create a light & foamy texture which we know as whipped cream, often sweetened or flavor with vanilla. Keep on shaking to break down the phospholipid membrane, releasing the air, allowing the fats to clump together more tightly into a dense mass of butterfat. This takes a lot of agitation to force the hydrophobic (water-fearing) fats together, releasing the watery buttermilk.

**Make it Awesome:**
After you’ve tasted the delicious simplicity of fresh homemade butter, experiment with flavorings, mixing in herbs, spices, or other tasty mix-ins to enjoy smeared on crackers, bread, bagels, or other treats. Since you learned both how to make whipped cream & how to make butter, the opportunities are endless! Search the internet for inspiration & ideas.

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