

Crystallizing a Mixture

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Purpose: To observe endothermic/exothermic changes and physical/chemical changes during the crystallization of a mixture of lactose, fatty acids, water, propylene glycol, amyl acetate, ascorbic acid, sucrose, protein and vitamins A, B, D and E.

Procedure:

1. Obtain 50 mL of the lactose mixture and put it in the small jar which has been rinsed well with water.
2. Seal the small jar tightly. (Check by turning it upside down.)
3. Put the small jar in a baggie and seal the baggie (remove all the air in the baggie)
4. Obtain a coffee can and lid. Fill it about 1/3 full with ice and coat it with rock salt; mix.
5. Put the small jar in the can and surround it with more ice and salt (even the top).
6. Put a sack on the floor and roll the can back and forth on its side for 15 minutes. (Note what happens to the outside of the can.) This activity can be done outside on a side walk if available and the weather conditions are favorable.
7. Open the can and remove the jar. Rinse the outside of the jar. Sample the contents of the jar.
8. Pour off the liquid in the can. Dump all solids onto the lid; pick out the ice. **Return the salt to the designated place.**
9. Thoroughly clean all equipment.
10. Return the cleaned jars and spoons to the designated places.

Questions:

1. Why did the crystals form in a wheel-shaped pattern inside the jar?

2. Is the crystallization of the lactose mixture a physical or chemical change?

3. What is the brine? _____

4. Is the formation of brine a physical or chemical change? _____
5. Is the brine homogeneous or heterogeneous? _____
6. What formed on the outside of the can? _____
7. Is this a physical or chemical change? _____
8. Why does this happen on the outside of the can? _____
9. Is this crystallization of the lactose mixture an endothermic or exothermic process?

10. Identify an endothermic process in this experiment? _____
11. Why is it necessary to keep rolling the coffee can? _____

12. Why didn't you fill the small jar to the top? _____
13. What did you produce in the small jar? _____
14. Which flavor of this crystallized mixture would you predict is the favorite of American people? _____
15. Which country do you think eats the most of this crystallized mixture? _____

16. If you could create a special flavor of this crystallized mixture, what flavor would it be and why? _____

RECIPE

1 quart of Half and Half
1 can Eagle brand sweetened condensed milk
1 T of vanilla

Answer Key

1. rolling can back and forth
2. physical, freezing is a phase change
3. salt solution
4. physical change
5. heterogeneous
6. frost
7. physical (g) --> (l)
8. cold can
9. exothermic, decrease temperature, energy lost to the surroundings
10. melting of ice
11. bring warm lactose mixture in the middle in contact with the cold jar
12. the lactose mixture will expand when it freezes
13. ice cream
14. vanilla (29%), chocolate (8.9%), butter pecan (5.3%), strawberry (5.3%)
15. 1st U.S., 2nd New Zealand, 3rd Denmark, 4th Australia
16. Student's answers will vary.