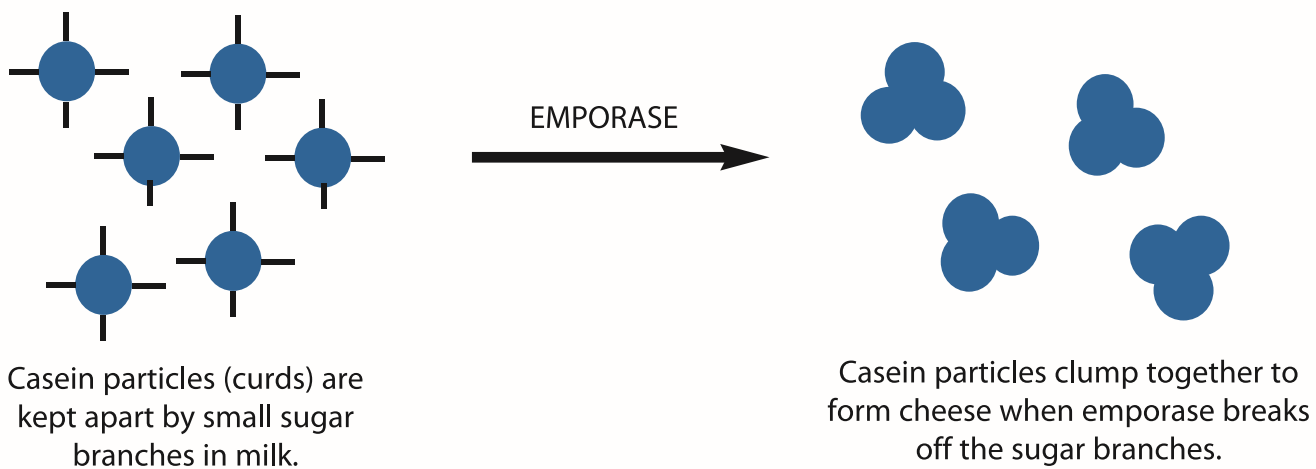


Milk to Cheese

Cheese is the solid portion of milk (curd) which has been separated from the liquid portion (whey). In cheese production, enzymes are used to separate the curds and whey in milk. The cheese-making process was actually discovered by our nomadic ancestors. They would travel great distances, carrying liquids in the stomachs of dead animals. When milk is placed in a stomach, the enzymes of the stomach cause the milk to curdle, thus producing clumps of curds or cheese. In this experiment, we will combine the enzyme **emporase** with milk and observe this chemical reaction.

Emporase performs the following chemical reaction:



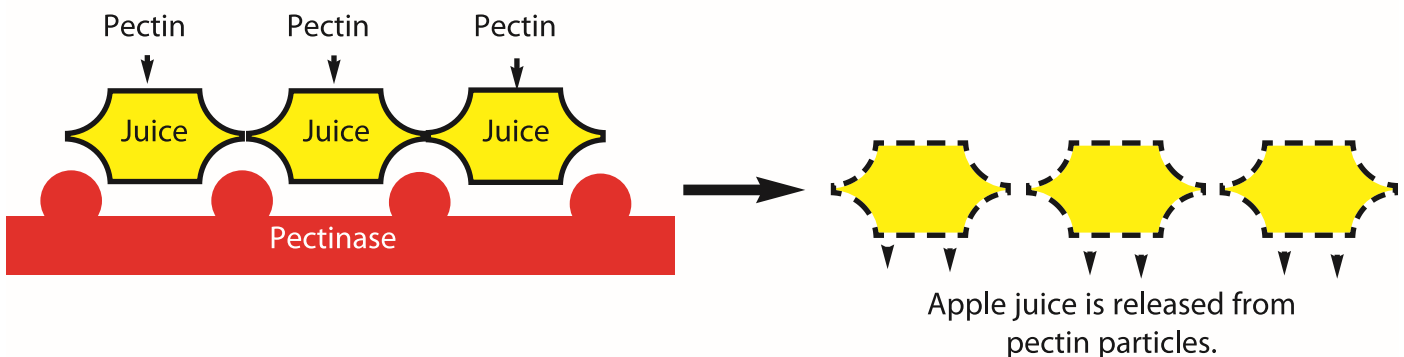
Procedure:

1. Heat a solution of 100 ml whole milk and 20ml of buttermilk to 55°C.
2. Label two plastic cups: **experiment** and **control**.
3. Fill each cup halfway with the milk/buttermilk solution.
4. Add 1ml of emporase enzyme to the experiment cup and stir.
Allow both cups to sit for 5 minutes.
5. Label 2 clean plastic cups "experiment" and "control", and place a separate piece of cheesecloth over each.
6. While holding cheesecloth in place, pour both the experiment and control solutions into their respective cups. The curds should remain on top of the cloth, while the whey filters through into the cup. Compare the experiment and control.

Applesauce to Apple Juice

Millions of apples are used to make juice every year in countries around the world. In the flesh of an apple, apple juice is stored in tiny particles surrounded by walls of pectin. Pectin is a sugar molecule, and must be destroyed to release the juice trapped within. The enzyme **pectinase** is used to perform this chemical reaction in juice factories today. Years ago, apples would be pressed, or crushed to extract their juices. Which method yields more juice? In this experiment, we will find out!

Pectinase performs the following chemical reaction:



Procedure:

1. Label 2 plastic plates: one **experiment** and the other **control**.
2. Place an equal amount of applesauce in each plate.
3. Add 1ml of pectinase to the experiment plate and stir. Let stand for 5 minutes. **What do you observe?**
4. Place separate coffee filters over two plastic cups. Label one cup experiment, and the other control.
5. Pour the applesauce from each plate onto the filter of the appropriate cup. Juice will pass through the filter and collect in the cup, and the fruit pulp will remain on top of the filter.
6. Measure and compare the amount of juice collected from each plate.