

Milk Fireworks

You won't believe what is happening in a bowl of milk.

WHAT TO DO

An adult will place 4 small drops of food colors in a bowl of milk. Dip one end of a toothpick in some dish soap, then gently touch it to surface of the milk and watch what happens.

WHAT'S HAPPENING?

Milk is a homogenous mixture of fats, sugars, proteins and water molecules. The fats and proteins in particular are long chain-like molecules with some regions that are drawn to water molecules (hydrophilic) and other regions that want to get away from water (hydrophobic). This causes these long molecules to twist and fold around each other until they settle down into a barely stable arrangement (called an equilibrium) that allows them to stay suspended in the milk. Soap is also made up of long chain-like molecules, with one end hydrophilic and the other end hydrophobic, so when soap is added to the milk mixture it completely disrupts the fragile equilibrium and causes the protein and fat molecules to start twisting and turning and moving around all over again as they fight with the soap molecules. Normally you can't see any of this happening, but when the food color drops are placed on the surface they get carried along as the fats, proteins and soap molecules play their tug-of-war, creating an explosion of mixing and moving colors that looks like fireworks or little volcanoes erupting. This display can last for several minutes, so be patient and don't stir or bump the bowl. When you're sure it has stopped, you can add a little more soap. to start things moving again.