

I can see - Milk Fireworks!

Use simple materials from home to explore colour mixing and the properties of liquid in this fun activity.

Topic: I can see – Colours

Time: 15 min

Age group: 5 - 7

What you need

- Plate
- Milk (Whole Milk)
- Food colouring
- Dish washing soap
- Cotton swab



What to do

Set up

- Have all your materials at hand

Activity

- Pour enough milk in the plate to completely cover the bottom to the depth of about 1-2 cm . Allow the milk to settle before moving on to the next step.
- Add one drop of each of the four colours of food colouring—red, yellow and blue—to the milk. Keep the drops close together in the centre of the plate of milk.
- Ask children to predict what will happen when you touch the tip of the cotton swab to the centre of the milk? It's important not to stir the mix—just touch it with the tip of the cotton swab. Go ahead and try it.
- Now place a drop of dish washing soap on the other end of the cotton swab. Place the soapy end of the cotton swab back in the middle of the milk and hold it there for 10 to 15 seconds.
- Add another drop of soap to the tip of the cotton swab and try it again. Experiment with placing the cotton swab at different places in the milk. Notice that the colours in the milk continue to move even when the cotton swab is removed. Are the colours changing?

The science

Milk is mostly water, but it also contains vitamins, minerals, proteins, and tiny droplets of fat suspended in solution. Fats and proteins are sensitive to changes in the surrounding solution (the milk).

The secret of the bursting colours is in the chemistry of that tiny drop of soap. Like other oils, milk fat is a non-polar molecule and that means it doesn't dissolve in water. When soap is mixed in, however, the non-polar (hydrophobic) portion of micelles (molecular soap structures in solution) break up and collect the non-polar fat molecules. Then the polar surface of the micelle (hydrophilic) connects to a polar water molecule with the fat held inside the soap micelle. Thanks to the soap connection, literally, the non-polar fat can then be carried by the polar water. This is when the fun begins.



The molecules of fat bend, roll, twist, and contort in all directions as the soap molecules race around to join up with the fat molecules. During all of this fat molecule gymnastics, the food colouring molecules are bumped and shoved everywhere, providing an easy way to observe all the invisible activity. As the soap becomes evenly mixed with the milk, the action slows down and eventually stops. This is why milk with a higher fat content produces a better explosion of colour—there's just more fat to combine with all of those soap molecules.

Science talk

Science talk is a way of giving children the language they need to investigate and explore concepts. It doesn't need to sound scientific! The scientific method is about asking questions, making comparisons and predications and discussing results. Science talk is just a way to give children the simple vocabulary they need to develop their own understanding.

Description words

Use and repeat descriptive words such as colours, shades, blend, mix and change.

Science process words

Observe, notice, compare, same, different, change, test, predict and results.

Open ended questions

Questions are the key to thinking scientifically! Open ended questions (those that can't be answered with one word or just yes or no) are good as they encourage children to explain and expand upon their thoughts. For example: What happened? How did the colour change? Why are new colours appearing?

Skills

Observing, predicting, recording, learning about the concepts of colour and mixing.

Extending the activity

- Extend the learning by experimenting with different types of milk, such as soy milk, coconut milk, chocolate milk or butte milk.
- Learn about mixing colours – add only red and blue food colouring to make purple, yellow and blue to make green and red and yellow to make orange. The swirling effect mixes the colours together making a new colour.
- Experiment with full cream milk and skim milk. Are the results the same or are they different?
- We used liquid dish detergent to make the colours move. But you could try some other soap or detergent, like shampoo, liquid hand soap, laundry detergent, or regular soap. You could compare the way the different soap or detergent makes the colours move.

Stay Safe

- Keep an eye for spills (have cleaning utensils at hand)
- Watch out for food colouring stains