

MAKE FIREWORKS IN A JAR

Experiment with liquids and density while creating colourful underwater trails

What you'll need:

- Warm water
- 2-3 tbsp oil (olive, vegetable or canola)
- Food colouring (one colour or many)
- Clear jar or large glass (any size)
- Bowl or container
- Fork or spoon
- Towel for clean up

Careful! Food colouring can stain.

Activity setup:

1. Pour oil into the bowl.
2. Add three or four drops of food colouring to the oil. If you're using more than one colour, add two to three drops of each colour. Do they mix?
3. Stir the food colouring and oil with a few swipes with the fork. What happens to the food colouring?
4. Fill the clear jar about three-quarters full with water.
5. Pour the food colouring and oil mixture from the bowl into the jar.

Enjoy the fireworks!

How does it work?

Water and oil are **immiscible**, meaning they don't mix.

Water (H_2O) is made from two hydrogen atoms and one oxygen atom, and water molecules are **polar**—they have a partial negative charge from the oxygen atom and a partial positive charge from the hydrogen atoms. This causes water molecules to be attracted to each other, creating strong hydrogen bonds between them.

Oil is made up of hydrogen and carbon atoms, so they're called **hydrocarbons**. Unlike water molecules, hydrocarbons are **non-polar**—electrons are evenly distributed across the molecules—and there is no positive or negative charge. The bonds holding the hydrocarbon molecules together aren't strong enough to break the hydrogen bonds between the water molecules, and so can't mix. We say oil is **hydrophobic**, or "water fearing."

Food colouring is a water-based liquid, so it doesn't mix with the oil. Instead, it forms small spheres within it. Food colouring, like water, is denser than oil—it has more atoms packed tightly together per volume than oil does—so droplets of food colouring sink to the bottom of the oil.

So when the oil and food colouring are poured into the water, the oil floats to the top carrying the food colouring inside of it. But when the liquids settle, the food colouring sinks through the oil and enters the water.

That's when things get fancy. The food colouring is denser than water, so it sinks to the bottom of the jar. As it sinks, it begins to mix and slowly dissolve into the water. As the dyes spread out, they leave a trail resembling fireworks.

