



# Rainbow Film

Can you make rainbow colors from clear nail polish?

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## Try this!



Write your name on a strip of black paper. Hold one end and slide the paper into the pan.

Tip: Make sure the paper is under the water, except for the end you're holding.



Use the brush to drip one drop of nail polish onto the surface of the water. Watch what happens—the polish spreads out into a thin film!



Now lift the paper out of the water. The film of nail polish should stick to the paper. Does the nail polish still look clear?

The nail polish spreads out into a super thin film, which creates rainbow colors. The film is only a few nanometers thick, so it reflects light in special ways.

## What's going on?

The thin film is only a few hundred nanometers thick, which is about the same thickness as the soap film in a soap bubble. That's also the same size range as the wavelength of visible light.

The film of nail polish is slightly thicker in some places and thinner in others. It reflects light differently depending on how thick it is, so you see different colors.

White light is made up of all wavelengths, or colors, of light. Wavelengths that are in sync, hitting both the front and back of the film, are reflected back to your eyes as bright colors. Different wavelengths are in sync at different parts of the film, depending on its thickness.

Many beautiful things in nature get their iridescent colors in this same way, including bird feathers, butterfly wings, sea shells, and beetle shells.



## How is this nano?

Thin films can reflect light in special ways, because they're only a few hundred nanometers thick. (A nanometer is a billionth of a meter.)



**Thin-film solar cell**

Nanotechnology takes advantage of special properties at the nanoscale to create new materials and devices. Researchers are creating thin-film batteries, solar cells, electronic displays, and coatings for different surfaces.