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# Exploring Materials—Nano Gold

*What happens when gold gets really small?*

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# Exploring Materials—Nano Gold

## Try this!

Look at the three containers. Which one contains gold?

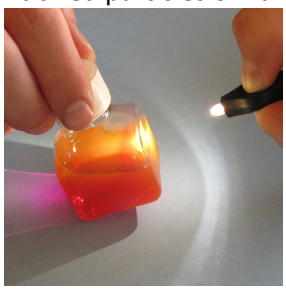
## What's going on?

All three containers have gold in them! The difference in their appearance is due to the size of the gold particles.

Large pieces of gold, like the flakes in one of the vials, look shiny and golden. But when gold gets very, very small, it looks different because it interacts differently with light. The containers with red and orange liquids in them have nano gold, tiny particles of gold so small that they're measured in nanometers. A nanometer is a billionth of a meter—smaller than the wavelength of light.

Nano gold can look red, orange, or even blue! The color depends on the size and shape of the nanoparticles, as well as the distance between them. Here, the red nano gold particles are about 20 nanometers across, while the orange nano gold particles are about 80 nanometers across.

Take a look at the samples of stained glass. Their color comes from real gold! Nano gold has been used to make red stained glass since the Middle Ages. Different colors of glass contain different-sized particles of nano gold.



## Now try…

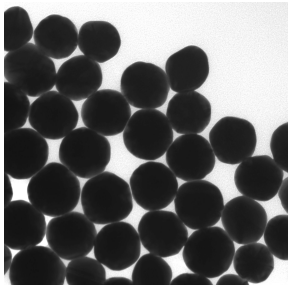
1. Place the container of orange (80 nm) nano gold on the white paper, and tilt the bottle.
2. Shine the light through the bottle. What color do you see on the paper?

   *Tip: Squeeze the mini-light to turn it on.*

## What's going on?

Nano gold interacts with light in surprising ways. When you look at the container of 80 nm gold under regular ambient light, you see the longer, orange wavelengths of light that are scattered by the tiny particles of nano gold. But when you look at the light that shines through the container and onto the paper, you see the shorter, purple wavelengths of light that are transmitted by the suspension of nano gold.

## How is this nano?



**Nano gold particles**
80 nm diameter

**A material can act differently when it's nanometer-sized.** (A nanometer is a billionth of a meter.) Tiny particles of gold look red, orange, or blue—not shiny and golden.

Nanotechnology takes advantage of special properties at the nanoscale to create new materials and devices. Gold nanoparticles can be used as markers to indicate the presence of specific strands of DNA. And gold nanoshells—tiny spheres of glass covered with a thin layer of gold—are being tested as a part of a new cancer therapy.