

Exploring Products—Sunblock

Try this!

1. Take a piece of black paper.
2. Use a cotton swab to put a small dab of ointment on the paper. Try rubbing it in.
3. Now use a swab to rub in a dab of sunblock. Is it easier to rub in than the ointment?



What's going on?

The sunblock rubs in better than the ointment, because it contains tiny, nanosized particles of zinc oxide. (A nanometer is a billionth of a meter.) The nanoparticles of zinc oxide are so small that they don't reflect visible light, making the sunblock transparent on skin.

The ointment also contains zinc oxide, but the particles are much bigger. These larger zinc oxide particles reflect visible light, so they create a white film. (To see how this works, look at the pictures of white dots on a black background.)



Both products are equally effective at absorbing UV radiation and keeping it from reaching your skin, but many people prefer sunblock that rubs in clear.

Research shows that sunblocks containing nanoparticles of zinc oxide and titanium dioxide are safe to use. The zinc and titanium minerals in the sunblock don't go through the outer layer of healthy, adult skin. Still, some people have concerns about the use of nanoparticles in sunblock and other products.

Many other health and beauty products contain nanosized particles, including hair products, cosmetics, and toothpaste. These products are not regulated by the U.S. Food and Drug Administration (FDA), and are not required to indicate whether their formulations include nanosized particles.

How is this nano?

Sunblocks containing nanoparticles are one of the most common applications of nanotechnology.

Nanotechnology takes advantage of special properties at the nanoscale. For example, the nanoparticles in sunblock are invisible to the human eye because they're smaller than the wavelength of visible light.

Some people are concerned that the particle size of the ingredients may make a difference in how safe they are. That's because materials can act differently when they're nanosized—so just because something is safe on the microscale doesn't necessarily mean it's safe on the nanoscale. More research is needed before we can know for sure.



Learning objectives

1. Sunblocks containing nanoparticles are one of the most common applications of nanotechnology.
2. Nanoparticles in sunblock are invisible to the human eye because they're smaller than the wavelength of visible light.

Materials

- Sunblock with nanoparticles of zinc oxide
- Zinc oxide ointment
- Black construction paper
- Cotton swabs
- "Particle Size" sheet

Notes to the presenter

SAFETY: To avoid potential reactions due to allergies or sensitivities, do not allow visitors to apply the ointment or sunblock to their skin.

Visitors may wonder how they can tell if their sun protection contains nanoparticles. Here are some guidelines:

- If a product includes zinc oxide or titanium dioxide, it's a mineral sunblock that works by absorbing UV rays. If a mineral sunblock rubs in clear, it probably contains nanoparticles.
- Products that contain avobenzone, oxybenzone, or PABA are chemical sunscreens that do not contain mineral nanoparticles.

More information on potential health concerns related to nanoparticles in sunblock can be found in the "Invisible Sunblock" program, available at www.nisenet.org/catalog/programs/invisible_sunblock

Related educational resources

The NISE Network online catalog (www.nisenet.org/catalog) contains additional resources to introduce visitors to nanomaterials and nanotechnology in consumer products and applications of nanotechnology:

- Public programs include *Aerogel*, *Future of Computing*, *Ink Jet Printer*, *Magic Sand*, *Nanoparticle Stained Glass*, and *Nanosilver: Breakthrough or Biohazard?*.
- NanoDays activities include *Exploring Materials—Ferrofluid*, *Exploring Materials—Liquid Crystals*, *Exploring Materials—Thin Films*, *Exploring Products—Nano Fabrics*, and *Exploring Products—Nano Sand*.
- NanoDays media include the poster and reference sheet *What's in Your Sunblock?*
- Media include *Everything is Made of Atoms* and *Zoom into a Computer Chip*.
- Exhibits include *Bump and Roll*, *Changing Colors*, and *Nanotechnology—Fact or Fiction?*

Credits and rights

This activity was adapted from "Invisible Sunblock," developed by The Franklin Institute for the NISE Network. The original program is available from: www.nisenet.org/catalog



This project was supported by the National Science Foundation under Award No. ESI-0940143. Any opinions, findings, and conclusions or recommendations expressed in this program are those of the author and do not necessarily reflect the views of the Foundation.

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