

## Exploring Products—Nano Food

### Try this!

1. Roll the large cube of connected blocks into the tray.
2. Count how many squares the cube is touching.
3. Now take the cube apart and re-roll the eight small blocks in the tray.
4. Count how many squares the blocks are touching. How does this compare with the number of squares the large cube touched?



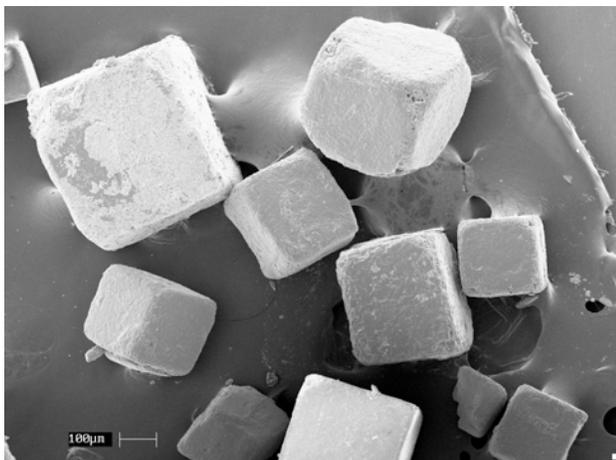
### What's going on?



We taste things when they come into contact with the taste buds on our tongues. In this demo, the cube and blocks represent salt crystals, the playing surface represents your tongue, and the black squares represent your taste buds. Even though there is the same total amount of “salt” in both cases, the smaller “crystals” (the broken-apart blocks) cover more area and touch more “taste buds.”

Some food scientists believe we can use much less salt but still get the same taste and experience just by using smaller crystals. So nano-sized salt crystals might help us make foods like potato chips lower in sodium and healthier—but with the same big flavor!

### How is this nano?



Salt crystals

**Nanotechnologies may improve existing products.** Nano-sized particles are already being used in many foods, both natural and processed. Mayonnaise, for example, is created by dispersing nanometer-sized globules of fat in water.

Researchers are devising new ways to manipulate food on the nanoscale in order to create specific tastes and properties. By controlling the size and structure of salt, fat, and sugar, food scientists can create healthier food that still has yummy tastes and textures.

While nano-sized particles of salts, fats, or sugars are thought to be safe—since the body will metabolize them in the same way as larger particles—the same may not be true for other foods. As a result, more research may be needed

on the long-term impact of nano-sized ingredients that aren't traditionally eaten but are finding their way into our foods, such as silver, titanium and silica.

## Learning objective

Nanotechnologies may improve existing products.

## Materials

- Tray with tongue cutout taped to the inside
- Snap cubes (16)

Snap cubes are available through education supply stores, such as [www.learningresources.com](http://www.learningresources.com) (Item # LER 7586).

Tongue image can be downloaded from [www.nisenet.org](http://www.nisenet.org).

## Notes to the presenter

**SAFETY NOTE: Do not allow visitors to put the snap cubes in their mouths as they pose a potential choking hazard.**

Each time you begin the activity with a different visitor group, piece together eight of the snap cubes to create a large cube. Encourage visitors to count every little black square that a block touches (even partially) when they're comparing the large cube with the broken-apart blocks.

You can use this activity to further explore conversations about how nanotechnology is being used in food and food production. Nano-sized salt crystals are just one example of how nanotechnology may change our food. There are also new techniques that reduce fat content but maintain taste and texture. For example, one chocolate shake product uses silica nanoparticles coated in cocoa instead of solid pieces of cocoa, and some mayonnaises use nano-sized water droplets coated in fat instead of solid droplets of fat. Nanotechnology is also used in food packaging. Nano-thin wax-like coatings can be used on fruit and vegetables to keep them fresher longer. Nanosilver is currently used in some food storage containers because it has powerful antimicrobial properties. And some plastic bottles have nano-particles of clay in them to keep oxygen from getting through the plastic.

## Related educational resources

The NISE Network website ([www.nisenet.org](http://www.nisenet.org)) contains additional resources to introduce visitors to the fundamentals of nanoscale science and technology:

- Public programs include *Nanotechnology: Small Science, Big Deal!* and *Kitchen Chemistry*.
- NanoDays activities include *Exploring Properties—Surface Area*, *Exploring Materials—Oobleck*, *Exploring Fabrication—Gummy Capsules*, and *Exploring Size—Ball Sorter*.
- Media include the *Intro to Nanotechnology* video, the *Mr. O* video series, the *Nano and Me* video series, and the *What's Nano About...?* video series.
- Exhibits include the *Nano* mini-exhibition.

## Credits and rights

Salt crystal image by John Hunt, Cornell Center for Materials Research, with support from NSF Award No. DMR-1120296.



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