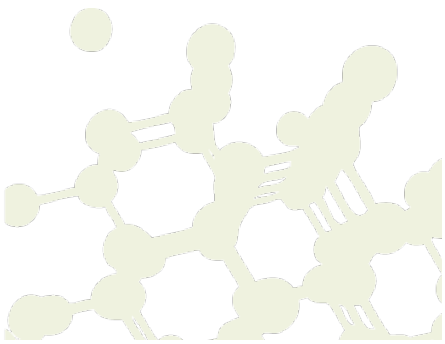
NanoDays

Exploring Properties—Surface Area

What's different at the nanoscale?



Exploring Properties—Surface Area

Try this!

1. Pour 20 ml of colored water from the pitcher into each measuring cup.
2. Remove two antacid tablets from their wrapper. Break one in half, and drop it into a cylinder. Break the other tablet into many small pieces, and put it in the other cylinder.
3. At the same time, pour the water from each cup into a cylinder.
4. Which fizzes up faster, the tablet you broke in half or the tablet you broke into lots of pieces?

What's going on?

The crushed tablet fizzes faster than the halved tablet. That's because it has a greater *surface area to volume ratio.* For the same amount of antacid, the crushed tablet has more surface—or exterior—to react with the water. Because the water can reach more of the antacid immediately, the chemical reaction (fizzing) happens faster.

Small things have more surface area for their volume than larger things do. Some things that aren't reactive at all in big pieces are very reactive when they're tiny. Steel wool catches fire, but you can't easily light a lump of metal on fire!

How is this nano?

Nano adhesives stick graphics onto cardboard boxes

A material can act differently when it's nanometer-sized. Things on the nanoscale have a lot of surface area, so they react much more easily and quickly than they would if they were larger.

Nanotechnology takes advantage of different material properties at the nanoscale to make new materials and tiny devices. Nanotechnology allows scientists and engineers to make other things like smaller, faster computer chips and new medicines to treat diseases like cancer.

Shrinking starch molecules down to 100 nanometers in size makes an extra-sticky, eco-friendly glue that requires no additional chemicals.