

Health and safety

The food colorant should not be swallowed

Some people may be intolerant to the food colouring. As a precaution we would recommend that if the colorant comes into contact with skin it is rinsed off immediately with copious amounts of water.



What happens in this experiment?

This experiment illustrates how we use different senses to detect different things and that just because one sense cannot detect something, it doesn't mean it isn't there.

By performing serial dilutions of the food colorant the colour and smell will gradually fade. The colour will fade more quickly than the smell, illustrating that even though our eyes cannot detect the chemical responsible for the colour, it is still present, as verified by the smell.

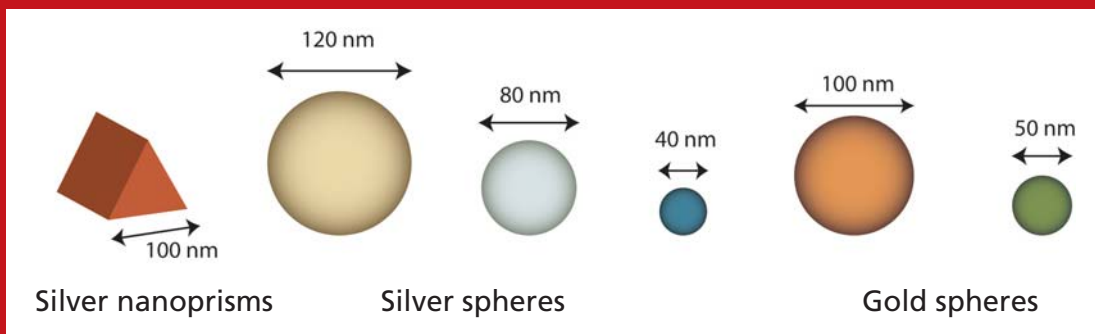
Just like we use our eyes to see large things and our nose to smell small things, nanoscientists use special tools to analyse and manipulate things at the nanoscale.

Atomic force microscopes can feel and move individual atoms, while special surfaces with nanotextures on them can repel water extremely efficiently.

This activity serves as a nice introduction for 'Activity 3: Magnetic probe' which illustrates how surfaces with nanostructures are examined.

Applications

Technologies based on the properties of nanoscale particles are not new. Since the Middle Ages some materials' properties and behaviours in relation to their size were already known, although they did not appreciate how small the particles were. Glaziers could create beautiful coloured glass for windows, for example in our medieval churches. These different colours were made by using the light-refracting properties of different sized gold nanoparticles. Glazed glasses displayed shining colours such as green, orange, purple and red.



Ideas for conducting the activity or discussion

This activity helps to illustrate how small the nanoscale is. Some examples you might like to give are:

- Our **nails** grow one nanometre each second.
- The virus most usually responsible for **the common cold** has a diameter of 30 nanometres.
- A **cell membrane** is around 9 nanometres across.
- The **DNA** double helix is 2 nanometre across.
- The diameter of one **hydrogen atom** is around 0.2 nanometres.

Encourage students/ participants to consider the things that they cannot see directly. Some examples could include the ozone layer, dyes in stained glass windows or the colloidal nature of milk.

Learning objectives or school curriculae

- An understanding of dilutions and concentration
 - An appreciation of the size of the nano-scale.
 - An introduction to colloids (a mixture with particles in the range of 10^{-9} and 10^{-6} m).
 - An appreciation that different senses detect different things.