

Molecule Size

How can you measure the size of a molecule?

Answer

If you're Benjamin Franklin you pour oil on a pond...

In 1774 Benjamin Franklin - also famous for flying kites in thunder storms - poured about 5 mL of oleic acid on to a pond in Clapham Common, London. Oleic acid can be made from olive oil and just like normal cooking oil it spreads across water to make a thin film, he added just enough of the acid to cover the entire surface of the water. From knowledge of the size of the pond and the volume used he was able to estimate the thickness of the layer over the surface of the water. He came to a value of ~3 nanometers (0.00000003 meters) and in doing so arguably made the first measurement of a length of a molecule. These days the agreed number is closer to 2 nanometers, but how big is a nanometer? Well it's roughly 50 thousand times thinner than a human hair. That is certainly smaller than anyone can see, so given he made his measurement over 250 years ago his estimate of 3 nm isn't bad.

These days we have many other ways to estimate and measure the size of molecules and the technique used really depends on what type of molecule or substance you are looking at. However, one of the most popular ways is to use an electron microscope. These microscopes are now so powerful they can even see individual atoms.