

Water Marbles

You've never seen water do this on a paper plate!

WHAT TO DO

Fill a pipette with colored water from one of the bowls, then drip a few drops onto a specially treated paper plate and watch what happens.

WHAT'S HAPPENING?

This paper plate has been carefully coated with special silica-based material called aerogel which has been chemically modified to make it *super-hydrophobic*. [Aerogels were first developed by NASA to have extremely low density (96% air by volume) and excellent thermal insulation properties.]

Hydrophobic substances repel water (in contrast to *hydrophilic* substances which attract water). When you put a little water on most surfaces- like a tabletop- the water droplets flatten and spread out because the water molecules are attracted and stick to the molecules of the surface material (we say the water "wets" the surface). Some materials, like an ordinary paper plate, even absorb the water. Waxy materials are very water repellent and droplets tend to form "beads" on the surface, but still spread out and stick a bit. Super-hydrophobic surfaces, on the other hand, are *completely* water repellent. Water molecules cannot wet or stick to the surface at all, so they instead stick or bond to other water molecules, pulling the droplets into little spheres which actually roll across the surface (much larger droplets may flatten due to gravity but still slide frictionlessly on the plate). Some plant leaves, notably lotus and lily pads, are naturally super-hydrophobic and this property is often called the "Lotus Effect".