

HYDROPHOBIC SAND

Explore the behaviour of sand that is coated with a waterproof (hydrophobic) substance. Create and sculpt magical underwater sand figures. Use sand over and over.

PROCEDURE

Required by each group of students

Hydrophobic sand
Container with water (plastic cup or clear cut-off soft-drink bottle)
Small dish
Spoon & Funnel

Activities

1. Pour some sand into the dish and observe how the sand pours and looks.
2. Use your finger to put a drop of water onto the sand. Observe.
3. Now, slowly pour the sand into the water using the funnel. The sand will coil magically through the water. Students should observe the silvery layer between the sand and water. Allow time for all students to move the sand with spoons or to sculpt sand patterns and stalagmites.
4. Spoon some of the sand out of the water, put it on newspaper and feel it.

Extentions

- 🔍 Add a small amount of sand on the surface of the water and it will float. Add more and it will sink, penetrating the water's surface tension "skin" on the surface.
- 🔍 As hydrophobic sand is non-polar, it will attract all non-polar solvents such as oil. Add one droplet of cooking oil to the sand and observe.
- 🔍 Fill a teaspoon with the sand, submerge it under the water and turn the spoon vertical.

Saving the sand

Slowly pour off as much water as possible from the container. Scoup each colour of sand onto a sheet of paper, spread out into a thin layer and allow to dry. Return to containers when dry.

WHAT IS HYDROPHOBIC SAND?

Hydrophobic sand is simply ordinary sand that has been exposed to the vapours of a silicon compound known as **trimethyl hydroxysilane**. This silicone compound is a covalent compound but since it has a backbone consisting of C and Si atoms (similar type of atoms), it is **non-polar**.

Water on the other hand is a **polar** covalent compound as it is made up of hydrogen and oxygen atoms (different atoms) that do not share their bonding electrons equally.

It is a well-known fact that non-polar and polar covalent compounds have no affinity for each other - a generalisation that has led to the expression: "Like dissolves like". And therefore the treated sand is not "wetted" by the water.

Substances that are attracted to water is "hydrophilic". ("Hydro" means "water" and "philic" means "loving".)

A substance repelled by water is known as hydrophobic. ("Phobic" means "fearing".)

Regular sand grains are attracted to water as they have areas that are polar or hydrophilic.

Other well-known hydrophobic substances are oil, silicone lubricants, a duck's feathers and Scotchguard® spray.

DISPOSAL

All sand should be kept for reuse. Do not use in fish tanks as the hydroxysilane may have an influence on fish. If you want to dispose of it - dispose in the garbage bin.

SAFETY

Hydrophobic sand is non-toxic and completely safe.

