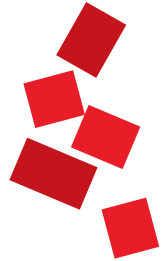


Health and safety

- Do not eat the magic sand!
- Do not get the magic sand in your eyes!
- Avoid inhaling fine particles of sand
- Avoid prolonged contact between the sand and your skin



You will need

- Magic sand
- Water
- Glass (or other transparent material) container
- A spoon
- A fine sieve

What you can do

- Examine the sand
Does it feel like normal sand? Does it behave like normal sand when it's dry?
- Pour the magic sand into the water
What happens? Look at the surface of the sand in the water; do you notice anything? What might cause this effect?
- Put your hand into the water and lift out the sand
What does it feel like? Is it still wet?
- Pour the sand slowly onto the water
What happens and why is this?
- Pour a layer of sand onto the surface of the water. Gently push your finger into the layer of sand and pull it out again.
Is your finger wet?
- Can you make a really skinny column of sand by the way you pour it?
- What happens if you pour the sand into the water through a straw or funnel? What happens if you pour out the water through a fine sieve?
- Put some dry sand on a piece of paper and drop water onto it using the pipette
Does it act like sand on the beach?

Taking the magic out of your sand!

- Take a very small amount of magic sand to destroy. Sprinkle it onto the water's surface so it floats. Using the Pasteur pipette, squeeze a drop of liquid detergent onto the surface of the water.
What happens?
- Now try the above experiment with a drop of vegetable oil
What happens this time?

What's happening?

Magic Sand is regular sand (silicon dioxide: SiO_2) that has been coated with a special nano-coating. This nano-coating is **hydrophobic** ('water hating'). When Magic Sand is poured onto water it won't mix with the water, but will float until the mass of the sand breaks the surface tension of the water and the sand sinks. The Magic Sand in the kit is made by exposing regular sand to vapours of trimethylsilanol ($(\text{CH}_3)_3\text{SiOH}$).

Oil is a common example of a hydrophobic material. If you pour some oil into a cup of water, it will float on the surface and tries to stick together away from the water. Magic Sand behaves in the same way, except it sinks because unlike oil, sand is denser than water.

Magic Sand was originally developed to trap ocean oil spills near the shore. By sprinkling Magic Sand onto floating petroleum, the Magic Sand would mix with the oil and make it heavy enough to sink.

What does it mean?

Sand is any particle between $60\ \mu\text{m}$ and $2\ \text{mm}$ in size. Smaller than this is 'silt' and larger is 'gravel'.

Silicon is a very common chemical element that is the basis of most of the minerals composing the rocks of earth.

Hydrophobic and **hydrophilic** literally mean 'water hating' and 'water loving'. Hydrophobic substances will not mix with water, while hydrophilic substances will. Oil and magic sand are hydrophobic. Ethanol, salt and sugar are hydrophilic.

Amphipathic substances can mix with hydrophobic and hydrophilic substances. Detergents are amphipathic and contain both hydrophilic and hydrophobic parts.



To find out more

- <http://www.flyingcolours.org.uk/cgi-bin/item.cgi?ap=1&id=1457>
- <http://bit.ly/66XJ1N>