
# Grains and powders

**GRAINS and POWDERS are small pieces of solid. Because they are small, both grains and powders can move more easily.**

You may think of solids as being large chunks of material that do not move – the bricks in a wall, for example. But pieces of solids move quite easily (Picture 1) even when they are quite large.

The smaller the material, the easier it moves. Think, for example, of the grains of sand on a beach, or grains of rice or wheat. Some particles of solid are even smaller. They make powders, like flour, for example.

## How solids move

If you have ever tried piling up dry sand, or rice grains, you will see that you can never make the pile at a very steep angle (Picture 2). This is because the grains don't stick together very well. As a result, grains and powders *appear* to pour like a **LIQUID**.

## The effect of water

Water has an important effect on grains and powders. When grains or powders are damp, the water sticks them together. This is why you can make a sandcastle on a beach of damp sand, but you cannot make a sandcastle in a sandpit of dry sand.

▼ **(Picture 1) When solid pieces are small, they look as though they are being poured. Even quite large pieces behave this way when they move. In this waste pile, the conveyor is adding fist-sized pieces, which then roll down the sides. Notice how, when solids are 'poured', they build up into a cone. The ash that falls during a volcanic eruption also rolls down the side of some volcanoes and helps explain their conical shape.**

▶ **(Picture 2) When sand moves, as in this antique hour glass, it pours through a hole and forms a cone-shaped pile in the bottom glass. Although the sand appears to flow as it passes through the hole, we know it is made of grains. If it were a liquid, it would take the same shape as the bottom of the hour-glass.**

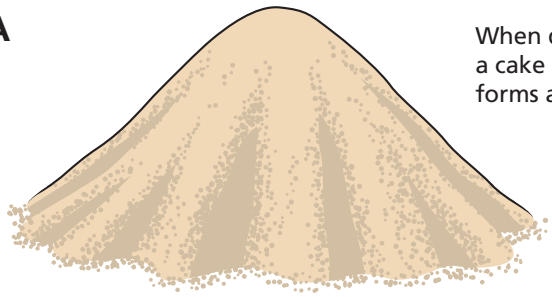


**Weblink:** www.science-at-school.com

The ingredients for a cake, that you mix in a bowl, behave the same way. The flour and sugar will be loose and easy to move about when they are dry (Picture 3), but as soon as water or milk are added, they stick together and form a dough. However, if you add too much liquid, all of the strength of the solids is lost.

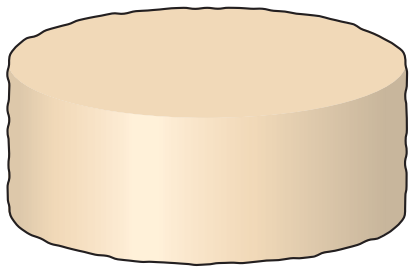
**▼ (Picture 3) These pictures show what happens when cake ingredients are mixed with different amounts of water.**

**A**

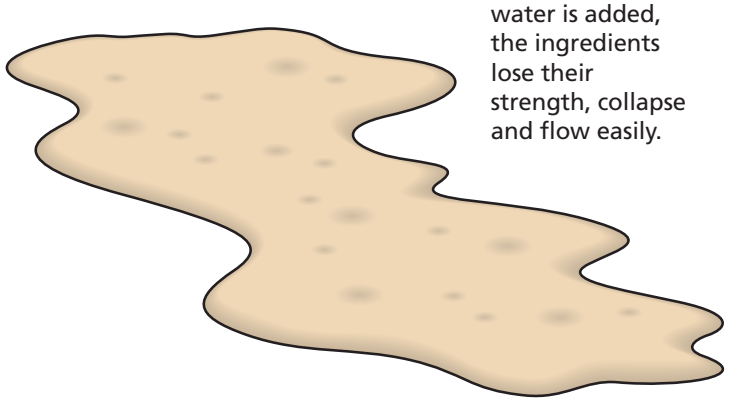


When dry, a cake mix forms a cone.

**B** When milk or water is added, the ingredients are made damp and they form a strong dough.



**C**



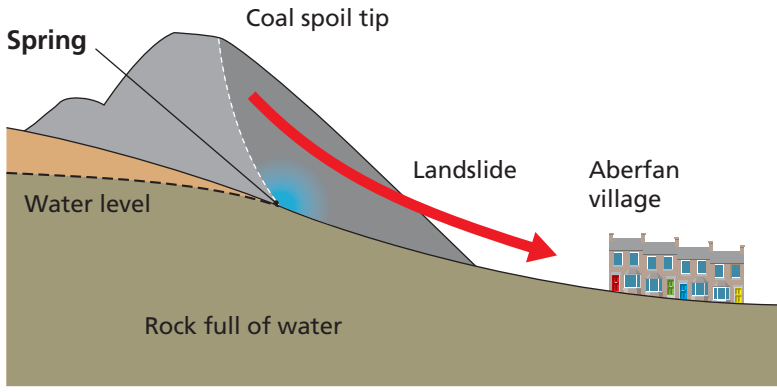
If too much water is added, the ingredients lose their strength, collapse and flow easily.

## Soils and landslides

Soils are made of small particles. Just like a cake mix, soil will hold together best when it is damp. However, when a soil gets very wet it loses its strength and can easily flow. When this happens it can cause a **LANDSLIDE**.

Landslides can be extremely dangerous. In 1966, for example, there was a mound of coal waste high on a hill overlooking the village of Aberfan (Picture 4). The coal waste was made of small pieces, just like a soil. When it became full of water from a nearby spring, the coal simply flowed down the hillside and straight into a primary school. Within seconds, 144 children and their teachers were killed.

**▼ (Picture 4) The tragedy of Aberfan, South Wales, happened because the spaces between grains of coal waste became full of water.**




### Summary

- **Grains and powders are small particles of a solid.**
- **Dry powders and grains can move easily.**
- **Damp grains and powders hold together.**



**Weblink:** www.science-at-school.com