What is in dirty water?

Dirty water is a mixture of very tiny PARTICLES – some of which have dissolved and others that have not.

Water is very good at carrying other substances. Some substances dissolve in the same way as coffee grains and are carried in solution. Other substances are carried along only when water is flowing swiftly. The mud carried by rivers during a flood is like this. The mud does not dissolve, and instead it is suspended in the water. We say the mud is in **SUSPENSION**. This happens quite naturally and in a way which is not harmful. However, when people or factories are careless with their waste it can also dissolve in water and cause **POLLUTION** (Picture 1). To prevent this we treat the water in a water treatment plant.

Cleaning up dirty water means that both suspended and dissolved substances must be removed from water.

▲ **(Picture 1) Very dirty water flowing in a river in a city. This water has scum on the surface, and the water itself is a dark grey due to pollution.**

Settling out

Given enough time, suspended substances will settle out of water. Settling is slow and may take many weeks (Picture 2).

Filtering

If a substance is only suspended in a liquid, it has not become part of the

▶ **(Picture 2) A water treatment plant uses big lakes to allow suspended substances to settle out, then the water is filtered through large circular beds of sand. Only then are the dissolved substances treated.**

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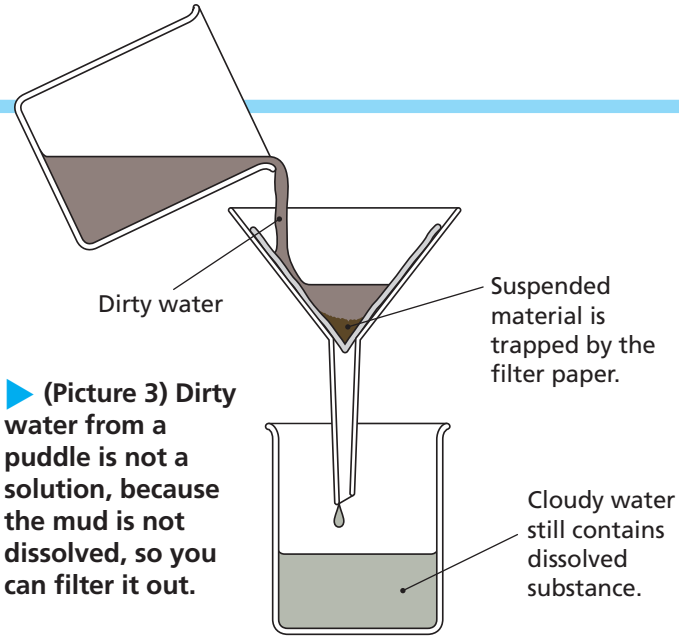
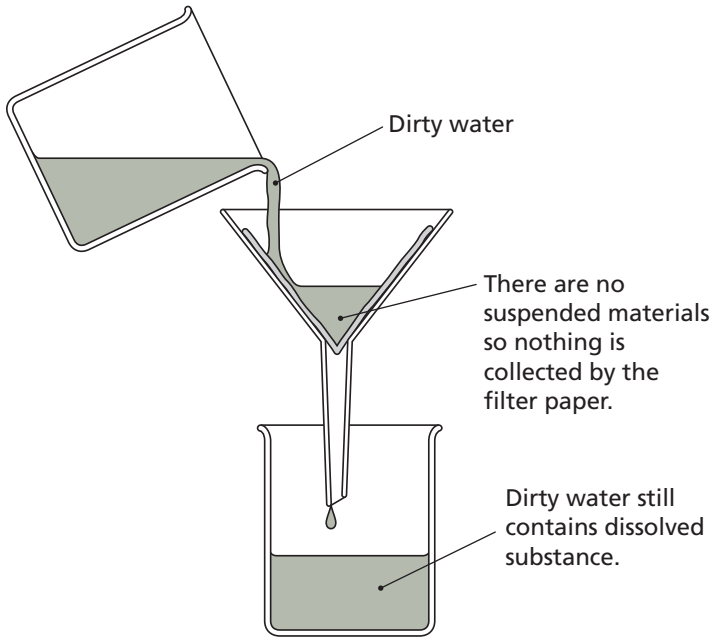


▶ **(Picture 3) Dirty water from a puddle is not a solution, because the mud is not dissolved, so you can filter it out.**

liquid. As a result, we can **FILTER** it out. Pouring muddy water through a filter paper, for example, will remove all of the material suspended in the water but not the dissolved material (Picture 3). In this way the filter paper **SEPARATES** out the suspended substance from the dissolved substance. If you pour all of the substance through the filter paper and nothing is left behind on the filter paper, then everything has dissolved in the water (Picture 4).

▼ **(Picture 4) Substances in solution are so small they cannot be separated from the water by pouring them through a filter paper. Substances that are completely dissolved, like ink, can be poured straight through a filter paper without being trapped.**



What remains

You will find that after filtering a muddy pool, or washing up water, the water will probably still be cloudy. This is because some substances are dissolved in it.

Even if it is clear, it can still contain dissolved substances, because not all dissolved substances are coloured (as we saw on page 4 with dissolving sugar).

The next step is to remove the dissolved substances. A way of doing this is shown on page 20.

Summary

- **Dirty water can carry unwanted substances.**
- **Some substances can be removed by filtering and settling.**
- **Water can look clean and still be polluted.**

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