

Water

Water is the most common liquid and a very special one. It exists as a solid, liquid or gas over a relatively short range of temperature. Chemically, it is a compound of hydrogen and oxygen (formula H_2O).

Water is needed by all living things. We can manage without food for several weeks, but we cannot last many days without water.

The water cycle describes the changes that happen to water in nature. Water is evaporated by the heat from the Sun. The water vapour rises into the atmosphere where it cools down and condenses into cloud formations. As the clouds get higher and colder, the droplets of water get bigger and eventually fall out of the sky as rain. The rain either soaks into the ground or runs into streams and rivers. Eventually, the water makes its way back to the sea and the cycle is repeated.

The water from reservoirs is first filtered to remove solid particles. The filtering is done by letting the water pass through filter beds of sand and gravel. Small amounts of chlorine or of other chemicals are then added to the water to kill bacteria.

In addition to domestic use, industry uses large amount of water. Nearly all of this water finds its way back into streams and rivers. Unfortunately, it is not always very clean when it is discharged into them.

Water pollution is a serious problem. When we have finished using water, we just let it go down the drain. If that unclean water was allowed to run into streams and rivers they would soon become unfit for life, dirty and smelly. In the past, untreated sewage was simply discharged into the sea. Nowadays there is much stricter control over the disposal of sewage which is processed before it is allowed to be discharged into the environment. Wastewater from industry can contain all sorts of harmful chemicals. Some of those most dangerous to animal life contain metals such as mercury and lead.

Apart from nitrogen, another source of pollution from farms is the use of pesticides.

If large amounts of detergents are released into rivers, the river may become covered with foam. Some detergents are harmful to river life. It is possible now to obtain biodegradable detergents that are broken down by naturally occurring bacteria.

Hard water is caused by dissolved calcium and magnesium compounds in the water. There are two types of hard water, temporary hard water – which can be softened by boiling – and permanent hard water – which is not softened by boiling.

(from: Stone-Andrews-Williams, *Examining GCSE-Science*, Stanley Thornes Ltd.)

1 Read *Water* and find words matching these definitions.

- White or grey mass of very small drops of water floating in the sky - D
- Very small drops - D
- Small rivers - R
- Lakes used as sources or stores of water - V
- Mixture of small stones with sand - L
- Poisonous gas used to sterilize water - H
- Waste material and water from houses and industries - W
- Throwing away - P
- Pipe carrying wastewater away - I
- Mass of small air bubbles in water - E

2 Answer these questions about *Water*.

- How is wastewater filtered and disinfected?
- What would happen if untreated wastewater were allowed to run into lakes, rivers and seas?
- What are some of the most dangerous chemicals contained in wastewater from industries?
- What are the advantages of biodegradable detergents?
- What chemicals is hard water caused by?

3 How much more do you know about water?

"It exists as a solid, liquid or gas over a relatively short range of temperature."

- What is the range of temperature over which water exists as a liquid?
"Chemically, it is a compound of hydrogen and oxygen (formula H₂O)."
- How many atoms of hydrogen and how many of oxygen are there in a molecule of water?
"The water cycle describes the changes that happen to water in nature."
- Can you put these sentences in the right order to describe the water cycle?
 - A portion of runoff enters rivers moving water towards the oceans.
 - Cloud particles fall out of the sky as rain or snow.
 - Most precipitation falls back into the oceans or onto land as runoff.
 - Some water evaporates into the air.
 - The sun heats water in the oceans.
 - The vapour rises into the air where cooler temperatures cause it to condense into clouds.

"Small amounts of chlorine or of other chemicals are then added to the water to kill bacteria."
- What are the other chemicals which may be added to water to kill bacteria?
"Apart from nitrogen, another source of pollution from farms is the use of pesticides."
- What are pesticides used for?