

Name ..... Class ..... Date .....



## Distillation

### Specification reference:

- C1.1.2 Mixtures

### Aims

This is an activity to help you improve your literacy skills. In this activity you will learn more about the separation technique of distillation and explore how distillation is used to get pure drinking water from seawater. You will practise answering questions that involve some key command words and scientific terms.

### Learning outcomes

After completing this worksheet, you should be able to:

- understand that seawater is a mixture
- describe how freshwater can be obtained from seawater by distillation.

### Task

Read the following passage and then answer the questions that follow.

Although 70% of the Earth's surface is covered in water, 96% of this water is found in seas and oceans and another 2% is locked up as ice in the polar ice caps and in glaciers. This means that very little fresh water is available and in many countries water is now a very precious resource.

Seawater is a mixture of water, dissolved salts and gases, and small amounts of organic material from living organisms. The salt in water is measured in parts per million (ppm). Fresh water has a salt content of less than 1000 ppm, but typical seawater has a salt content of 35 000 ppm. It would be fatal for humans to try and drink seawater as our kidneys cannot cope with the high salt levels. In some countries, people can quite easily obtain fresh water supplies from rivers, streams, or reservoirs, but in other places there are few suitable fresh water supplies available.

Desalination is the process of removing salt from seawater to provide fresh water for people to drink, or for the irrigation of farmland. The idea of obtaining fresh water from seawater using distillation was first suggested by Aristotle over 2000 years ago. However, the process requires a great deal of energy and only very affluent countries like Saudi Arabia that can afford the high fuel costs, have a seacoast, and are experiencing a water shortage presently use desalination to obtain fresh water.

# AQA Chemistry

## GCSE Student literacy sheet

### C1, Topic 1.3

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One traditional method of desalination uses vacuum distillation. In this method, the pressure is reduced to allow the water to boil at a much lower temperature than its normal boiling point of 100 °C. The water vapour is then cooled and condenses to form pure liquid water. Very salty water is also produced, but dumping this back into the sea can make the surrounding water too salty and can damage nearby sea life. The energy required for the process is often obtained from burning fossil fuels, which releases carbon dioxide, a greenhouse gas, into the atmosphere. Nuclear power could be used to produce the energy for distillation, but public opinion can be strongly against building nuclear power stations.

#### Questions

1 State what the term “ppm” stands for.

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2 State what desalination means.

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3 Give the name of the first person to suggest distillation as a way to extract fresh water from seawater.

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4 Calculate the ratio of the amount of salt in seawater to the amount of salt in fresh water.

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5 Calculate the percentage of water on the Earth’s surface that can be safely drunk.

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6 Describe how distillation can be used to get fresh water from seawater.

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7 Describe an advantage of vacuum distillation over simple distillation.

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8 Explain why very few countries use distillation to obtain fresh water.

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9 Discuss the use of fossil fuels and nuclear fuels in the extraction of pure water from seawater.

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