

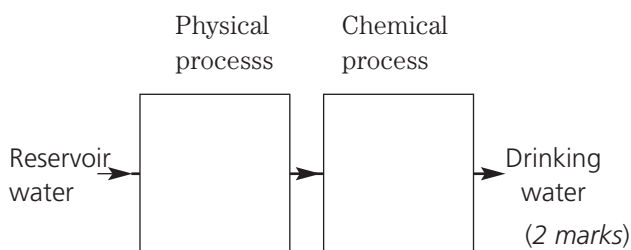
- 2 Here is a picture of an underground cave found in a limestone region.



- a) Give the name of **one** of the icicle-like objects shown. (1 mark)
- b) What type of water is found in limestone regions? (1 mark)
- c) Why might kettles used to boil water in limestone regions need to be replaced more often than in other regions? (1 mark)

- 3 Water is the most important solvent known to man.

- a) Give **one chemical** test for water and the result you would expect to observe if water was present. (3 marks)
- b) Public water supplies go through two **main** processes to convert reservoir water to drinking water.
- (i) Copy the diagram below and write the name of each process in the blank boxes. (2 marks)



- (ii) What's the purpose of chemical process? (1 mark)

- c) A student tested four samples of water (each 5 cm^3) from different areas of Northern Ireland by shaking with 3 drops of soap solution. Another 5 cm^3 of each sample of water was boiled and the soap solution test was repeated. The observations were recorded in the table.

Sample	Observation with soap solution	Observation for boiled sample with soap solution
A	No lather	Lather
B	Lather	Lather
C	Lather	Lather
D	No lather	No lather

- (i) Which **two** samples contain hard water? (2 marks)
- (ii) Which **one** sample contains temporary hard water? (1 mark)
- (iii) Explain how you worked out your answer to part c)(ii). (2 marks)

- (iv) Explain how temporary hardness arises in rainwater. (3 marks)
- (v) Give a balanced symbol equation for the reaction in part c)(iv). (3 marks)

- d) The sample of permanent hard water may be softened using washing soda.
- (i) Explain, in terms of ions, how permanent hard water is softened using washing soda. (3 marks)
- (ii) Give a balanced symbol equation for the reaction in part d)(i). (3 marks)
- e) Give **two** advantages and **two** disadvantages of hardness in a town's water supply. (4 marks)