

Mandatory experiment 27.1**To show the presence of dissolved solids in a sample of water**

Apparatus required: clock glass; Pyrex beaker; hotplate or bunsen burner and wire gauze; tongs

Chemicals required: water (tap water or sea water or water from a stream or lake)

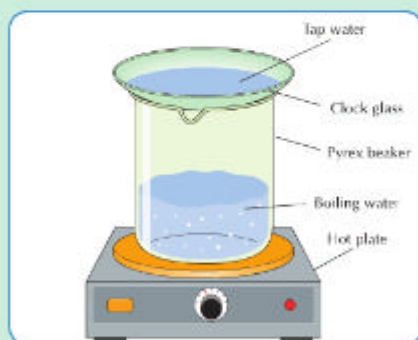


Fig. 27.6 An experiment to investigate if tap water is pure water.

Method

1. Set up the apparatus shown in Fig. 27.6. Water from the sea or a stream or a lake may be used instead of tap water.
2. Bring the water in the beaker to its boiling point. Note that the steam produced, evaporates the tap water from the clock glass.
3. Turn off the heat when all the water in the clock glass has evaporated.
4. Using tongs, remove the clock glass from the beaker.

Result

Solid material is left on the clock glass.

Conclusion

This material must have been dissolved in the tap water.

In many cases, these dissolved substances add a refreshing taste to the water. Spring water usually contains many substances dissolved in it, Fig. 27.7.

Mandatory experiment 27.2**To test samples of water for hardness**

Apparatus required: rack of test-tubes

Chemicals required: soap flakes; water samples (rain water; tap water; sea water; distilled water; hard water)

Note: Soap flakes may be made using a bar of soap and a grater. Soap solution may be made by dissolving five soap flakes in 100 cm³ of deionised water.

In this experiment the hardness of different samples of water is compared, Fig. 27.10. This is done by adding soap flakes (or soap solution) to the water, a small amount at a time until the water gives a permanent lather. The harder the water, the more soap flakes are required to give a permanent lather.

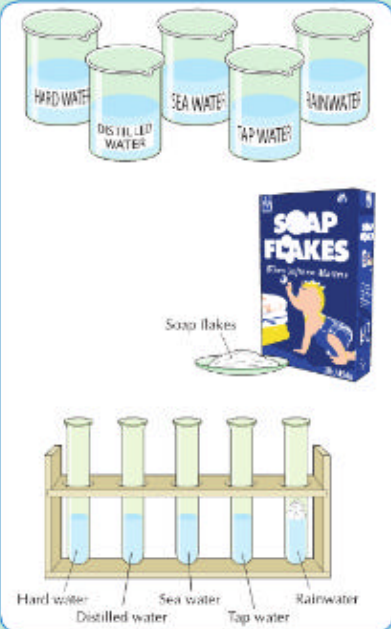


Fig. 27.10 Comparing the hardness of different samples of water.

Method

1. Add the same amount of water from each sample to the test-tubes as shown in Fig. 27.10.

2. Add a soap flake to each sample of water. Alternatively, add 2 cm³ of soap solution from a burette.
4. Put your thumb over the mouth of each test-tube and shake vigorously for a few seconds. Put each test-tube back in the rack and wait for about 20 seconds. If a lather remains after this time, we can say that one soap flake or 2 cm³ of soap solution was required.
5. If a lather does not remain, add another soap flake and shake again. Wait a further 20 seconds.
6. Continue on in this way and record the number of soap flakes (or volume of soap solution) required to produce a permanent lather. Summarise your results in the form of a table.

WATER SAMPLE	NO. OF SOAP FLAKES (VOLUME OF SOAP SOLUTION)
Rain water	
Tap water	
Sea water	
Distilled water	
Hard water	

Result

Each water sample requires a different number of soap flakes to form a permanent lather.

Conclusion

The water sample that requires the largest number of soap flakes (or largest volume of soap solution) is the hardest. (We expect sea water to be very hard).

The water sample that requires the smallest number of soap flakes (or smallest volume of soap solution) is the softest. (We expect rain water and distilled water to be very soft).