

POTABLE WATER



Answer all the questions below then check your answers.

1. What is potable water?
 - a. Is potable water the same as pure water?
2. Why is water from rivers and streams not safe to drink?
3. At the water works explain how:
 - a. Large objects such as logs, shopping trolleys, twigs and leaves are removed from the water.
 - b. Silt and other small particles are removed from the water during sedimentation.
 - c. How are microorganisms in water killed or deactivated?
2. Why is aluminium sulfate added to water during the sedimentation phase?
3. What are the two methods commonly used to desalinate seawater?
 - b. What are the pros and cons of getting fresh water from seawater by desalination?
 - c. Draw a labelled diagram illustrating how reverse osmosis works.

4. Many bottles waters are spring water which contains dissolved minerals such as magnesium and calcium. These ions have potential health benefits and many people prefer the taste of spring water to tap water. A student decided to investigate several properties of water samples from various sources to find any differences between the water samples. She decided to measure:

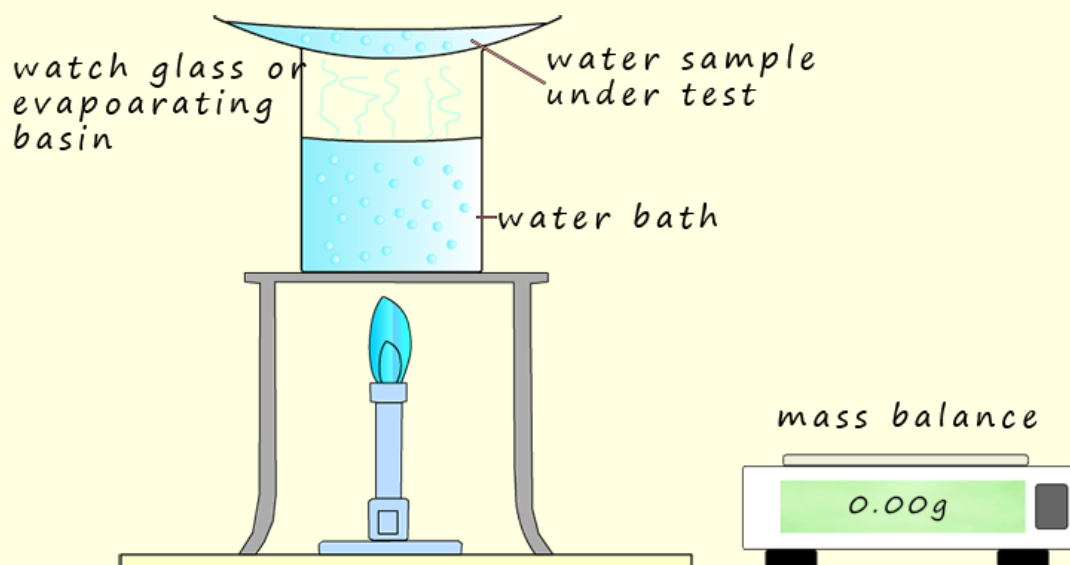
- the mass of dissolved mineral in the water.
- The pH of the water samples.

She tested the following water samples:

- Sea water
- Spring or bottled water
- Rain water
- Tap water
- sea water after distillation.

Experiment 1 - To find the mass of dissolved salts in each water sample

The student set-up the apparatus shown below to find out how much dissolved solid was present in each water sample.



- What measurements will the student have to make in order to calculate the mass of dissolved solid present in each water sample?
- What is the purpose of the water bath?
- For each water sample under test is it necessary to use the same volume of water for each water sample?
- What are the advantages of using repeat results or pooled results from the class?

5. Desalination of seawater

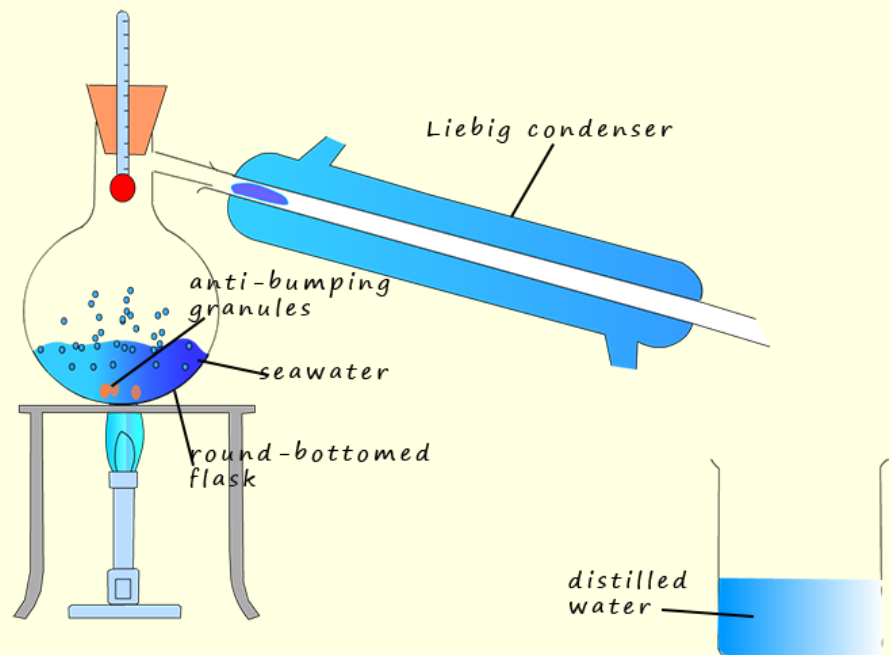
The student used the apparatus shown to desalinate seawater.

- Name the method shown opposite which the student used to desalinate the seawater.

- What are anti-bumping granules used for?

- Would you expect any dissolved substances to be found in the distilled water?

- Suggest why many people living Dubai might complain about the "taste" of the water.



6. How could the student test the pH of her water samples? Draw a labelled diagram and give some detail of what the student would do.

Answers

1. What is potable water?

Water that is safe to drink

a. Is potable water the same as pure water?

No, spring water and water from boreholes is potable but contains many dissolved minerals in it. Pure water contains no dissolved substances in it.

2. Why is water from rivers and streams not safe to drink?

May contain harmful pathogens, bacteria and viruses or other harmful dissolved substances. It may also contain industrial or agricultural pollutants.

3. At the water works explain how:

a. Large objects such as logs, shopping trolleys, twigs and leaves are removed from the water. *A large metal screen or grid will remove these.*

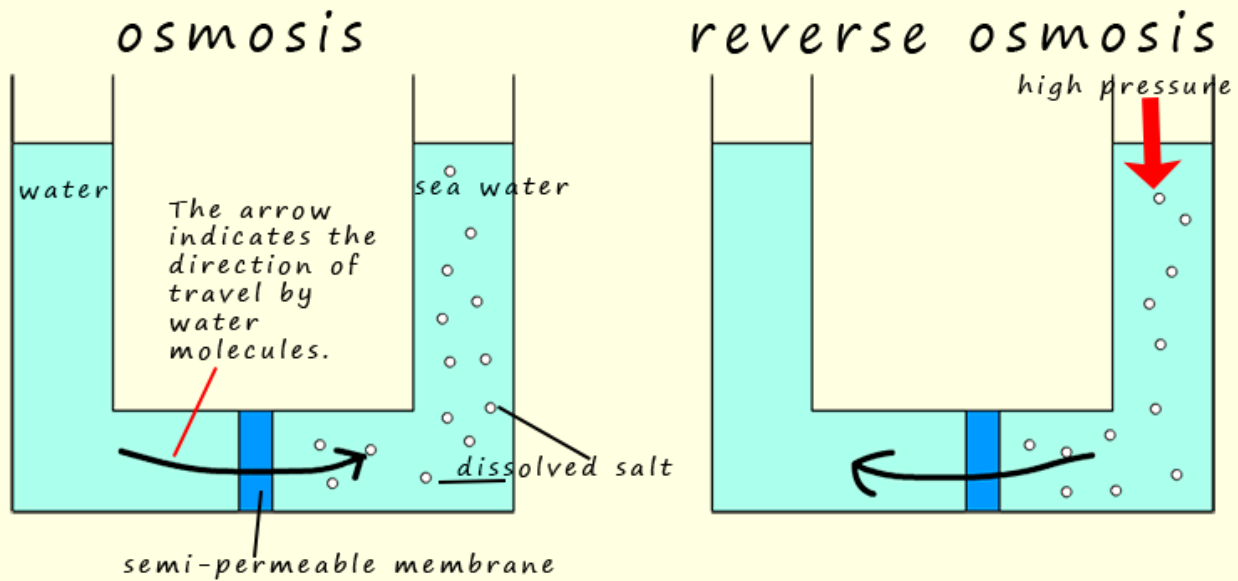
b. How silt and other small particles are removed from the water during sedimentation. *Filtration through sand and gravel filters and in sedimentation tanks and by use of a coagulating agent such as aluminium sulfate.*

c. How are microorganisms in the water killed or deactivated?

Most common method using chlorine or ozone to kill bacteria. UV light can also be used to deactivate bacteria and viruses.

2. Why is aluminium sulfate added to the water during the sedimentation phase? To destroy any colloidal particles such as clays in the water. The aluminium sulfate will remove small particles that filtration will not. The aluminium sulfate will cause small particles that will not settle (colloidal particles) to clump together. These large clumps of particles can then be removed by filtration.
3. What are the two methods commonly used to desalinate sea water?
Distillation and reverse osmosis.
- b. What are the pros and cons of getting fresh water from seawater by desalination?
- Energy intensive processes – both processes use large amounts of energy.
 - Pure water or distilled or de-ionised water is produced. Many people complain that it has no taste.
 - Highly concentrated salt water solution are left behind when the seawater is distilled. This is more often than not simply returned back to the sea. This can damage marine habitats.

c. Draw a labelled diagram illustrating how reverse osmosis works.



During osmosis water will move from areas where it is in high concentration to an area where it has a lower concentration

In reverse osmosis a high pressure is applied to the sea water side of the membrane and this forces the water molecules through the membrane and into the fresh water side

4. Many bottled waters are spring water which contains dissolved minerals such as magnesium and calcium. These ions have potential health benefits and many people prefer the taste of spring water to tap water. A student decided to investigate several properties of water samples from various sources to find any differences between the water samples. She decided to measure:

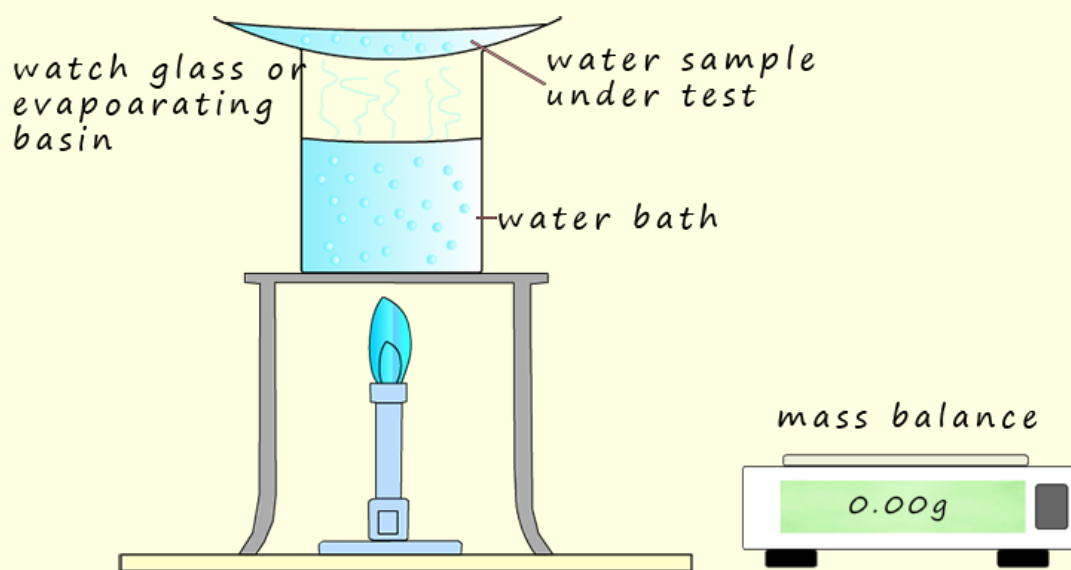
- the mass of dissolved mineral in the water.
- The pH of the water samples.

She tested the following water samples:

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- Tap water
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Experiment 1 - To find the mass of dissolved salts in each water sample

The student set-up the apparatus shown below to find out how much dissolved solid was present in each water sample.



a. What measurements will the student have to make in order to calculate the mass of dissolved solid present in each water sample?

- Record mass of watch glass.
- Record mass of watch glass and any solid salts obtained
- Subtract one measurement from the other to get the mass of dissolved salts.

b. What is the purpose of the water bath?

Will allow the water in the watch glass to slowly evaporate and allow the student a much greater control over the temperature than simply heating the watch glass directly with a Bunsen flame. This would more than likely break the watch glass.

c. For each water sample under test is it necessary to use the same volume of water for each water sample?

Yes - otherwise investigate would not be fair. Volume of water would be a control variable in this experiment.

d. What are the advantages of using repeat results or pooled results from the class? Can calculate an average mass, more results means a more accurate overall result. Will also help spot any anomalous or erroneous results.

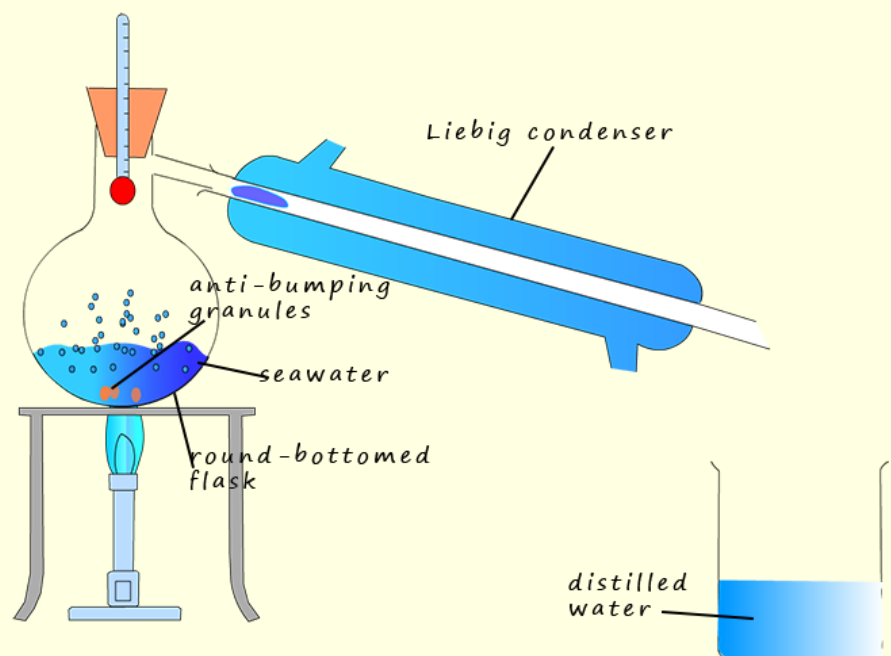
5. Desalination of seawater

The student used the apparatus shown to desalinate seawater.

a. Name the method shown opposite which the student used to desalinate the seawater. Simple distillation

b. What are anti-bumping granules used for?

Allows smooth boiling of the seawater



c. Would you expect any dissolved substances to be found in the distilled water?

No only pure water should be in the beaker. Any dissolved salts will be left in the round bottomed flask.

d. Suggest why many people living Dubai might complain about the "taste" of the water. Some people say pure water is tasteless- many people prefer taste of spring water or tap water because it contains dissolved minerals.

6. How could the student test the pH of her water samples? Draw a labelled diagram and give some detail of what the student would do.

Place water samples in test-tubes and add universal indicator. Record colour produced. Would be more accurate to use a pH meter to measure the pH of each water sample. Universal indicator not that good at telling difference between small pH changes which might be present here.