04 Functions of Water

4.1 Water as a solvent

You already know that the sea water has a salty taste. Do you know the reason for this taste? It is because many salts are dissolved in sea water. All living beings need oxygen to breathe. How do fish get oxygen to breath in water? They use oxygen that is dissolved in water.

Water can act as a solvent. All the above phenomena are connected with this special function of water.

Figure 4.1 ▲ Sea water

Figure 4.2 ▲ Fish living in water

Let's do Activity 4.1 to find out how water is important as a solvent.

Activity 4.1

Take the following materials in equal quantities and dissolve them separately in 5 ml of water in test tubes. Record your observations in the Table 4.1.

Table 4.1

Substances	Observations
White sugar	Sugar crystals disappear. Solution is colourless.
Glucose	
Kondis crystals	
Surgical spirit	
Coconut oil	
Laundry blue	
Paraffin wax	
Kerosene	
Common salt	
Vinegar	
Turmeric powder	
Camphor Balls	
Sodium bicarbonate	

Most of the above substances dissolve in water. But some dissolve a little and some do not dissolve in water. Through this activity we examined how some solids and liquids dissolve in water. Do gases dissolve in water? Let's do Assignment 4.1 to find it out.

Assignment 4.1

- Observe and record the positions of fish in a fish tank in which the water is bubbled with air (oxygen).
- Now observe the positions of fish when the air supply is stopped.

The gases such as oxygen, carbondioxide are soluble in water. Fish use oxygen, dissolved in water for respiration.

Water is considered as a solvent because many things dissolve in water. Similarly, we can separate the things that are dissolved in water. Therefore, this solvent property of water helps us in day-to-day life as well as in industrial activities.

Imagine how "water as a solvent" is important in your day-to-day activities.

Let's do Assignment 4.2 to find out how water is important as a solvent.

Assignment 4.2

- List the difficulties that you face when there is no water supply in your kitchen.
- Record the methods of supplying nutrients for hydrophonic cultivation

It is clear that this special property of water; acting as a solvent, is important not only for us but also for the aquatic organism to live and for the plants to grow.

Following are some instances where water is important as a solvent.

- To make drinks by dissolving sugar, colourings and flavours in water
- To dissolve salt and flavours to make food tasty
- To dissolve concentrated acids in water to prepare battery acid, artificial vinegar etc
- To dissolve medicine in water
- To produce vaccines and saline in health field
- Aquatic animals use oxygen that is dissolved in water to breathe
- To remove dirts on clothes and body
- Use coloured water for decorating purposes.

Assignment 4.3

Prepare another list of instances where water is used as a solvent.

For extra knowledge

- Diluted sulphuric acid is prepared by dissolving concentrated sulphuric acid in water. Battery acid contain diluted sulphuric acid.
- Artificial vinegar is prepared by dissolving acitic acid in water.
- A type of saline solution prepared by diluting sodium chloride solution to a standard concentration.

Assignment 4.4

- Prepare some coloured solutions by dissolving different colours of dye in water.
- Pour them into glass containers with different shapes.
- Prepare a list of instances where such colourful solutions are used in our day-to-day life.

Figure 4.3

Assignment 4.5

- Collect some labels of different kinds of soft drinks.
- List out the substances that are dissolved in water to prepare them.

Uses of separating materials dissolved in water

Activity 4.2

You will need :-

A common salt solution, spirit lamp, a candle, a lid of a tin

Method:-

Put some common salt solution on to the lid and heat it as shown in Figure 4.4.

Use a tripod and a wine spirit lamp or an empty box of milk powder with a ventilator at the side and a lighted candle to heat it. Record your observations.

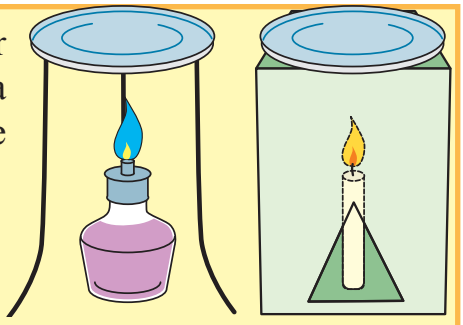

Figure 4.4

You will observe salt remains on the lid as a white powder.

Different types of salts of minerals are dissolved in water, when rivers, streams and water ways are flowing towards the sea. When this happen for long period of time, sea water become salty. Thus, sodium chloride is the mineral salt that dissolved most in the sea water. Salt is produced from sea water, by evaporating water exposing to solar heat.

Figure 4.5 A saltern

Figure 4.6 A sugar cane tree

The juice in sugar cane contains sucrose dissolved in water. Sugar is produced by removing the water in sugar cane.

A sugary solution can be extracted from coconut flower which is known as sweet toddy. Treacle can be produced by removing some amount of water from this sweet toddy. If water is totally removed from sweet toddy jaggery can be produced. Jaggery and treacle can also be produced from palmyra and kitul trees.

Figure 4.7 A coconut tree used to get sweet toddy

Assignment 4.6

Design a poster to illustrate the use of water as a solvent.

4.2 Water as a coolant

Why do buffaloes wallow in water on hot days?

Why do we feel cool when we wash our hands, legs and face with water at a time of sweating?

How do you explain the cooling ability of water?

Water can bear a large amount of heat. It absorbs the heat and reduces the heat of objects. Because of this feature water is considered as a good coolant.

Let's do Activity 4.3 to observe the coolant property of water.

Activity 4.3

- Get two beakers of similar size. Put same amount of cotton wool into both beakers.
- As shown in the Figure keep two thermometers inside the beakers and get the readings.
- Put a little amount of water on to cotton wool in one beaker and keep for a few minutes.
- Get the readings of the thermometers and compare the readings.

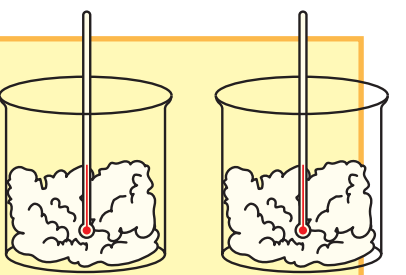

Figure 4.8

You can observe that the temperature of the thermometer in wet cotton wool has been reduced.

Uses of coolant property of water

- The energy generated by burning fuel helps a vehicle to run. At this process of burning fuel the engine of the vehicle gets heated a lot and

Figure 4.9

stops functioning. The heat of the engine is absorbed by water or by a coolant in the radiator and prevents the engine from faltering due to overheat.

- Water is used as a coolant in factories to avoid overheating of machines while operating.

Assignment 4.7

List out some other instances where water is used as a coolant.

4.3 Water as a medium of life

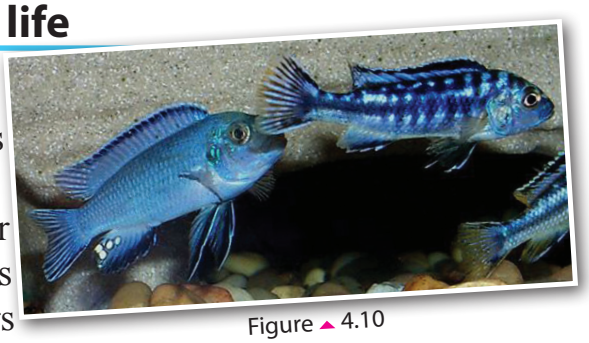

Figure 4.10

Can a fish live out of water?
It will die in a few minutes, if it is taken out of water. Why is it?
Fish use oxygen dissolved in water for respiration. When water pass through their gills, oxygen enters into blood vessels.
Fish cannot obtain oxygen if there is no water. Lots of fish die during a drought period because they cannot get oxygen without water.

- Many aquatic Organisms use water as their living environment (Habitat)

e.g.:- Fish - Tilapia, Tuna
Amphibian - Toad
Reptile - Watersnake, Turtle
Mammals - Dolphin, Whale

Figure 4.11 Fishing by breaking ice layers

During the winter season even surface water gets frozen, water remains as liquid state under the ice layers. So that fish can survive without any harm during the winter.

Some people break these ice layers and do fishing during this season.

Water acts as a medium for biological activities taking place in all living

beings which live in water and land.

- Digestion food and producing energy through reaction of glucose and oxygen and many other chemical reactions take place in a medium of water.
- The nutrients absorbed to the body after the digestion of food, are transported to the cells by dissolving in blood. So this process too takes place in a medium of water.
- Vitamins, minerals, medicine are transported through our body by using a medium of water in blood.
- Also the excretory materials such as urea produced in our cells, are transported to the excretory organs with the help of blood.

For extra knowledge

- The excess protein taken to our body is decomposed to urea in the liver.
- This urea is mainly excreted as urine which has a watery medium. Little amount of urea is also excreted as sweat.

So it is obvious that water plays a major role in the existence of life.

Assignment 4.8

Prepare a wall paper about the living beings that use water as a medium of life. Divide them as plants, animals and micro organisms.

Assignment 4.9

Design a poster to illustrate the use of water as a medium.

Summary

- The main functions of water are as a solvent, as a coolant and as a medium of life.
- The solvent property of water is helpful to dissolving things in water and separating things from water.

- Heat is generated in our body during the biological processes.
- Heat is also generated in machines when they are operated. This heat can be removed by using water because water act as a coolant.
- Water is the medium of life for aquatic organisms.
- Water is an essential medium to maintain the biological processes in all living beings.

Exercise

01) Select the correct answers for the given questions.

I. What is the most soluble substance in water?

1. Laundry blue 2. Table salt 3. Sand 4. Coconut oil

II. Which property of water is used to cool the engine of a vehicle?

1. As a solvent 2. As a medium
3. As a coolant 4. As an insulator

02) Fill in the blanks using the correct answer.

I. Sea water has become salty due to dissolving …… in it.

II. …… can be produced by evaporating sea water.

III. …… property of water, makes it easy to absorb minerals by plants.

IV. When we take an ice cube into our hand we feel cold. The reason for this is flowing of heat from …… to ……

V. …… acts as the medium for biological processes that take place in the human body.

Technical Terms

Solvent	-	ද්‍රාවකය	-	கரைப்பான்
Solution	-	ද්‍රාවණය	-	கரைசல்
Solute	-	ද්‍රාව්‍යය	-	கரையம்
Coolant	-	ශීතකාරකය	-	குளிராக்கி
Medium	-	මාධ්‍යය	-	ஊடகம்