



5

AAP (WATER)

Dear student, in the previous lesson you've learned about the protection of land in the Vedas. In this lesson, we will read about one of the five great elements - aap (water). Water is also known as one of the five great elements. About three quarters of our earth consist of water, yet the problem of water is increasing. Do you know why the water problem persists? Where does water come from? And why is water important for us?

Now, there's another problem which is arising; whatever water that can be used is becoming poisonous. There is a continuous shortage of potable water. Do you know what are the causes for all these? Can we contribute anything to stop this water pollution? Water has been given great importance in our Vedic culture. Water conservation has been a fundamental component of our culture. Let us study from composition to the source, properties, uses and pollution of water in this lesson.



OBJECTIVES

After reading this lesson you will be able to:

- know the need and utility of water;



Notes

- Understand the various forms of water;
- understand the water pollution and protection;
- understand the importance of water in Vedic culture.

5.1 IMPORTANCE OF WATER

You must have felt that if we do not get water to drink for long enough, then our condition worsens. Water is not only necessary for us but also for all living things. More than two-third of our body weight is due to water. Not only this, water is also essential for many biological functions of our body, such as to digest food, to keep body parts healthy, etc.

You know that, we get food from trees, plants and animals; and all of them also need water. All the food items - such as potatoes, tomatoes, apples - all of them contain a lot of water.

Apart from this, water is essential for everyday things like; from cleanliness and bathing to cooking, farming, industrial uses and power generation.



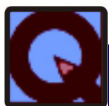
Fig. 5.1

**ACTIVITY 5.1**

Make a list of all the items that are found around you, which require water.

5.1.1 Uses of Water -

1. Water provides habitat to many organisms. There are many types of aquatic animals, such as all kinds of fish and sea creatures, which survive only in water and grow on their own.
2. The water present in the blood, etc., in the bodies of living beings, carries the function of transporting food, mineral salts and gases from one place to another. More than two-thirds of the human body is water, which shows that a sufficient amount of water is required for the above activities.
3. When water collects in lakes and ponds and also in the form of rivers, But when it flows, it acts to carry seeds, fruits and many types of microorganisms from one place to another. In this way, the seeds, which fall into rivers and canals and flow from one place to another, go down and grow at a suitable place somewhere. Thus, water also helps in spreading plant life on the earth. Fruits also have seeds, they also flow with water from one place to another.

**INTEXT QUESTIONS 5.1**

1. A large part of an organism's body is water. What are their benefits?
2. What are the utilities of water in industries?

**Notes**



Notes

3. Describe four such ways for which we use water in the house?
4. If the water was not transparent, what would be the harms on the living organisms, living in the water?

5.2 DIFFERENT FORMS OF WATER

As you may have noticed, water is usually found in a liquid state, which is called fluid state. But when cooled to zero degree, it turns into ice, which is its solid state. If the water is heated to 100 degrees, it turns into vapor, which is its gaseous state. This means that water is found in all three forms i.e. solid (ice), fluid (water) and gas (vapor)

Composition of water

In 1781, Henry Cavandish proved by an experiment that water is not an element but a compound of hydrogen and oxygen. Its chemical formula is H_2O . When we heat it, it turns into vapor and upon cooling it returns to its liquid state again. Water molecules need to be heated to 2200 degrees Celsius in order to break into hydrogen and oxygen. But heating the water to 2200 degrees is very difficult, because it turns into vapor at 100 degrees. The only alternative is decomposition of water. When an electric current is carried in water, it breaks down into its elemental elements - hydrogen and oxygen. Hydrogen and oxygen are found in water in the ratio of 1 : 8 according to weight and 2 : 1 according to volume.

Different Sources of Water

When the water is so important and necessary for us, we should also know where the water comes from and from which sources?



Fig. 5.1

The main sources of water which we use are wells, rivers, lakes, ponds, waterfalls and hand pumps.

Although there is a huge reservoir of water in the form of oceans, seas and lakes on our earth, in the same way it is very difficult for us to get water for its use directly.

Water cycle

Due to the heat of the sun; seas and oceans evaporate and fly into the sky as water vapor. At a high altitude, this water vapor

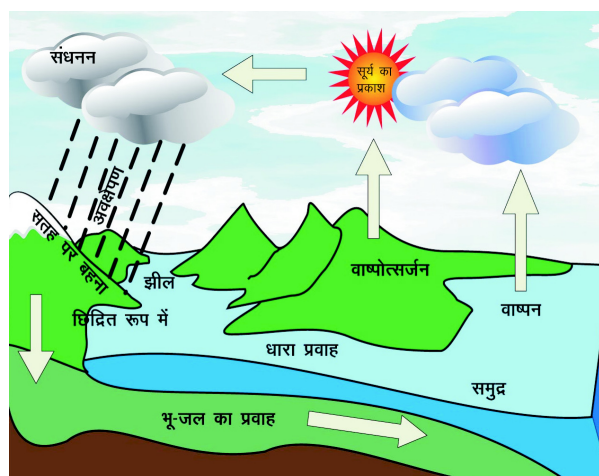
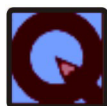


Fig. 5.2



starts to cool and then turn into small droplets of water, thus they take the form of clouds. Then a situation comes in that these small droplets of water, combine to form big drops of water and then it starts raining. This rain water does not contain the impurities which are found in the seas and oceans.

After the rains, some part of this water soaks in the ground and the rest goes to the lakes and seas through the river and drains.



INTEXT QUESTIONS 5.2

1. Fill in the blanks:
 - (a) Solid form of water is called.....and gaseous form
 - (b) Pure water turns solid on.....and gaseous form on.....
 - (c) Water is a compound ofand.....
 - (d) Water by weight has 1 part.....and 8 parts.....
2. What is the easiest method of dividing water into hydrogen and oxygen ?
3. The following sentences are true or false:
 - (a) Due to decreasing number of ponds, ground-water level is decreasing
 - (b) The Sun plays the most important role in providing us pure water
 - (c) The process of large-scale distillation is continuous in nature.
 - (d) Rain water also has many impurities because it is basically sea-water.

5.3 HARD WATER AND SOFT WATER

Rain water is pure, but after reaching the earth, many types of impurities and salts dissolve in it, due to which the properties of water also changes. . If we look at the water of the sea, ordinary salt is dissolved in more quantity than other salts, due to which the taste of sea water is very salty (saline).

There are two types of water depending on the presence of water soluble salts. Let's study it.



ACTIVITY 5.2

what you need to do: study about the pond and tap water.

What you need: Two plastic naps, two samples of water - one taken from a tap and the other from a pond, a little soap powder.

How to do: Put both samples of water in separate taps. Add a couple of spoons of soap powder to each sample and stir well by hand.

What you saw: There is a lot of foam in the water sample obtained from the tap and they remain for a long time. Either foam is not formed in the water obtained from the pond, but even if a lot is formed, it is destroyed quickly.

Conclusion: The water of the pond is hard and tap water is soft.

Water that does not contain salts etc. and easily lathers with soap, such water is called soft water. Rain water and distilled water are examples of soft water.



Notes



If soap is not rubbed in water, froth does not arise. The same white substance is formed with soap, it is called hard water. This is due to the magnesium and calcium salts present in it. Sea water, lake water and water from open wells are often hard water.

Measures to remove the hardness of water

Due to dissolution of ordinary salt or calcium salts in hard water, the taste of water is good. Therefore it can be used for drinking. However, it cannot be used in pharmaceutical or chemical sector industries, because there is a need for pure water in which no impurities are dissolved.

Hard water is completely unusable for washing clothes. This also spoils the cooking and eating utensils because these utensils solidify the layer of salts dissolved in hard water. Have you noticed that a white colored layer solidifies on the coil parts of the water heating immersion rod . This white layer consists of impurities dissolved in water.

Water hardness is of two types depending on the salts dissolved in it: (1) temporary hardness, and (2) permanent hardness.

1. Temporary hardness: The hardness that is caused by bi-carbonate salts of calcium and magnesium dissolved in the water is called temporary hardness. This type of hardness can be easily overcome by boiling water at high temperature. Bi-carbonate salts precipitate as insoluble carbonate salts by heating. The salts settle down and then they can be easily separated by filtering.

2. Permanent hardness: Such hardness is due to dissolution of



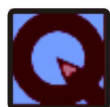
calcium and magnesium in chloride and sulfate salts in water. It cannot be boiled away with proper means. It overcomes by special chemical treatments, such as -

(A) By washing soda: When dissolved soda is added to hard water, the dissolved impurities of sulfate and chloride salts are converted into insoluble carbonate salts. Insoluble salts are filtered and separated. Thus, they remove these impurities. Now pay attention to the following:

- | | |
|--------------------|-----------------------|
| - Sodium Carbonate | - Magnesium Chloride |
| - Sodium Chloride | - Magnesium Carbonate |
| (Soluble) | (Insoluble) |

If sodium chloride (ordinary salt) is dissolved as an impurity in water, it does not cause hardness in the water.

(B) By permutite method (using zeolide): Zeolite contains sodium and aluminum oxide sand particles and water. When the hard water passes through the filter of permutid (zeolite), the calcium and the magnesium ions of the salts are added to zeolite and; the sodium ions of the zeolite moves into the water. The water thus obtained is not hard.



INTEXT QUESTIONS 5.3

1. If my bucket of water does not foam with soap, instead forms like curd then
 - (a) The water is soft or hard
 - (b) It must have been taken from the pond or covered well.



Notes

2. If the hardness of water overcomes by boiling then:
 - (a) It will be called permanent hardness or temporary?
 - (b) Or will calcium chloride or calcium Bi-carbonate dissolve in that water?
3. Which of the following can we use hard water-
 - (a) In washing
 - (b) In drinking
 - (c) In industries
 - (d) In drug manufacturing.
4. Write the names of two methods of removing the temporary stiffness.
5. Does dissolving salt in water make it hard water?

5.4 PROPERTIES OF WATER

In our daily life we mostly use water from the tap or well. Do you know whether it is pure water or not? To know this, let us study the properties of pure water

1. Pure water is colorless and transparent liquid but you must have seen that sometimes when looking at deep water, it appears blue. This Appearance is caused by scattering of light.
2. Pure water is odorless. Contaminated water causes an unpleasant smell. It is caused by dissolved dirt in it.
3. Pure water is tasteless, but water from any place is tasty. Do you know why? This is due to dissolved gases and some mineral salts in it.



Germs find favorable conditions in the stagnant waters of lakes and ponds. These germs present in the air and soil reach from one place to another through the water of rivers. This causes the water to become polluted and not potable for drinking. So before using water, It must be checked.

4. On heating, the water remains thin and cold; and does not thicken. If the water starts getting thin and thicker on cooling, then imagine what will happen to the organisms and plants?
5. Water is transparent to visible light. Light rays can go very deep in water. That is why we can see deep in water. Life of many aquatic organisms is possible in water. Tell what would have happened if the water was not transparent?
6. Water is a good solvent for many substances. That is why we use it in pharmaceutical manufacturing and many chemical industries. Please tell, What would happen if water was not solvent?
7. Water cools to ice (solid) when it cools to zero degree temperature. When the ice is hot, it starts changing again to zero degree temperature in a liquid state. This temperature at which the ice reverts to water is called the melting point of ice. But due to dissolution of impurities in water, the melting point of ice decreases.
8. On heating pure water to (100 degree Celsius) it starts boiling and turns into a gaseous state (in steam). This temperature is called the boiling point of water. For pure water, it is the right temperature for boiling. But due to dissolution of impurities in water, boiling point increases. This means that



Notes

some impure water boils at a higher temperature than (100 degree Celsius).

9. Generally, the density of a substance in the solid state is greater than the density of its fluid state. But the solid form of water, the density of ice, is less than the liquid water. This is why ice floats above water.

When the normal temperature (room temperature) is greater than (melting temperature of ice), the water temperature obtained by melting ice usually increases and its density is greater at (1.3 times of water). It is over. Because (more than) temperature, the density of water starts to decrease. Hence, the density of water above and below (ice) is reduced. Due to this quality, the winter days in cold regions; In spite of freezing of ice, aquatic organisms live there.

10. Water is a solvent, because most of the substances present in water are bad conductors of electricity. That is, distilled water cannot conduct electricity.

5.5 WATER PURIFICATION

All the water available on earth is not potable. Potable water is translucent, colorless, odorless and has a flavorful liquid due to dissolution of some salts and gases. If there is no inaccuracy in it, then pure water is tasteless. But the water from the lake, river, wells and other sources is not pure. It contains some unwanted substances and also contains some harmful microorganisms. Now the question arises how to purify such impure water? For this we adopt many methods. Let's study those methods:

1. Distillation method: Distillation is the process by which water purification can be done easily. Take some quantity of water in a bowl and heat it to its boiling point. The bacteria and germs present in water are destroyed on heating and water gets converted into vapor. Oil particles unsettled in water and dissolved mineral salts remain in the cup. When this water vapor passes through a condensate tube filled with cold water, it condenses and becomes pure water.

Distilled water is pure water. It is used in medicine making, laboratory solutions and car batteries. Being tasteless, it cannot be used for drinking.



Fig. 5.4 Water Purification

2. Filtration: Filtration is separating dissolved impurities such as dust mites, sand, plant residues etc. from water. A special method of filtering (separating) them is by laying layers of charcoal, coarsely-grained sand and some pebbles in a vessel and pouring the dirty water in it. There is a hole in the bottom of this pot, in which cotton is placed. If the water passes through these layers and comes out through the sand in the hole, then the above mentioned impurities remain in these layers and clean water comes out, which is filled in another vessel. This water is either boiled or chlorinated to make it bacteria free.



Notes

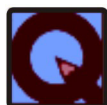


Notes

3. Chlorination: To chlorine the water, chlorine tablets are added to the water. Chlorine destroys almost all microbes. Sometimes there is some smell coming from your tap water. It is caused by chlorination of this water.

The water in the Swimming pool is usually treated by chlorination.

4. Mixing Potassium Permanganate: Have you noticed that sometimes To purify the water of the wells, pink colored crystals of potassium permanganate are added to it. When potassium permanganate dissolves in well water, a merger of potassium permanganate is formed in water, which kills almost all germs and thus the water becomes bacteria free.



INTEXT QUESTIONS 5.4

1. Why is water purification necessary?
2. What is the difference between methods of distillation and filtration of water?
3. Why is sometimes, potassium permanganate is added to wells?

5.6 WATER POLLUTION

If unwanted impurities are found in the water, then the water is no longer drinkable. Such water is called polluted water. Nowadays, the problem of water pollution is becoming so serious that even the water of the rivers, seas, lakes, ponds, etc., is getting much polluted.

Have you ever wondered why water pollution is happening and what are the losses due to it? Let's try to find out.



Fig. 5.5 Water Pollution

Notes

Causes of Water Pollution

Water pollution is due to unwanted impurities found in the water of rivers. The extent of pollution depends on the flow of rivers, the sewage effluents found in them, and the amount of waste from industries.

Some harmful bacteria like insects and mosquitoes make their habitat in lakes, ponds and stagnant water. Water is also polluted by washing clothes and bathing animals in them. Water has become very polluted due to dead bodies and waste materials and other unwanted impurities of plants and animals living aquatic life in the sea. That is why some efforts have to be made for the purification of seawater. The stagnant water of lakes and ponds is more polluted than the flowing streams of rivers and covered wells.

Disadvantages of polluted water

1. Polluted water causes many infectious diseases such as cholera, diarrhea, dysentery, typhoid, etc.



2. Pollution makes the water dirty, so that it cannot be used in any work like washing clothes etc.
3. Algae in water cause foul smell and make its color dirty. Algae make aquatic life unsafe (adding copper sulphate to water can make it algae free).

Prevention of water pollution

Water is life. Therefore, people should be aware to prevent water pollution. A law should be made to prevent pollution factors.

Dirty drains left in rivers should be stopped. To treat harmful impurities, plants should be planted.

To treat the excreta, it is filled in large tanks and stirred rapidly. By running it, air enters into it, which causes oxidation of harmful compounds. Harmless substances are formed in this process.

Do you know that water treatment plants are installed in Delhi and other metros? These thriving take place where the drains of the city fall into the rivers.

Industrial wastes contain toxic substances. They can be extracted by chemical methods. Industrial waste should not be allowed to be released into the rivers without refining to prevent water from getting polluted.

Covering wells can save water from pollution.

5.7 WATER CONSERVATION

What does conservation mean? As you may know, conservation means - to use with caution and frugality. We all know that, although there is a lot of water on the earth, there is still a shortage of potable water. Therefore, people should be aware for the proper use of water.

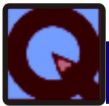
We should also make tireless efforts to conserve drinking water. As far as possible, we all must work with less water and do not waste water unnecessarily. Agricultural irrigation requires more water. Therefore, if we collect water and use it in our traditional methods, such as ponds, etc., even in the field of irrigation.

There is a lot of emphasis on water conservation in our Vedic culture. The sage of Rigveda says that "We all enjoy the comfort of the water from clouds as well as other types of water."

Ray Ghava and Bhoomi Dev away from us from our evil deeds.

“ आ शर्म पर्वतानामोतापां वृणीमहे
घावाक्षामारे अस्मद्रपस्कृतम्।”

(Rigveda 8.18.16)



INTEXT QUESTIONS 5.5

1. Write the names of two pesticides that are used in water purification?
2. Name four factors that cause water pollution?
3. What four steps will you take to prevent water pollution?
4. Write the names of four diseases caused by polluted water?





Notes

**WHAT HAVE YOU LEARNT**

- It is not possible for a creature to survive without water. Life originates in water.
- a large part of organisms are water. Water is required in the body for many bio-activities.
- Some organisms like fish can survive only in water.

**TERMINAL QUESTIONS**

1. Draw a picture and describe the continuous cycle of nature.
2. Differentiate between soft and hard water. Name one use of hard water?
3. Write a note on the topic 'Importance of water in life'?
4. There is not only shortage of water but also for drinking water on the earth, elaborate on this topic and write your thoughts
5. What efforts should be made to conserve water resources on earth?
6. 'Greenery on earth is associated with water.' Write your thoughts on this topic?
7. Describe three measures of water circulation.
8. Draw and explain the distillation method.
9. Describe the three properties of water that make it an important chemical for life.
10. Explain the method of the boiling point of water by drawing.



ANSWERS TO INTEXT QUESTIONS



Notes

5.1

1. To run all the functions of the body smoothly.
2. (1) To cool the hot appliances
(2) as a solvent
3. (1) in bathing and washing
(2) in cooking
(3) in drinking
(4) Cleanliness
4. The path ahead and their food (prey) is not visible

5.2

1. (a) Ice, vapor
(b) cooling, boiling
(c) Oxygen, Hydrogen
(d) Hydrogen, Oxygen
2. Electrical decomposition
3. (a) True, (b) False, (c) True, (d) False

5.3

1. (a) Hard water,
(b) must have been taken from the pond



2. (a) Temporary
(b) Calcium Bi-carbonate
3. (b) drinking
4. (1) to boil at a high temperatures
(2) by distillation
5. yes

5.4

1. It may contain soil particles and bacteria etc.
2. In distillation, water is converted into vapor to obtain pure water and in filtration water is filtered.
3. To destroy harmful bacteria.

5.5

1. Chlorine tablets, potassium permanganate
2. Dirty water flowing out of homes, washing clothes, sewage urine, waste of industries
3. Cholera, diarrhea, dysentery, typhoid

