

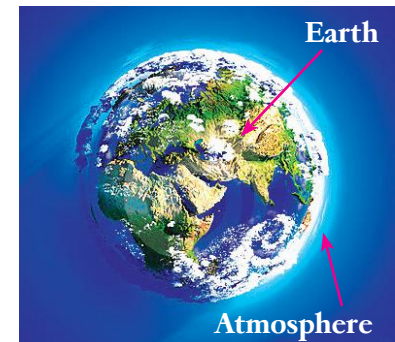


## AIR

We know that air is present all around us. We cannot see or smell air but can feel its presence when it moves. Air is essential for life. We use it to breathe.

## ATMOSPHERE

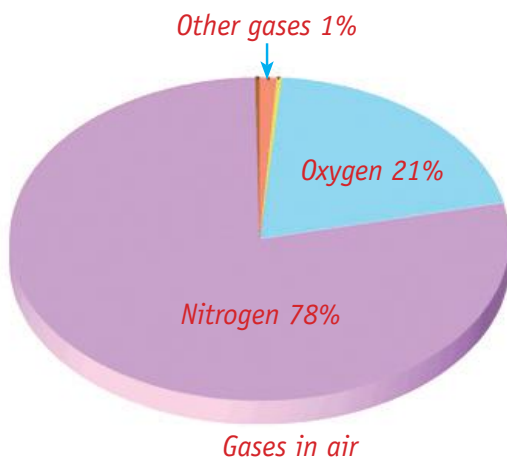
Our earth is surrounded by a blanket of air called the **atmosphere**. The atmosphere extends to a height of about 300 km above the earth's surface. As we go higher up in the atmosphere the amount of air becomes lesser. The gravity pulls the layer of air towards the surface of the earth.



*Gravity binds the atmosphere*

## HOW DOES ATMOSPHERE HELP US?

- (i) It maintains the temperature on Earth for the survival of living things.
- (ii) It burns the meteorites before they reach the earth's surface.



## Composition of Air

Air is a mixture of many gases. About 78% nitrogen, 21% oxygen and 1% other gases like neon, argon, carbon-dioxide, ozone are present in air. It also contains water vapour and dust particles.

## Oxygen

All the living organisms need oxygen for breathing. Burning also needs oxygen. Nothing can burn without **oxygen**.

## Nitrogen

All living things require nitrogen for their growth. But they cannot use nitrogen directly from the air. Most of the plants take nitrogen from the soil. Animals get nitrogen from the food they eat. It also keeps the process of burning under control.

## Carbon Dioxide

**Green plants use carbon dioxide gas to make their food.** It is also used in fire extinguisher to put out fire.

## Activity : 1

### PROPERTIES OF AIR

#### 1. Air Occupies Space

- (i) Take an empty glass and a bucket half filled with water.
- (ii) Put the inverted glass into the bucket of water. This must be done very quickly and forcefully. The glass must be kept straight and put inside in an inverted position.
- (iii) The water does not enter the inverted glass. Why ? The air present in the empty glass prevents the water from entering it.
- (iv) When we tilt the glass held in water, we find that the air present in the glass goes out in the form of air bubbles. As the air from the glass escapes, water starts entering the glass. This shows that the glass which appears to be empty to us is actually filled with air. So, it proves that air occupies space.



*Air cannot escape : water does not enter the glass*

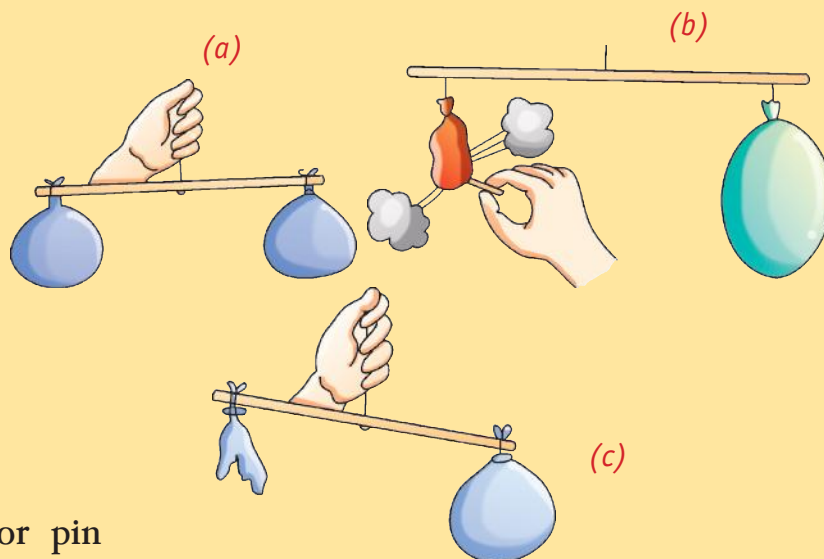


*Water enters the glass*

## Activity : 2

#### 2. Air has Weight

- (i) Inflate two balloons of the same size. Tie a piece of a string in the middle of a stick. Tie both the balloons to the ends of the stick. Balance the stick by shifting the positions of the balloons. (fig b)
- (ii) We now take a needle or pin and prick one of the balloons. Air escapes from the balloon.
- (iii) The stick tilts towards the side of the air-filled balloon. This happens because the inflated balloon has air in it, whereas, the deflated balloon has nothing. This show that air has weight. (fig c.)

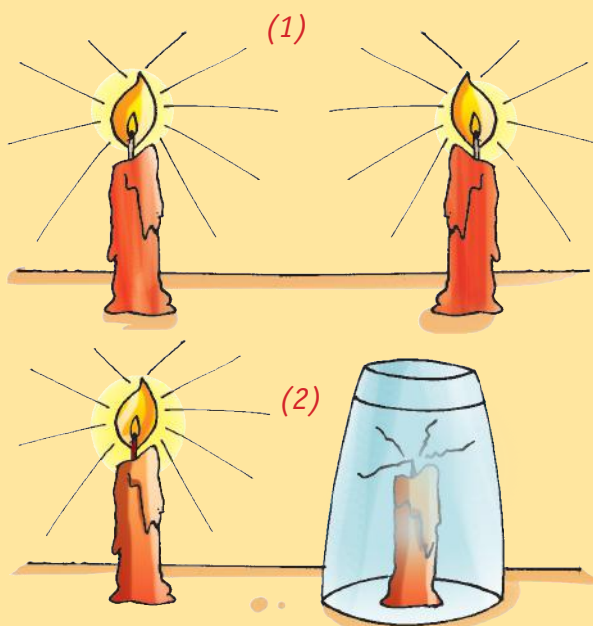


### 3. Air is Necessary for Burning

Air is necessary for burning of things. For example, to burn a candle, paper, kerosene oil, cooking gas, air is necessary. The oxygen gas present in air helps in burning.

#### Activity : 3

- (i) Take two candles and fix them on a table. Light both the candles.
- (ii) Now cover one burning candle with an inverted glass. The glass should not touch the flame.
- (iii) After sometime, we observe that the candle covered with a glass, stops burning. The other candle continues burning. Why does the candle in the glass stop burning?
- (iv) The reason is, when the burning candle is covered with glass, the oxygen supply from the air is cut off. Once all the oxygen inside the glass is used up, the candle stops burning. The other candle continues burning because it gets oxygen from the air. This shows that air (oxygen) is necessary for burning.

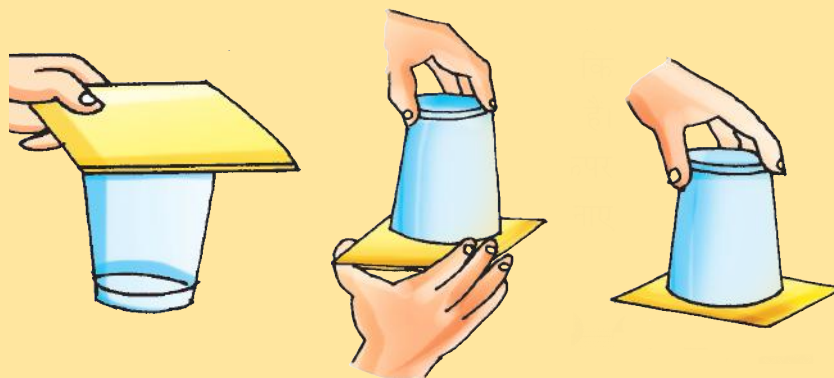


### 4. Air Exerts Pressure

We have learnt that air occupies space and has weight. Anything that has weight exerts pressure. So, air also exerts pressure. **The pressure exerted by air is called atmospheric pressure.**

#### Activity : 4

- (i) Take a glass tumbler and fill it with water upto its brim. There should be no air bubbles in the tumbler.



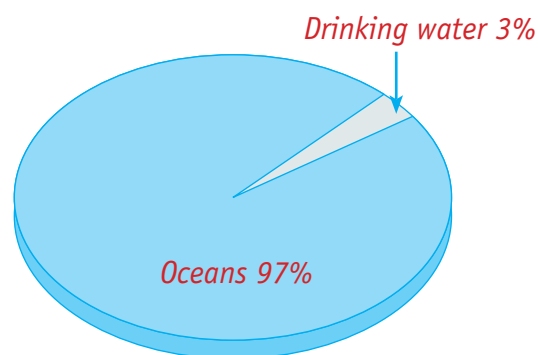
*Air exerts pressure.*

- (ii) Place a piece of cardboard on the mouth of the glass.
- (iii) Hold the cardboard tightly with one hand and turn the glass upside down very quickly.
- (iv) Remove your hand gently from the cardboard. You see that the cardboard stays in its place. The water also does not fall at all. What keeps the cardboard piece stuck to the glass?

It is the pressure of air. The air outside the cardboard piece exerts pressure on the cardboard and prevents it from falling. This shows that the air **exerts pressure**.

## Water

After air, the second most essential thing for our life is water. All living things need water. Three-fourth of our earth surface is covered with water. Only 3% of total water can be used for drinking. 97% of water is in the oceans contains salts. Can you tell some uses of water other than drinking.



1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_

## 4. How do we get Water ?

We get water from rivers, ponds, lakes and rain. We also get water from ground by using wells, hand pumps etc. But water in rivers, ponds and lakes etc. is not pure. Many things like dirt, mud and germs are mixed with water and make the water unfit for use. **The substances that make the water unfit to use are called impurities.** Impurities are of two types.

### Do You Know ?

We can live without water about one week.

- (i) **Soluble impurities** : All those impurities that can dissolve in water are called **soluble impurities**. For example salts of potassium and magnesium.
- (ii) **Insoluble impurities** : All those impurities that do not dissolve in water are called **insoluble impurities**. For example : sand and mud.

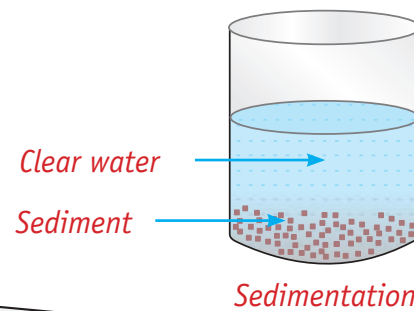
## REMOVAL OF IMPURITIES FROM WATER

### How to remove Insoluble Impurities?

We can remove insoluble impurities like sand by using the following methods.

## (i) Sedimentation

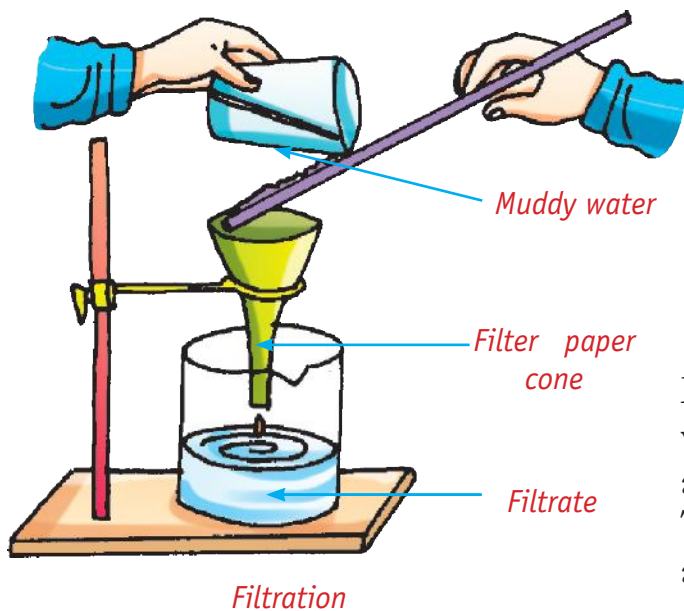
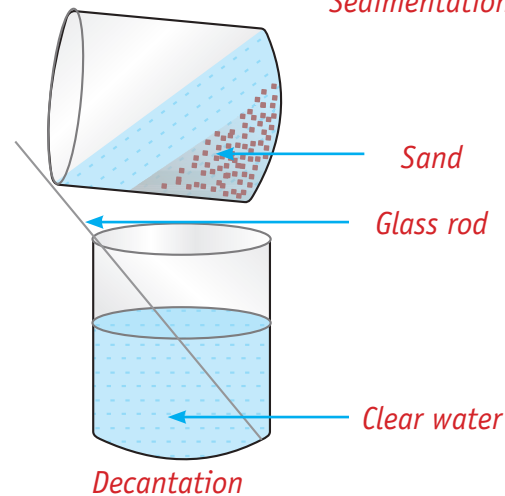
In this method a mixture of water and insoluble impurities is allowed to stand undisturbed in a container for some time. The heavy insoluble impurities settle down at the bottom of the container. This layer of impurities is called sediment. When the impurities settle down, clear water left above the layer of impurities. This is called **sedimentation**.



## (ii) Decantation

After sedimentation the clean water is poured gently into a separate container without disturbing the sediment of impurities. This is called **decantation**.

We can improve the rate of sedimentation by adding chemicals like alum. This is known as loading.



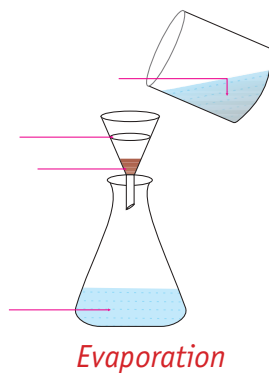
## (iii) Filtration

This method is used to separate water from insoluble impurities like sand by using a filter paper.

**Method :** To filter a mixture of water and sand, we make a cone of filter paper and keep it inside a funnel. The mixture is poured into the funnel. The sand does not pass through the filter paper and remains behind on the filter paper. This is called **reduce**.

The clear water comes out of the filter paper and is collected in the flask below the funnel. This called filtrate. This method of purifying water is called **filtration**.

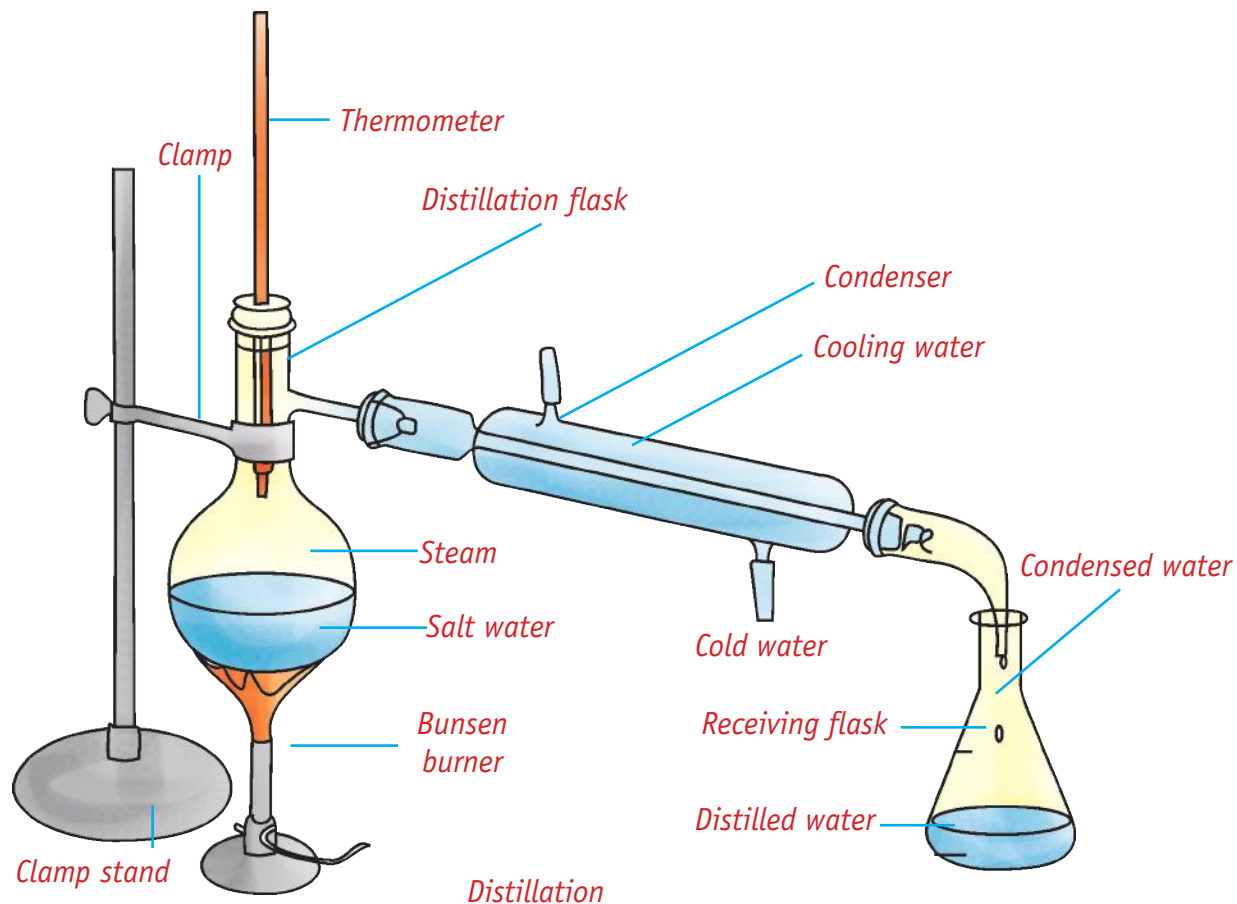
## HOW TO REMOVE SOLUBLE IMPURITIES?



We can remove soluble impurities by the following two methods.

**(a) Evaporation :** In this method we heat the solution containing soluble impurities like salt. After some time water gets evaporated (changes into steam) and the impurities left behind.

**(b) Distillation :** In evaporation we only get impurities and water mixes into air in the form of vapour. But in distillation we can get impurities as well as pure water. In distillation, impure water is heated in a flask.



On heating water changes into steam and impurities are left behind in the flask. The steam passes through the condenser. Here it cools and changes into water. This water is pure which is collected in a separate flask.

## **PURIFICATION OF DRINKING WATER**

Impure water is may be harmful to us and leads to many diseases, so we must drink pure water. We can purify water by using the following methods.

- (i) **Boiling** : Water is heated for 10 minutes. Boiling kills the germs present in water and makes the water pure. It is the simplest way to purify water.
- (ii) **Chlorination** : Addition of chlorine tablets in water to kill germs and to make water pure is called chlorination.
- (iii) **Water purifier** : In some houses, we get purified water from electrical water purifier.



*Electrical Water purifier*



## Know the Keywords :

- Meteorites : Small fast moving heavenly body that has fallen to earth.  
 Exerts : Forcefully or effectively.  
 Soluble : Able to be dissolved.  
 Flask : Narrow necked bottle.

## Point to Remember

- Atmosphere : blanket of air surrounding the earth.
- Distillation : heating water to form steam and then cooling it to form water again.
- Filtration : purifying water by pouring through a funnel fitted with a cone of filter paper.
- Loading : adding chemicals like alum in a mixture to improve the rate of sedimentation.

## EXERCISE TIME

### A. Multiple Choice Questions (MCQs).

Tick (✓) the correct word :

- The gas necessary for burning \_\_\_\_\_.  
 a. oxygen  b. carbon dioxide  c. nitrogen
- Which of the following forms a layer of sediment in water?  
 a. sand  b. sugar  c. salt
- The atmosphere extends to a height of about \_\_\_\_\_ kilometers.  
 a. 500 km  b. 300 km  c. 200 km
- Insoluble impurities from water can be separated by \_\_\_\_\_.  
 a. distillation  b. evaporation  c. filtration
- The water we drink can be purified by \_\_\_\_\_.  
 a. chlorination  b. boiling  c. both

### B. Fill in the blanks :

- A mixture of sand water can be separated by using \_\_\_\_\_.
- We add \_\_\_\_\_ tablets to water to kill germs.
- Salt is a/an \_\_\_\_\_ impurity.
- During the process of evaporation, the \_\_\_\_\_ is lost.

### C. Write 'T' for true and 'F' for false statements :

- Air is present all around us.
- Air is a mixture of many gases.

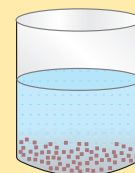
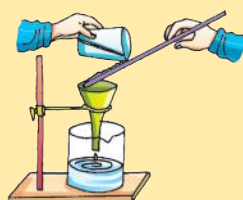
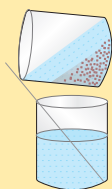
3. Green plants use oxygen gas to make their food.
4. Air is necessary for burning of things.
5. In distillation, impure water is heated in flask.



**D. Match the following :**

- |                 |                         |
|-----------------|-------------------------|
| 1. Oxygen       | a. 78 %                 |
| 2. Other gases  | b. water is heated      |
| 3. Boiling      | c. act of killing germs |
| 4. Chlorination | d. 1 %                  |
| 5. Nitrogen     | e. 21 %                 |

**E. Identify the process in the pictures and their names in the space provided :**



**F. Answer the following questions :**

1. What is the percentage of oxygen in the atmosphere ?
2. Name the instrument which is used to measure atmospheric pressure.
3. Name two methods of purifying water.
4. What is loading ?
5. Write an activity to show that air occupies space.
6. Explain the filtration with the help of a diagram.



## Creative Work

- Draw to show :  
Air has weight :

- Siphon is used to draw liquids from big vessels. Make your own siphon using a rubber pipe, a bucket full of water and an empty tub.