

The extraordinary life forms on earth are due to the presence of air and water on this planet. These components along with the sunlight bring about changes in the weather and climate of the planet.

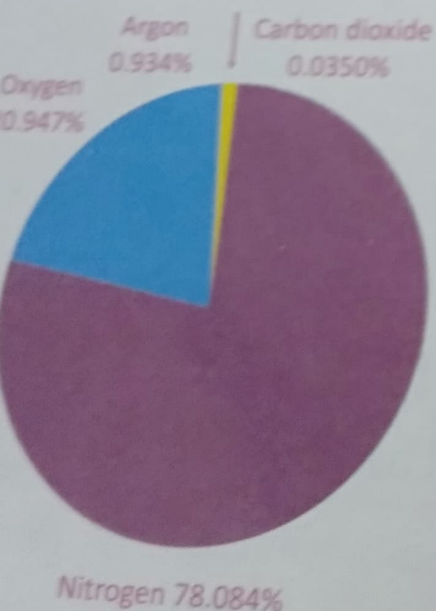
Air

Hold your hand in front of your face, and breathe in deeply. Now gently blow outward towards your fingers. What do you feel? Does it feel cool and tingly? What you felt blowing past the tips of your fingers is commonly referred to as **air**.

Air is one of the primary things that makes life on Earth possible. Air is a synonym for **atmosphere**. The Earth's atmosphere or air is made up of a variety of gases and other particles. Most of the planets in our Solar System, and even some of the moons have atmospheres. However, the atmospheres of these planets and moons are very different from that of the Earth.

C1(a)

💡 (**Atmosphere** – The thick blanket of air around the earth.)



The atmosphere of our planet is made up of three primary gases. These gases are **oxygen**, **nitrogen**, and **argon**. In addition to these three gases, there are many other gases in the atmosphere, in trace or small amounts. Additionally there are small particles, or particulates floating in the atmosphere, such as dust, water and pollen.

keep the atmosphere warm enough for life to exist. Carbon dioxide is naturally added to the atmosphere by the process of breathing in living beings. It is artificially added in huge amounts by burning fuels and other human activities. (Scientists believe that with the increasing amount of carbon dioxide the Earth's temperature will rise causing many unpredictable effects.)

Ozone

Ozone is a molecule made up of three oxygen atoms. (This gas is mainly found in a layer of the atmosphere commonly referred to as the **ozone layer**. This gas has the unique ability to absorb the Sun's ultraviolet radiation. Like a giant sheet of sunscreen it protects animals and plants from getting too much of the Sun's brutal ultraviolet rays.) Without this protection conditions on this planet would be very hazardous to life forms.

Water Vapour

(The amount of water vapour in the air is called **humidity**.) The humidity is very high during rainy seasons. It also makes us feel uncomfortable and sweat excessively.

Layers of the Atmosphere

The atmospheric belt around the earth can be divided into layers:

- **Troposphere** – It is the first layer around the earth that is made up of gases that we breathe everyday.

Light up a candle and place it on a table. Wait for it to burn for a minute. Now cover it with an inverted glass. What happens?



Oxygen is required for burning of substances.

• Stratosphere

- The second layer of the atmosphere where the aircrafts fly is the stratosphere. It also consists of the ozone layer.

Ans C5

• Mesosphere

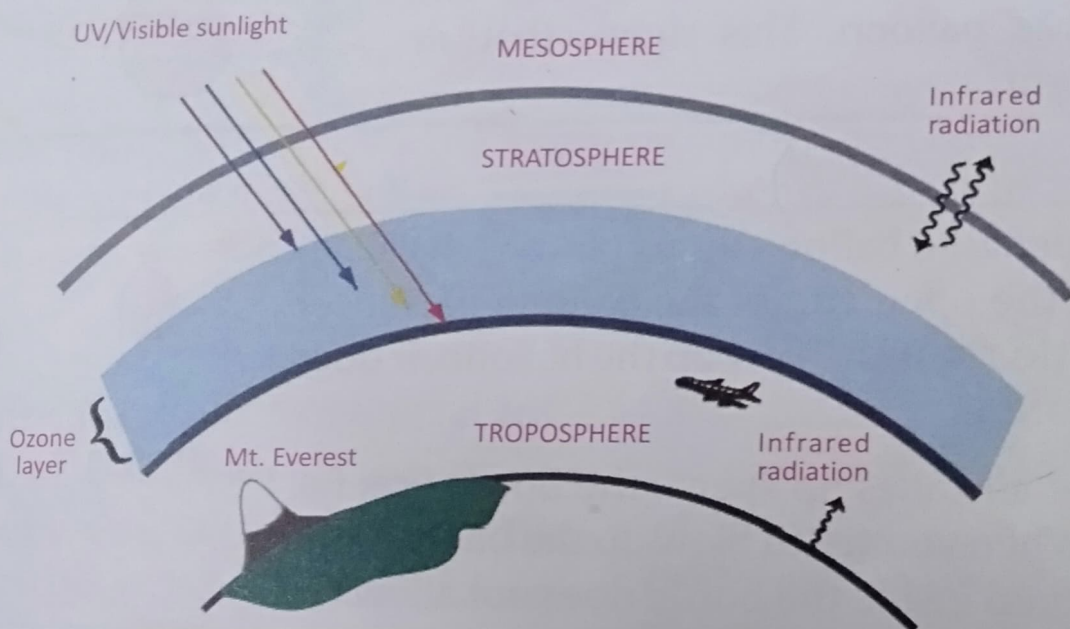
- It is the third layer of the atmosphere that blocks the meteors or the small rocks by burning them before they can reach the surface of the earth.)

• Thermosphere

- It is the layer in which the space shuttles orbit.

• Exosphere

- It is the last layer of the atmosphere.



Quick Revision:

A. Write True or False against the following statements:

1. Nitrogen is added to air by burning bodies of dead living organisms.
2. Rain and snow wash oxygen out of the atmosphere.
3. Carbon dioxide absorbs ultraviolet rays.
4. Sun's rays are harmful for us.

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B. Fill in the blanks:

1. Mesosphere layer burns rocks and meteors.
2. The orbits shuttle in the Thermosphere layer of atmosphere.
3. Ozone layer is present in Stratosphere
4. The Exosphere is the last layer of the atmosphere.

Let us take two balloons, a needle, a foot ruler and some string.

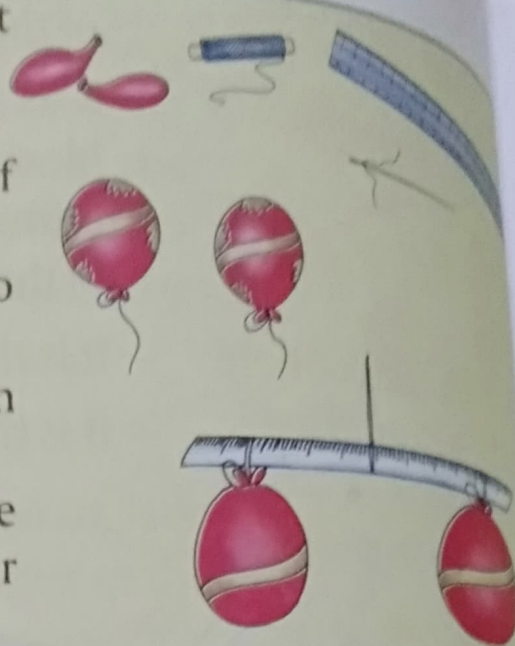
Inflate the balloons and tie their ends.

Tie these upside down at the two ends of a ruler.

Now string the ruler from the centre so that the balloons balance each other.

Ask your teacher to puncture one balloon with the help of a needle.

The inflated balloon is heavier than the punctured balloon. This shows that air has weight.



2) Air occupies space

Push a deflated balloon into a plastic bottle and stretch the open end of the balloon back over the bottle's mouth. Blow up the balloon. It does not inflate.

Because air takes up space, the bottle was full of air. When you try to blow up the balloon, the air trapped inside the bottle does not allow the balloon to inflate further.



3) Air expands on heating

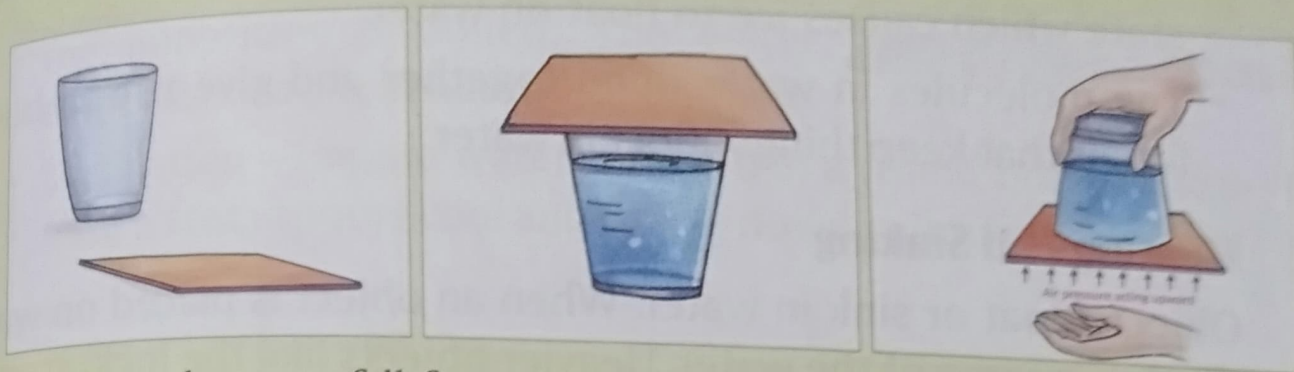
Take an empty bottle and stretch the balloon over the mouth of the empty bottle. Put the bottle in the pot of hot water, let it stand for a few minutes and watch what happens.

As the air inside the balloon heats up it starts to expand. The molecules begin to move faster and further apart from each other. This is what makes the balloon stretch. There is still the same amount of air inside the balloon and bottle, it has just expanded as it heats up.



Air exerts pressure

Take a glass and fill one-third of it with water. Place a cardboard over the mouth of the glass. The cardboard should be a bit bigger than the mouth of the glass. Now put some pressure on the cardboard from the left hand and invert the glass with the right hand. Slowly remove the hand and see what happens.



The water does not fall from the glass, retaining the cardboard and the water in the same place as before. This takes place because the air pressure outside pushes the cardboard upwards.



Water

Water, like air, is also essential for survival of life. Rain is the main source of water on earth that fills up the ponds, lakes, wells, river and the underground table.

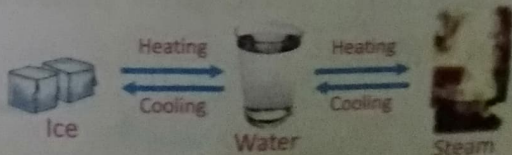


Properties of Water

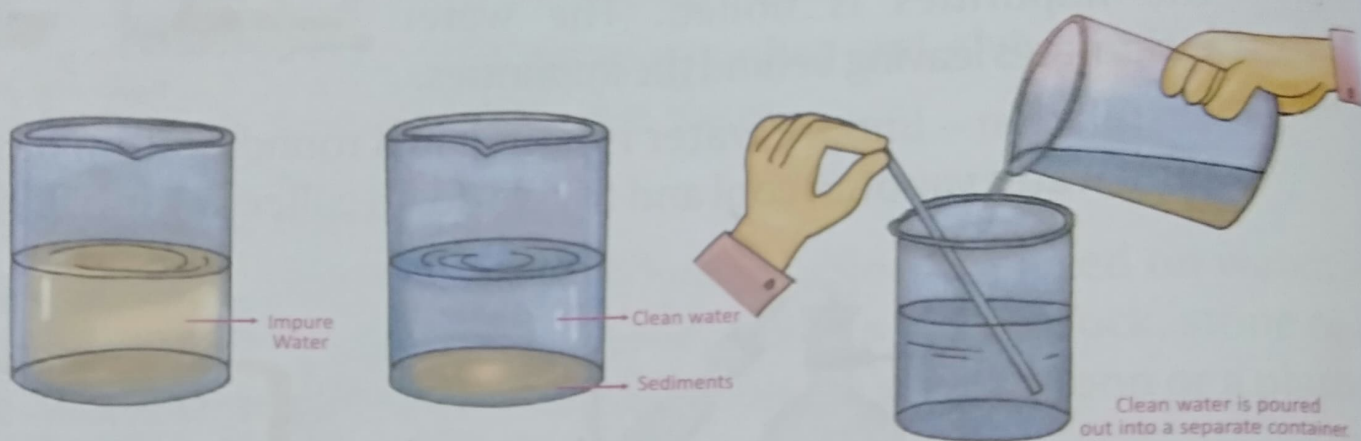
- Water is made up of two molecules of hydrogen and one molecule of oxygen. H_2O
- Water is a neutral substance. It is neither acidic nor basic.
- Water is a universal solvent. It dissolves almost anything in itself. For this reason water is never pure under natural conditions.

Density – It is the mass per unit volume of a substance.

Volume – It is the amount of a substance.



- **Sedimentation** ^{C1(c)} – It works on the principal that heavy objects settle at the base of the solution. The solution of water and the insoluble impurities are made to stand for a while. The impurities settle down at the bottom of the container and are called **sediments**. This process is called **sedimentation**. ^{C1(d)} (The clean water is poured out in a separate container, a process called **decantation**.)



Sedimentation and Decantation



Purification of Drinking Water

Though water is an essential supporter of life, dirty water carries many germs that can lead to dreaded diseases like typhoid, cholera and jaundice. It is therefore very important to purify the water that we drink. Drinking water can be purified in three ways:

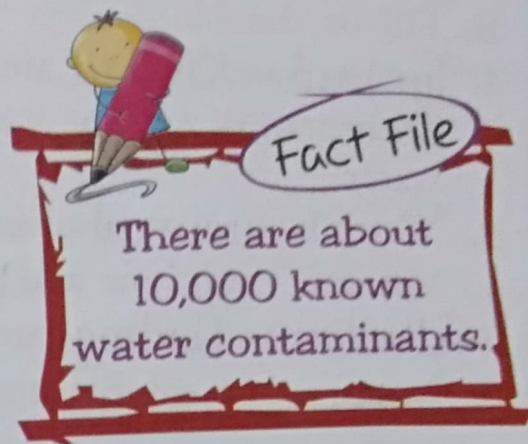
- **Filtration** – It is the first step to clear the insoluble impurities from water.
- **Boiling** – Filtered water can be heated to its boiling point and then allowed to boil for about 10 minutes. This kills the disease carrying germs in it.
- **Distillation** – The water collected by this process is called **distilled water** and is the purest form of water. Such pure water finds wide use in car batteries, injections and medicine manufacture.
- **Chlorination** – Water can also be purified by adding the right amount of chlorine in it. It is mostly used in villages and small towns.)

Ans C2

- **Sewage Treatment** – In big cities, the dirty water is collected from the entire city in one area and is purified using a combination of all the three given processes.

New Words

- Humidity** – The amount of water vapour in the air.
- Neutral** – The substances that are neither acidic nor basic.
- Sedimentation** – The process by which a solution is made to stand until the impurities settle down at the bottom.
- Decantation** – Collection of pure water in a separate container.
- Chlorination** – Addition of chlorine to water in order to kill germs.



Let's Revise

1. Air is a mixture of gases, dust and water vapour.
2. Amount of nitrogen being added into the soil is balanced by the processes that remove it.
3. Carbon dioxide absorbs infrared radiation.
4. Ozone absorbs ultraviolet radiation.
5. There are five layers of the atmosphere that envelops the earth.
6. Different processes can be used to separate soluble and insoluble impurities from water.

Let's Answer

- A. Look at the pictures and write the property of air or water they depict. Explain in one line.



Lighter objects float on water



Molecules of water give rise to buoyant forces that keep things afloat in water



Air exerts pressure

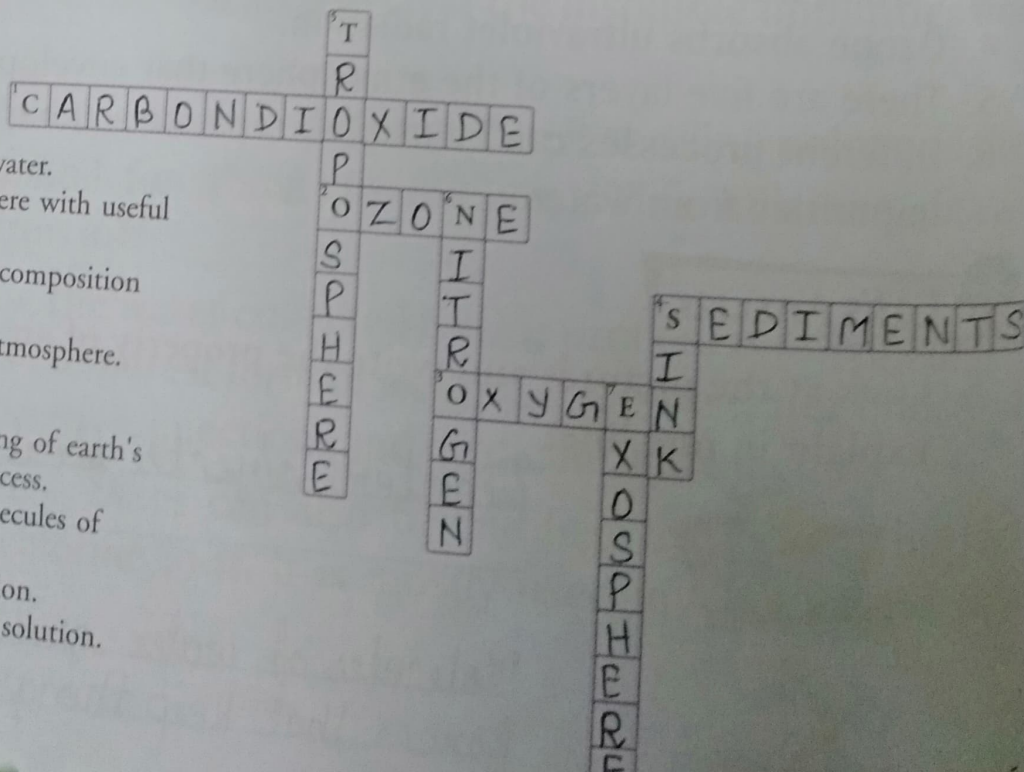
B. Fill in the blanks:

1. Typhoid and Cholera are water borne diseases.
2. Treatment of sewage water in cities is undertaken to provide clean drinking water.
3. Water is a universal solvent.
4. Volcanic eruptions add Nitrogen gas to the air.
5. Filtration and boiling are two methods to purify water.
6. Sugar is a soluble impurity and sand is an insoluble impurity.

C. Answer these:

1. Define the following:
 - a. Atmosphere Pg-112
 - b. Humidity Pg-114
 - c. Sedimentation Pg-120
 - d. Decantation Pg-120
2. How is water purified in small towns? Pg-120
3. How is the ozone layer beneficial to us? Where does it lie in the atmosphere?
4. What are the harmful effects of increased carbon dioxide in air? Pg-114
5. What prevents meteors from entering the earth's surface? 115
6. State any three properties of air and water. Pg-117, 114

D. Read the clues and fill up the crossword:



Down:

4. Heavy objects ___ in water.
5. The layer of atmosphere with useful gases.
6. A gas given out by decomposition of dead animals.
7. The last layer of the atmosphere.

Across:

1. A gas that causes heating of earth's atmosphere when in excess.
2. It is made of three molecules of oxygen.
3. A gas vital for combustion.
4. Particles that settle in a solution.