

15. Air around Us (By: J.S. Mishra)

★ The invisible gaseous medium around us, mainly constituted by oxygen and nitrogen is known as air.

★ Air is transparent and colourless. It occupies space and is present all around us.

Atmosphere: The thin blanket of air surrounding the surface of the Earth is called the atmosphere.

• The atmosphere is divided into five layers on the basis of variations in temperature that changes due to increasing altitude.

Troposphere: This is the first layer to the atmosphere which is nearest to the surface and is responsible for weather conditions.

Stratosphere: This is the layer just above the troposphere which contains the ozone layer and where the aeroplanes fly and is also home to most of the clouds.

Mesosphere: This is the third and the coldest layer of our atmosphere and extends to about 80 km above the surface of the Earth.

Thermosphere: This is the fourth and one of the hottest layers of Earth. This is where the space shuttles go to study Earth from space.

Exosphere: This is the outermost layer of the atmosphere. It is beginning at 480 km above the Earth. This layer then extends into the space.

Constituents (Composition) of Air:

Air is a mixture of a number of gases and some other particles such as:

1. Water Vapour: Air contains water vapour which helps maintain the water cycle. When air comes in contact with cold surfaces, it is these vapours that turn into or condense into droplets of water.

2. Oxygen: Air contains oxygen that helps human and animals carry out the respiration process. Oxygen is also required for fire to keep burning. Air contains about 21% of oxygen.

3. Nitrogen: Air contains about 78% of nitrogen. This component of air helps plants in their growth process.

3. Carbon dioxide: Carbon dioxide is a very small (only 0.04%) component of air. We breathe in oxygen and give out carbon dioxide.

4. Dust and Smoke: Smoke is another component given out when fire burns. It is very harmful and adds fine dust particles and a few other gases to the air.

• It causes air pollution

• Air also contains very fine dust particles which can be seen when a beam of light enters a dark room.

Availability of Oxygen in Water and Soil

Soil and water have air dissolved in them.

• When we heat or boil water, we notice that bubbles start to form. These bubbles are an indication that air is present in the water. When water is heated, the air dissolved in it escapes first followed by water itself getting converted into vapour. This is how animals living underwater are able to respire.

• To see the presence of water in the soil, we take a small lump of it in a beaker and add water to it. We see bubbles coming out of it. It is a proof of the existence of air in the soil. Animals make use of this air to breathe under the soil. Some animals make holes and burrows in the soil to make a path for air to enter the soil. When it rains heavily, earthworms and other animals come

out of the soil because the path gets blocked by the water and they need to come outside to find the air.

Balance Of Oxygen And Carbon Dioxide In The Air

The balance of oxygen and carbon dioxide in the atmosphere is maintained through respiration in plants and animals and by photosynthesis in plants. Plants produce oxygen during photosynthesis and utilize oxygen during respiration. They produce much more oxygen during photosynthesis than they consume, during respiration This is how the oxygen consumed by plants and to a large extent by animals is replenished in the air through photosynthesis.

Air Supports Life

We all need air to survive. Air contains oxygen and carbon dioxide useful to plants and animals. Plants use carbon dioxide of the air to make their own food by a process called photosynthesis.

In Plants:

Plants have tiny pores called stomata, found on the underside of a leaf. Air containing carbon dioxide and oxygen enters the plant through these openings where it gets used in photosynthesis and respiration.

In Animals:

All animals need to respire. They use different organs and mechanisms for respiration.

In Aquatic Animals and Plants:

- Most aquatic animals like fish, tadpole, crab etc. have special organs for respiration called gills. Gills help to take in oxygen and give out carbon dioxide.
- Aquatic plants like Hydrilla also breathe in oxygen dissolved in water through their stomata.

In Amphibians:

Amphibians like frog has breathing systems for both air and water.

In Birds:

Birds have an efficient respiratory system as they need high levels of oxygen during flight. Birds have a pair of lungs with air sacs that remain open all the time so that air can easily pass through them.

In Mammals:

Most mammals breathe with the help of lungs.
They take in oxygen and give out carbon dioxide.

The importance of Air

Air has a number of uses:

- The air which is in motion is known as wind. The wind is important for the rotation of windmills which help in drawing water from tube wells.
- They also help in running flour mills.
- Windmills are also used to produce electricity.
- Insects and birds are only able to fly because of the presence of air
- Boats, yachts, aeroplanes and parachutes also need air to sail and glide
- Air has a very important role to play in the water cycle as well.
- It also helps in distributing the pollen and seeds from flowers of various plants.
- Compressed air is used in tyres of vehicles.
- Nitrogen is used on a large scale to manufacture fertilizers.
- Winnowing is possible only because of the air.
- Air is also useful for playing several musical instruments.

- Birds, bats and many insects fly in the air.
- We cannot hear the sounds in the absence of air.
- Various components of airplay various important roles.

Air Pollution

The addition of impure substances in the environment that are harmful to live beings is called pollution.

- ★Air is getting polluted day by day because of various human activities.
- ★Excessive burning of fuels like wood,coal, petroleum produce smoke and harmful gases and causes air pollution.
- ★Smoke and harmful gases released by vehicles,industries and machines are the major causes of air pollution.

These gases spread and mix in the air and spoil the quality of air, thereby making it impure.

- Air pollution has major adverse effects on plants, animals as well as human beings. Harmful gases present in the polluted air make breathing difficult.
- Air pollution also leads to a lot of lung disease like asthma and lung cancer.
- Air pollution also damages crops

Methods of reducing air pollution

There are a number of ways by which we can reduce air pollution:-

- Planting more and more trees
- Recycling plastics
- Regular checking of vehicles for the emission of harmful gases, etc.