

NOTES

CLASS 6

SCIENCE

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AIR AROUND US

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

The atmosphere is divided into five distinct layers on the basis of variations in temperature that changes due to increasing altitude. Air gets scant as we move up in the atmosphere. These are as follows:

- **Troposphere:** This is the first layer to the atmosphere which is nearest to the surface and is responsible for weather conditions. The troposphere itself is said to contain about more than 75% of the atmosphere!
 - **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 a good 80 km above the surface of the Earth.
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- **Thermosphere:** This is the fourth and one of the hottest layers of Earth where temperatures go to a **1500°** this is where the space shuttles go to study Earth from space! The air in this layer is very thin and about 99.9% of the atmosphere is said to lie below this particular layer.
- **Exosphere:** This is the outermost layer of the atmosphere where molecules and atoms escape into space. Beginning at 480 km above the Earth, this layer then extends into the space.

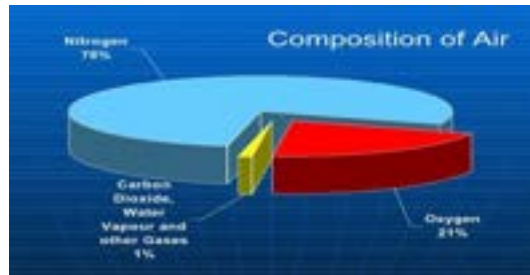


Constituents of Air

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. **The amount of water vapours in the air from place to place and time to time.** At a normal 30°C for instance can contain say up to 4% of water vapour.
2. **Oxygen:** It is the oxygen in the air that helps humans and animals carry out the respiration process. Oxygen is also required for fire to keep burning. If we were to keep an inverted tumbler covering a burning candle, the candle will go off in a few seconds because of the lack of oxygen-containing air due to the tumbler. Dry air is said contain about **21%** of oxygen.
3. **Nitrogen:** Dry air is said to contain about **78%** of nitrogen. This component of air helps plants in their growth process.
4. **Carbon dioxide:** Carbon dioxide is a very small (only **0.04%**) component of air and is a byproduct of respiration by humans and animals. Fire also uses up oxygen to burn and then produces carbon dioxide and a few other gases upon burning. This is why we feel suffocated if there is something burning inside a room. This happens due to an excess of carbon dioxide as the fire continues to burn in the room, choking out oxygen in the air.
5. **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.





6.

The composition of the components of air

As we can see from the Figure above, Oxygen and nitrogen together make up 99% of air while the other components come up to a mere 1% of all air in our environment.

Availability of Oxygen in Water and Soil

It is often asked how animals under the soil and in water are able to breathe. The answer is that both soil and water have air dissolved in them.

- When we heat or boil water, we often notice that bubbles start to form. These bubbles are in fact, an indication that air molecules are 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.



Air bubbles can be seen when water is heated

- 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 which as we discussed, is proof of the existence of air molecules in the soil. As water is added, it displaces the water molecules in the soil which we see in the form of bubbles. Animals make use of this air to breathe under the soil. Some animals make holes and burrows in the soil to help make pathways for air to enter the soil. When it rains heavily, earthworms and other animals come out of the soil because these pathways get blocked by the water and they need to come outside to find the air to breathe.



Air particles present in soil

Balance of Oxygen in the Atmosphere

It is common knowledge that humans and animals can't survive without plants because they produce oxygen via photosynthesis. The balance of oxygen in the environment is thus maintained through the respiratory processes of plants and animals.

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.

SOME IMPORTANT QUESTIONS

1. Fill in the Blanks-

- i.) Plants absorb ____ to make their own food.
- ii.) Oxygen is returned to the atmosphere by the process of ____.
- iii.) Combustion cannot take place without ____ gas.
- iv.) ____ gas maintains the temperature of the earth.
- v.) Carbon dioxide is ____ than air.

Answer.

- i.) Carbon dioxide ii.) Photosynthesis. iii.) Oxygen gas. iv.) Carbon dioxide v.) Carbon dioxide

State True or False

- i.) Plants use oxygen during photosynthesis.
 - ii.) The only elements in the air are nitrogen and oxygen.
 - iii.) Water vapour is present in the air.
 - iv.) Air exerts pressure.
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v.) The composition of air is constant in the atmosphere.

Answer.

i.) True ii.) False iii.) True iv.) True v.) False

Match the Following-

Column A	Column B
a.) Respiration	i.) Process of preparing food by plants.
b.) Air	ii.) It is moving air.
c.) Photosynthesis	iii.) Process of burning food to get energy.
d.) Nitrogen	iv.) It is a gaseous mixture
e.) Wind	v.) The major component of air.

Answer.

Column A	Column B
a.) Respiration	iii.) Process of burning food to get energy.
b.) Air	iv.) It is a gaseous mixture
c.) Photosynthesis	i.) Process of preparing food by plants.
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e.) Wind	ii.) It is moving air.



Very Short Answer Questions-

Q1. Name the main component of air.

Answer. Nitrogen.

Q2. What is the percentage of oxygen in the air?

Answer. 20.9%

Q3. What is the source of carbon dioxide in the atmosphere?

Answer. Animal and plant respiration, as well as fuel combustion.

Q4. Which gas in the air is necessary for combustion?

Answer. Oxygen.

Q5. Define humidity.

Answer. The amount of water vapour present in the air is humidity.

Q6. Which gas is given out during respiration by humans?

Answer. Carbon dioxide.

Q7. Can you see the air?

Answer. No, we cannot see air. We can only feel it.

Q8. Name some musical instruments in which air plays an important role.

Answer. Flute, saxophone, trumpet, horn, etc.

Q9. Which gas in the air is essential for breathing?

Answer. Oxygen.

Q10. Which gases in the air are not a supporter of combustion?

Answer. Nitrogen and carbon dioxide.

Short Answer Questions-

Q1. Why is air considered a mixture?

Answer. Air is made up primarily of oxygen and nitrogen, as well as carbon dioxide and other gases. In the air, these gases retain their properties. As a result, the air is referred to as a mixture.

Q2. Why do you think mountaineers bring oxygen cylinders when climbing high mountains?

Answer. The amount of air decreases as we ascend higher into the atmosphere. The air at the summits of extremely high mountains is so thin that people cannot breathe properly. Mountaineers, or people who climb mountains, carry “oxygen gas” cylinders with them. They breathe in oxygen from these cylinders to survive on high mountains.

Q3. List the properties of air.

Answer. The following are the properties of air:

- It is colourless
- It is transparent
- It can be compressed.
- It occupies space
- It has mass

Q4. Define atmosphere.

Answer. The atmosphere is a gaseous blanket that surrounds the earth and contains the air we breathe. The planet’s gravitational attraction keeps it close to the planet’s surface.

Q5. Why do you feel suffocation in a closed room, where some material is burning?

Answer. In a closed room where some material is burning, we feel suffocated because the smoke contains few gases and harmful fine dust particles.

Q6. How does oxygen reach animals living in soil and water?

Answer. Air fills the space between the soil particles. The air between soil particles supplies oxygen to the animals that live there.

Aquatic animals and plants use dissolved oxygen in the water.



Q7. Why does the transparent glass of windows become hazy if it is not cleaned regularly?

Answer. Dust particles in the air adhere to the clear glass of windows. These particles also attract other elements, such as pollen, which collects on glass. As a result, if the windows' transparent glass is not wiped regularly, it appears hazy.

Q8. What are the functions of long chimneys in factories?

Answer. When fuel is burned, smoke is produced. Frequent smoke is harmful because it contains a few gases and fine dust particles. Long chimneys in factories keep harmful gases and smoke away from the people living near the factory.

Q9. Why do our nostrils have fine hair and mucus? Why is it not recommended to breathe in through the mouth?

Answer. The air contains dust particles. Inside the nose, fine hair and mucus prevent dust particles from entering the respiratory system.

Dust particles may enter our respiratory tract if we breathe through our mouth because it lacks these dust barriers (fine hair and mucus). Hence, breathing through the mouth is not advised.

Q10. Why do animals that live deep in the soil come to the surface during heavy rains?

Answer. Animals that live in the soil obtain oxygen for breathing (or respiration) from the air that exists between the soil particles. When it rains heavily, water fills the spaces in the soil occupied by the air. In this situation, the animals living within the soil must emerge from the soil to breathe. Earthworms, for example, emerge from the soil only during heavy rains.



Long Answer Questions

Q1. Why do animals that live deep within the soil come to the surface during heavy rains? How can you say that animals and plants are mutually dependent?

Answer. Plants and animals are mutually dependent on survival. Plants cannot survive for long without animals because they require CO_2 for photosynthesis, which is exhaled by animals. Similarly, animals will have no oxygen to breathe if plants do not exist. As a result, we can say that both are required to keep the balance of oxygen and carbon dioxide in the atmosphere.

Q2. Are breathing and respiration the same thing?

Answer. No, breathing and respiration are not the same things.

Breathing is a biophysical process in which oxygen is inhaled, and carbon dioxide is exhaled. In contrast, energy is produced during respiration by breaking down glucose, either in the presence of oxygen (aerobic respiration) or in the absence of oxygen (anaerobic respiration) (anaerobic respiration).

Thus, breathing is a physical process, whereas respiration is a chemical process.

Q3. Breathing through your mouth could be dangerous.” How?

Answer. The amount of dust particles in the air varies according to time and location. We inhale air when we breathe through our nostrils. Fine hair and mucus are found inside the nose to keep dust particles out of the respiratory system. Breathing through our mouths can be harmful because it allows dust from the air to enter our respiratory system (lungs, etc.) and harm our health.

Q4. How is oxygen replaced in the atmosphere or air?

Answer. The oxygen in the air is used by animals (and plants) through respiration and is constantly replaced by plants through photosynthesis.

Plants produce their own food while simultaneously producing oxygen. Plants also use oxygen for respiration, but they produce more than they consume. Because of this, plants are said to produce oxygen.

Animals cannot survive without plants. Similarly, plants cannot survive without animals. They would consume the entire amount of CO₂ in the atmosphere. As a result, both are required to maintain the balance of oxygen and carbon dioxide in the atmosphere.

Q5. What will happen if atmospheric CO₂ levels rise?

Answer. Carbon dioxide has the ability to absorb infrared rays, which are heat rays. Nature maintains a carbon dioxide balance in the atmosphere, which provides optimal warmth. Increased carbon dioxide concentration in the atmosphere would raise the earth’s temperature, causing glaciers to melt and flood, and so on. This is referred to as Global Warming.



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