Composition and Structure of the Atmosphere

Discuss

Question
Discuss the importance of the different layers of the atmosphere ?
Answer:
The earth is the only planet in the universe that has life. One of the reasons why life exists on this planet is an encompassing blanket of gases called the atmosphere. It is like a blanket of air that protects the earth from the harmful rays of the sun. It also controls the temperature and, most important of all, it contains oxygen, which is essential for every form of life. This almost invisible blanket is kept intact around the planet by another invisible entity called gravity.

THINK AND ANSWER

Question
What would happen to the earth if the atmosphere disappeared ?
Answer:
If you would like to see what the earth would look like, take a look at the moon, with all its craters. Another thing that would happen if the earth had no atmosphere is the oceans would boil away, leaving no water here on earth because there is not atmosphere to help complete the water cycle.

VALUES AND LIFE SKILLS

Question
We often leave the lights switched on and fans running when we are not in the room. We switch on the air-conditioning even though we don't really need it. We insist on being dropped to school in the car every day. Thus, we waste valuable energy which is generally produced by burning coal and petroleum. As you know, the burning of these fuels release gases that pollute the atmosphere.
Make a list of the similar things that we do without realizing that we are destroying the environment. Think of the ways that we can behave differently.
Answer:
The list of the similar things that we do without realizing that we are destroying our environment and the ways that we can behave differently and save are :

1. **Leaving The Lights On :**
   You've probably heard this a million times before but turning the light off when you leave the room, even if you're only going for a few minutes, really does make a difference to the environment, since it saves a finite source of energy that can't be replaced.

2. **Boiling The Kettle :**
   Many people guess the amount of water they need when they boil the kettle, and they end up boiling too much. Boiling a kettle actually uses a lot of power- enough to light a whole household- which also costs the householder money. There are energy efficient kettles available that can help to reduce energy usage, and kettles that measure how much water is needed for a single mug or a pot of tea.
3. **Eating Farmed Meat :**
   Maybe you're not ready to take a step in the veggie or vegan direction, but if you're eating farmed meat, you're supporting an incredibly environmentally damaging industry. Many acres of rainforest are cleared to grow soy crops and grains to feed cattle, and overgrazing of cattle is a major reason for global soil depletion and source of climate pollution.
4. **Commuting :**
   Whether you're flying away on business trips or commuting to work on a daily basis, the way we travel is one of the biggest environmental polluters in our lives. You may not be able to
   give up these habits, but taking steps to reduce them will impact the environment, local pollution levels, and your health.
5. **Wasting Paper :**
   We live in a world of mass paper usage, where recycling can easily ease an otherwise guilty conscience and prompt even the most devoted re-users to waste paper. We may all be guilty of throwing away pieces of paper that could otherwise be reused at least once, if only for note-taking purposes and to-do lists, but it's easy to forget that recycling still uses energy, which can be reduced if you decide to reuse.
6. **Leaving The Tap Running :**
   Whether you're washing the dishes or brushing your teeth, leaving the tap running while you do so wastes a vast amount of water. It may seem like a small water saving, but soaking dishes before washing them and turning off the faucet while you brush your teeth really does reduce the amount of water you use.
7. **Using Plastic Bags :**
   It's hard to make the connection between the single plastic bag you get at the grocery store once a week, and the Great Pacific Garbage Patch. However, there is a strong likelihood that the plastic bags you bring home end will end up in the ocean, or worse. Consider buy a cloth bag instead and make a habit of keeping it in your pocket or bag.

EXERCISES

A. Fill in the blanks.

1. **78%** per cent of the atmosphere is made of nitrogen.
2. Along with carbon dioxide and methane, **water vapour** is a potent greenhouse gas.
3. The rate at which the temperature drops in the **troposphere** is 1°C per 165 metres.
4. The **thermosphere** is the layer of the atmosphere that help in radio transmission.
5. The upper part of the thermosphere is called the **ionosphere.**

B. Match the following.

A	B
1. Troposphere	**(i) Ozone**
2. Stratosphere	**(ii) Ions**
3. Thermosphere	**(iii) Outer space**
4. Exosphere	**(iv) Lowest temperature**
5. Mesosphere	**(v) Densest layer of atmosphere**

Answer:

A	B
1. Troposphere	(v) Densest layer of atmosphere
2. Stratosphere	(i) Ozone
3. Thermosphere	(ii) Ions
4. Exosphere	(iii) Outer space
5. Mesosphere	(iv) Lowest temperature

C. Choose the correct answer.

1. This per cent of the atmosphere is composed of nitrogen.

1. 99
2. **78**
3. 21
4. 76

2. 21 per cent of the atmosphere is composed of

1. Helium
2. **Oxygen**
3. Nitrogen
4. Hydrogen

3. This gas protects us from the harmful ultraviolet radiation.

1. Oxygen
2. **Ozone**

3. Helium
4. Hydrogen

4. The rate at which the temperature drops in the troposphere is called

1. **lapse rate**
2. loss rate
3. less rate
4. drop rate

5. This layer of the atmosphere has the lowest temperature.

1. **Mesosphere**
2. Thermosphere
3. Tropopause
4. Stratosphere

D. State whether the following are true or false.

1. The earth's atmosphere contains 99 per cent oxygen, which is essential for life.
Answer. False.
Correct : The earth's atmosphere contains 21% per cent oxygen, which is essential for life.

2. The stratosphere is the lowest layer of the atmosphere.
Answer. False.
Correct : The troposphere is the lowest layer of the atmosphere.

3. The temperature drops at the rate of 1°C per 185 metres in the atmosphere.
Answer. False.
Correct : The temperature drops at the rate of 1°C per 165 metres in the atmosphere.

4. The stratosphere extends from the top of the troposphere up to 80 km above the surface of the earth.
Answer. False.
Correct : The stratosphere extends from the top of the troposphere up to 50 km above the surface of the earth.

5. Communication satellites orbit in thermosphere.
Answer. True.

E. Answer the following questions in brief.

Question 1.
How is the atmosphere kept in place around the earth?
Answer:
The atmosphere is kept in place around the planet by another invisible entity called gravity.

Question 2.
Name the important gases that are found in the atmosphere.
Answer:
The important gases that are found in atmosphere are nitrogen, oxygen, carbon-dioxide, hydrogen, helium and argon.

Question 3.
How is carbon dioxide a useful gas for life on earth?
Answer:
Carbon dioxide exists in the earth's atmosphere as a colourless and odourless gas. Carbon dioxide is produced by all animals, fungi and microorganisms during respiration and is used by plants during photosynthesis. It is also useful gas as it creates the greenhouse effect. It would have been too cold for life to exist on this planet without greenhouse effect.

Question 4.
What is the troposphere?
Answer:
Troposphere is the lowest layer of the atmosphere. It protects us from the heat of sun during day and keeps the earth warm at night ozone. This is the densest layer of the atmosphere and its thickness varies from 8 km over the poles to 18 km over the equator.

Question 5.
What is the difference between the troposphere and the tropopause?
Answer:
The lowest layer of atmosphere is called troposphere where as the boundary between the troposphere and the stratosphere is called tropopause.

F. Answer the following questions in one or two paragraphs.

Question 1.
Write briefly about the layers of the atmosphere.
Answer:
The atmosphere is divided into five layers starting from the Earth's surface

1. **Troposphere —** Its average height is 13 km. The air we breathe exists here. Almost all the weather phenomena like rainfall, fog and hailstorm occur in this layer.
2. **Stratosphere —** It lies above the troposphere which extends up to a height of 50 km. This layer is almost free from clouds and associated weather phenomenon, making conditions most ideal for flying aeroplanes. It contains a layer of ozone gas.
3. **Mesosphere —** It lies above the stratosphere. It extends up to the height of 80 km. Meteorites bum up in this layer on entering from the space.
4. **Thermosphere —** In thermosphere, temperature rises very rapidly with increasing height. Ionosphere is a part of this layer. It extends between 80-400 km. This layer helps in radio transmission. In fact, radio waves transmitted from the Earth are reflected back to the Earth by this layer.
5. **Exosphere —** This upper most layer. This layer has very thin air. Light gases like helium and hydrogen float into the space from here.

Question 2.
State any three characteristics of the stratosphere.
Answer:
The main characteristics of stratosphere are:

(a) There are no clouds or weather changes so it is safe for air travel.
(b) It extends from the top of troposphere up to 50 km above the surface of earth.
(c) This layer has a band of ozone gas which protects us from sun's harmful ultraviolet rays.

Question 3.
What is ozone? What is the ozone layer? How is the presence of ozone layer essential to preserve life on earth?
Answer:
(03) is present in the earth's atmosphere in stratosphere and helps to protect the earth from the ultraviolet radiation from the sun.

Question 4.
State any three characteristics of the mesosphere.
Answer:
The main characteristics of mesosphere are :

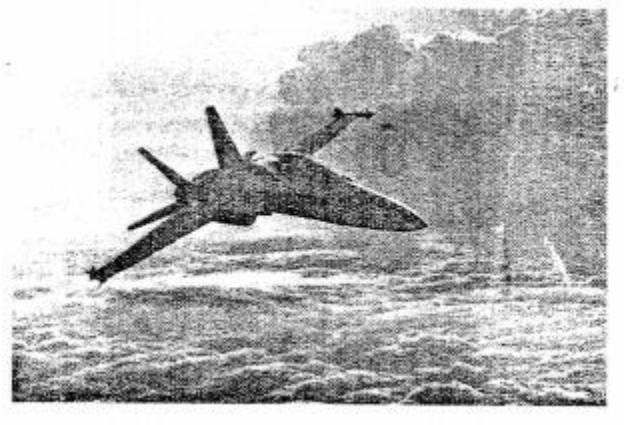
1. It extends from the top of stratosphere upto a height of 80 km above the earth.
2. This layer has lowest temperature in the atmosphere reaches -100°C at its end.
3. Most meteors from space burn up in this layer.

Question 5.
Why is the thermosphere important ?
Answer:
The upper part of the thermosphere is called the ionosphere. The ionosphere contains electrically charged particles called ions, which help in transmitting communication signals.

Question 6.
Explain the significance of the earth's atmosphere.
Answer:
Significance of the Atmosphere :

1. It gives us air to breathe.
2. It forms a protective shield against extreme heat.
3. It also protects us against falling debris from space.
4. It supports the formation of clouds and rain.

G Picture study :
This is a picture of a supersonic aircraft.



Question 1.
In which layer of the atmosphere does this airplane normally fly?
Answer:
A supersonic aircraft fly in stratosphere.

Question 2.
This layer of the atmosphere is also known to protect living beings from the harmful rays of the sun. How?
Answer:
It has a band of ozone gas which protects the sun's harmful U.V. rays to reach the living beings.

LET'S DO SOMETHING

In your notebooks, draw a diagram showing the layers of the atmosphere. Mark clearly the ozone layer, the height at which a jet plane can fly and also the height up to which birds can fly.

Answer: