11. Composition and Structure of The Atmosphere

EXERCISE

A. Answer the following questions :

1. What is the significance of atmosphere?

Ans. The significance of atmosphere :

- There is a continuous flux of energy and matter between the sea surface and lowermost layer of atmosphere to provide the conditions most suitable for existence of life.
- It consists of many major gases like Nitrogen, Oxygen, Carbon-dioxide etc , which are very important for life.
- The Ozone layer in the Stratosphere absorbs the burning ultraviolet radiation from the Sun. In its absence our planet would have been unfit for human habitation and other living beings.

2. State the components of the atmosphere.

Ans. The components of the atmosphere are:

Two main gases Nitrogen and Oxygen(78% and 21% respectively), make up about 99% of the clean dry air. The remaining gases are almost inert and constitute about 1% of atmosphere.

3. Name the different layers of the atmosphere.

Ans. The different layers of the atmosphere are:

- Troposphere, Stratosphere, Ionosphere and Exosphere.

4. State the important characteristics of each of the layers.

Ans. Important characters of the layers of the atmosphere are:

- **Troposphere:** It is the lower most atmospheric layer.
  - ➢ All weather phenomena that affect our life directly take place within troposphere.
  - ➢ It contains water vapour, a colourless, odourless gaseous form of water, which mixes perfectly with other gases. Excessive condensation leads to rain, hail or snow.
  - ➢ The dust particles present in this layer serves as nuclear centres around which the water vapour condenses to form cloud particles.
- **Stratosphere:** The lowermost limit of Stratosphere is tropopause.
  - ➢ It contains the ozone layer. It absorbs the burning ultraviolet radiation from the Sun. In its absence our planet would have been unfit for human habitation and other living beings.
  - ➢ No visible weather phenomena take place in this layer.
  - ➢ In this layer the temperature does not change with altitude.
- **Ionosphere:** It is above Stratosphere.
  - ➢ In this layer the ionisation of molecules and atoms occurs mainly as a result of ultraviolet rays, X-rays and gamma rays.
  - ➢ It reflects low frequency radio waves, but absorbs medium and high frequency waves. Thus this layer is especially important in long distance radio communication.
- **Exosphere:** It is the outermost layer of atmosphere.
  - ➢ It is highly predominant with rarefied Hydrogen and Helium gases.

5. What is the significance of atmosphere for the Earth?

Ans. Same as 1st.

6. What are the properties of Troposphere?

Ans. The properties of Troposphere are:

It is the lower most atmospheric layer.

- All weather phenomena that affect our life directly take place within troposphere.
- It contains water vapour, a colourless, odourless gaseous form of water, which mixes perfectly with other gases. Excessive condensation leads to rain, hail or snow.
- The dust particles present in this layer serves as nuclear centres around which the water vapour condenses to form cloud particles.

7. What is Tropopause?

Ans. The Tropopause is the boundary in the Earth's atmosphere between the troposphere and the stratosphere.

8. Why is Stratosphere found ideal for flying a jet air craft?

Ans. Stratosphere is found ideal for flying a jet aircraft because:

- No visible weather phenomena take palace in this layer
- the temperature does not change with altitude.

9. What is the significance of ozone in the atmosphere?

Ans. The significance of ozone in the atmosphere is :

- It is an important feature of the Stratosphere.
- It absorbs the burning ultraviolet radiation from the Sun.
- In its absence our planet would have been unfit for human habitation and other living beings.
- It protects us from these harmful rays.
- Thus, presence of this layer is a boon to human beings.

10. What are the causes of destruction of ozone layer?

Ans. The causes of destruction of ozone layer are:

- The emission of Nitrogen Oxide by a large number of supersonic transport aeroplanes may cause deterioration of ozone layer with the resultant serious damage to flora and fauna alike.
- A continuous release of synthetic chemicals primarily Chlorofluoro-carbons (CFCs) into the atmosphere.
- The CFC molecules are released in the Stratosphere where intense ultraviolet rays split them, freeing Chlorine atoms. These combine with oxygen to form Chlorine Monoxide.

11. Give the properties of Ionosphere.

Ans. The properties of Ionosphere are:

It is above Stratosphere.

- In this layer the Ionisation of molecules and atoms occurs mainly as a result of ultraviolet rays, X-rays and gamma rays.
- It reflects low frequency radio waves, but absorbs medium and high frequency waves. Thus this layer is especially important in long distance radio communication.

12. What is meant by Ozone Hole?

Ans. Excessive thinning of ozone layer when more than half of the ozone gas in a particular area is depleted, and harmful ultraviolet rays can pass through to reach the earth's surface.

13. What is meant by Greenhouse Effect?

Ans. Greenhouse effect is the process whereby radioactively active gases absorb and delay the loss of heat to space ,thus keeping the lower. Troposphere moderately warm throughout the radiation of infrared wavelengths.

14. What do you mean by 'Global Warming'? What are the consequences of 'Global Warming'?

Ans. Global warming is also referred to as climate change.

- It is the observed century-scale rise in the average temperature of the Earth's climate system, and its related effects.
- Because of the increasing level of CO2 in the atmosphere the global temperature is likely to rise by 1◦C and perhaps may increase up to 3◦C.

Consequences of Global warming:

- The coral reefs are being affected in nearly all the world oceans. 90% of the coral reefs in Indian Ocean has been wiped out.
- Increasing global temperature may affect the regional climate or atmospheric changes with regard to temperature precipitation, moisture etc. It may pose serious problems in the ecological balance, which in turn may affect the life of all living beings on Earth.

15. Name a few measures that could be taken to save the ozone layer.

Ans. The measures to be taken to save ozone layer are:

- Illegal trade is a major barrier, as substantial demand for

these harmful chemicals still exists.

- Each country has to take strict decision to ban the use of such chemicals.
- Another step that can help is to create worldwide awareness against the use of CFCs to save further depletion of life saving ozone layer.

16. What are the main functions of Oxygen?

Ans. The main functions of Oxygen:

- It is highly active chemically and combines with other elements in the process of oxidation.
- Combustion of fuels represent a rapid form of oxidation whereas weathering of rocks represents slow form of oxidation.

17. Why don't jet aircrafts fly in the Troposphere?

Ans. Jet aircrafts don't fly in the Troposphere because all weather phenomena takes place in this layer.

18. How is the water vapour added to the atmosphere?

Ans.
- When the water on the earth's surface is heated, due to evaporation, the water vapour rises and mixes in the lower layers of atmosphere which are cooler.
- The troposphere contains water vapour, a colourless, odourless gaseous form of water, which mixes perfectly with other gases.
- The degree to which water vapour is present in the air is known as humidity. Water vapour condenses into clouds and fog.

19. On the basis of composition of gases, how could we classify the atmosphere?

Ans. On the basis of composition of gases, the atmosphere is classified as

- Heterosphere and Homosphere.

20. Name the three realms of the Earth.

Ans. The three realms of the earth are:

Lithosphere ,Hydrosphere and Atmosphere

21. State the composition of the Earth's atmosphere.

Ans. Same as 2nd answer.

22. How can we reduce global warming?

Ans. Global warming can be reduced by :

- Conservation of forests.
- Reducing industrial pollution.
- Reducing release of CO2, in the atmosphere.
- By taking measures to save the Ozone layer from further depletion by controlling CFCs release in atmosphere.
- Increase in coral reefs

B. Define the following terms :

1. Troposphere

Ans. Troposphere: It is the lower most atmospheric layer.

- All weather phenomena that affect our life directly take place within troposphere.
- It contains water vapour, a colourless, odourless gaseous form of water, which mixes perfectly with other gases. Excessive condensation leads to rain, hail or snow.
- The dust particles present in this layer serves as nuclear centres around which the water vapour condenses to form cloud particles.

2. Stratosphere

Ans. Stratosphere: The lowermost limit of Stratosphere is Tropopause.

- It contains the ozone layer. It absorbs the burning ultraviolet radiation from the Sun. In its absence our planet would have been unfit for human habitation and other living beings.
- No visible weather phenomena take place in this layer.
- In this layer the temperature does not change with altitude.

3. Weather

Ans. Weather : The state of the atmosphere at a particular place and time as regards heat, cloudiness, dryness, sunshine, wind, rain, etc.

4. Greenhouse Effect

Ans. Greenhouse effect: It is the process whereby radioactively active gases absorb and delay the loss of heat to space ,thus keeping the lower troposphere moderately warm throughout the radiation of infrared wavelengths.

5. CFC

Ans. CFC: Chlorofluoro-carbons are synthetic industrial chemical compounds containing Chlorine, Fluorine and Carbon atoms.

6. Thermosphere

Ans. Thermosphere: Atmospheric layer of upwardly increasing temperature lying above the Mesopause.

C. Distinguish between the following :

1. Troposphere and Stratosphere

Troposphere	**Stratosphere**
It is the lower most atmospheric layer.	It is above Troposphere
All weather phenomena that affect our life directly take place within troposphere.	No visible weather phenomena take place in this layer.
There is a decrease of temperature with increasing altitude.	In this layer the temperature does not change with altitude.

2. Hetrosphere and Homosphere

Heterosphere	Homosphere
Consists of Thermosphere and Ionosphere.	The lower layer of atmosphere is called Homosphere.
Both the Thermosphere and Ionosphere function to filter harmful wavelength of solar radiation, protecting the Earth's surface.	It consists of Ozone layer which protects the earth from the harmful ultraviolet rays.

D. Give reasons for the following :

1. The layers of the atmosphere become thinner with altitude.

Ans. The layers of the atmosphere become thinner with altitude because:

- the gravity causes the upper layers of atmosphere to exert force on the lower ones. This causes the air to compress and hence the air becomes dense at the lower level in comparison, the air at height is thinner.

2. The Earth does not experience extremes of temperature.

Ans. The Earth does not experience extremes of temperature:

- It is neither too far, nor too near the sun.

3. Solid particles play an important role in the atmosphere.

Ans. Solid particles play an important role in the atmosphere:

- the solid particles like dust in the Troposphere serves as nuclear centres around which the water vapour condenses to form cloud particles.

E. Diagram :

Draw a self-explanatory diagram illustrating the structure of the atmosphere.

Ans. Students to do it themselves.