

Question : 02

a) What is the sequence of strata of atmosphere & on what factors does it depend?

Introduction:

Earth's atmosphere is actually a blanket of gas surrounding earth's surface, composed of

- i) Constant gases (Nitrogen 78%, Oxygen 21%)
- ii) Variable Gases (CO_2 , O_3 , water vapours).

Sequence of strata:

The atmosphere is like a multi-layered cake, in which layers are stacked one over the other. There are five layers of atmosphere based on the temperature variation as we move away from earth's surface.

- 1) Troposphere (decreases from 25°C to -53°C)
- 2) Stratosphere (Increases from -53°C to -3°C)
- 3) Mesosphere (Decreases from -3°C to -93°C)
- 4) Thermosphere (Increases upto 2000°C)
- 5) Exosphere (Keeps on increasing).

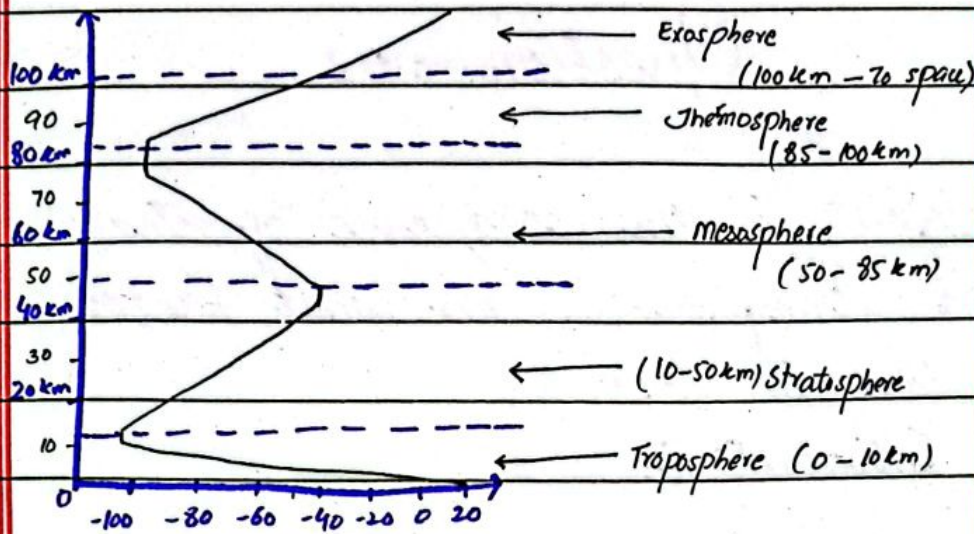


fig: Sequence of strata of atmosphere.

↳ Dependency factors:

The arrangement of layers of atmosphere depends on various factors:

i) Temperature: Prime Factor

The prime factor is the discontinuous fluctuation patterns in temperature. Every layer has its own temperature zone. e.g. Troposphere 20°C to -53°C

ii) Pressure:-

Pressure decreases in layers with the increase in altitude of the layers from earth.

iii) Gravity:

Gravity holds the gaseous content of the atmosphere. That is why troposphere holds 75% of total mass of atmosphere.

iv) Composition:-

Each strata has distinct composition. For example

Troposphere: 75% mass of atmosphere (N_2 & O_2)

stratosphere: Mainly contain Ozone (O_3).

v) Absorption of Solar radiation:

Mesosphere and Thermosphere absorb more radiations than stratosphere & troposphere.

vi) Electric properties:-

Electric properties is another important factor that divides the atmosphere in Ionosphere and neutralosphere.

b) Describe water cycle & major processes involved. Also write its importance?

Introduction:

Water cycle is the movement of water in hydrosphere. Water returns to water reservoirs and maintain the quantity of water in hydrosphere.

Water cycle is crucial for existence of life on earth.

Water Cycle & processes involved

Water cycle involves processes that changes water from one form to another (ie. vapours).

liquid and solid). Water from water sources is converted into vapours by Evaporation.

Plants lose water through Transpiration. These water vapours are converted into small droplets and are suspended in the form of clouds. The process is called as Condensation. These water molecules / droplets come down in the form of rain, snow, hail etc & the process is Precipitation.

This water becomes a part of water bodies by Surface runoff into the lakes, rivers & ultimately into oceans. Some water becomes the part of underground water through seepage into the ground and the process is Infiltration.

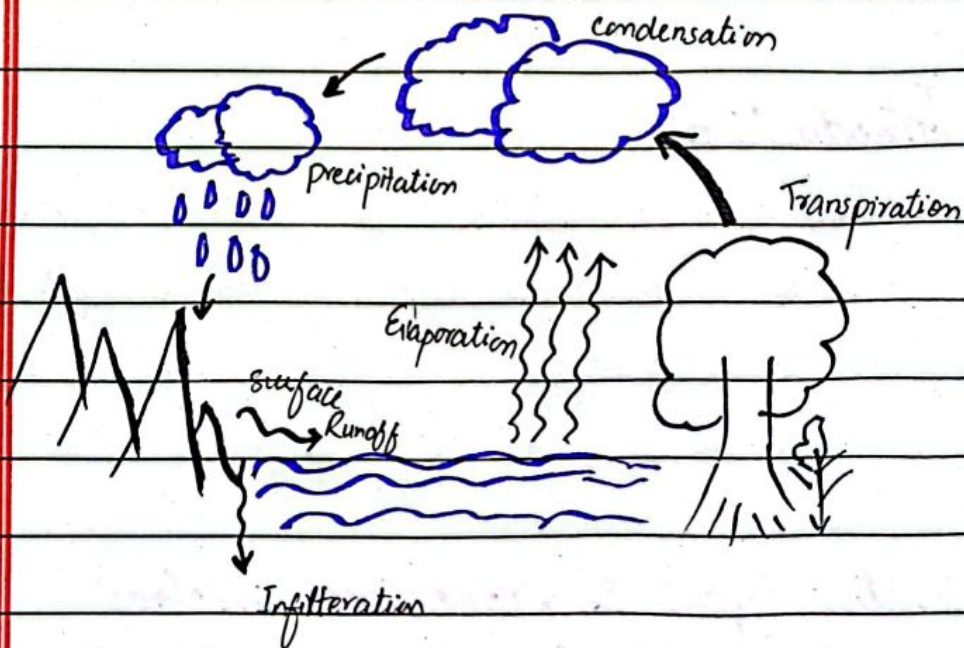


fig: Processes involved in water cycle

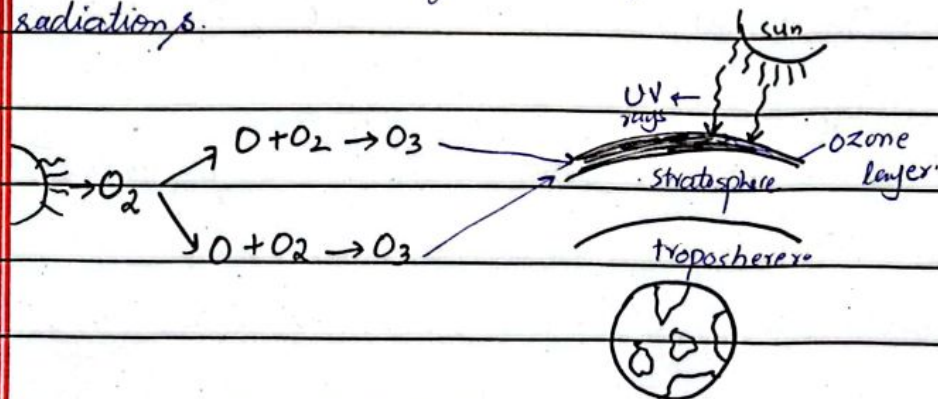
Importance of water Cycle:

Water Cycle is very significant for existence of life on earth.

- ↳ It maintains the supply of fresh water
- ↳ It helps in change in temperature through energy exchange.
- ↳ When water is evaporated it is purified
- ↳ It maintains the flow of minerals across the globe.
- ↳ It has shaped the geographical features of earth through sedimentation & soil erosion.

c) What is Ozone depletion? Write its mechanism. How can we protect ozone layer?

Ozone layer depletion is the destruction of ozone (O_3) layer in stratosphere where it shields the earth from harmful ultraviolet radiation.



Mechanism of Ozone Depletion:

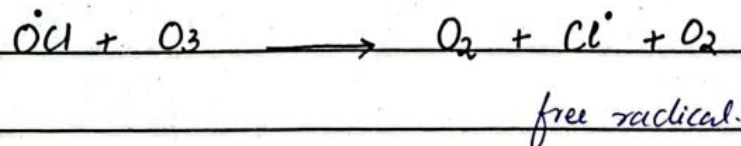
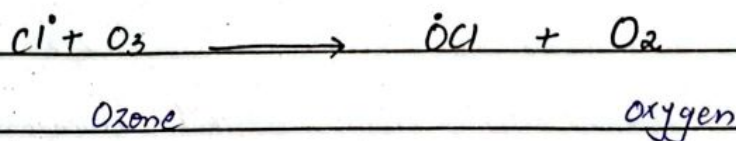
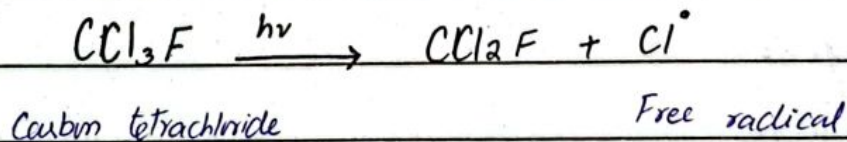
Ozone depletion occurs by (free radical mechanism). Human activities provide sources for the free radicals.

Sources:-

- ↳ Chlorofluoro Carbons (CFCs).
- ↳ Halons (bromide containing)
- ↳ Carbon tetrachloride (CCl₄)
- ↳ Aerosols

A single free radical can destroy millions of ozone molecules.

Mechanism:



A chain reaction starts that destroys millions of O₃ molecules resulting in depletion of ozone layer, which will allow harmful UV rays to reach earth's surface.

↳ Mitigation Strategies:

This disastrous phenomenon can only be stopped by taking necessary measures to stop the production of substances that causes it.

- Use of unleaded gasoline
- Minimum use of fire extinguishers
- Use of catalytic converters in vehicles
- Enforcement of Montreal Protocol
- Avoid using pesticides and fungicides
- Replacing CFCs with HFCs.
- Promoting public transport
- Using eco-friendly cleaners
- Ban on the use of Bromine containing Halon emitters.
- Promoting sustainable practices to conserve environment
- Raising awareness in all sectors of life to highlight the severity of the issue.

d) What is 'Acid Rain'. Write its causes and prevention. Also write dangers that are associated with it.

Introduction:

Acid rain is any precipitation (rain, snow or hail etc) that is acidic in nature.

PH = 4.2 to 4.4

"Acid Rain rain describes any form of precipitation that is acidic due to presence of high levels of nitric & Sulphuric Acids" (National Geographics).

Causes of Acid Rain:

Following are the causes of Acid rain.

Causes

Natural Causes

- Volcanic activity
- Biochemical reactions
- Wild fires

Anthropogenic Causes

- Burning of fossil fuels
- Exhaust of vehicles
- Smoke from Industries
- Burning of sulphur containing fuel.
- Agricultural pesticides & fungicides.

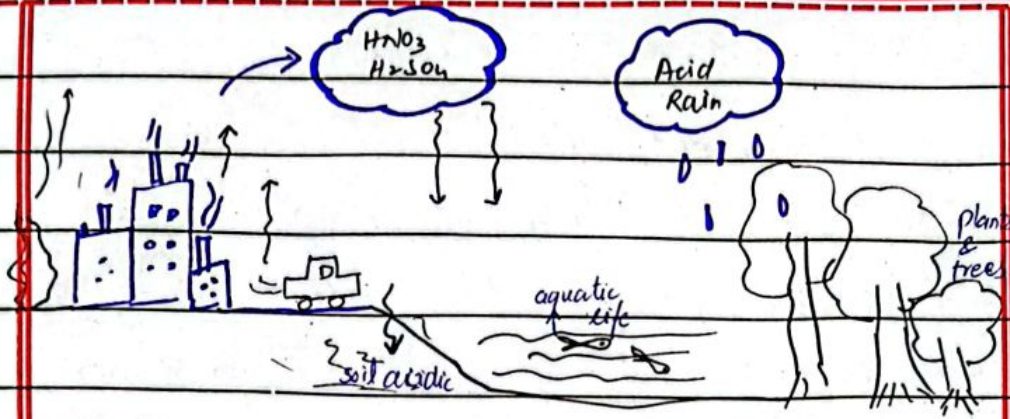


fig: Acid rain: Effects & causes.

Effects of Acids Rain:

Acid rain effects all life existing on planet.

more over it also damages the abiotic components (soil etc) as well.

- Human life: Causes skin diseases, health problems in humans.
- Plants & Trees: Destroys plants and trees causing them to wither.
- Aquatic life: The surface run off, becomes part of water bodies, increasing acidity of water making it inhabitable for aquatic life.
- Soil: It increases the acidity of soil & also causes leaching of heavy metals like lead and mercury that effect human life adversely.
- Buildings & Monuments: Erosion of Taj Mahal (India) and Statue of liberty is an example.

↳ Prevention Strategies:-

Possibility of acid rain can be mitigated by taking following measures.

- Reduce use of fossil fuel.
- Using renewable sources and bio-fuels.
- Use of catalytic converters in vehicles.
- Installation of scrubbers in factory chimneys.
- Reduce the use of fuel containing sulphur
- Removal of sulphur from coal before burning
- Adopting policies for sustainable environment.
- International agreement to control pollution.
- Legislation to stop unsustainable practices.