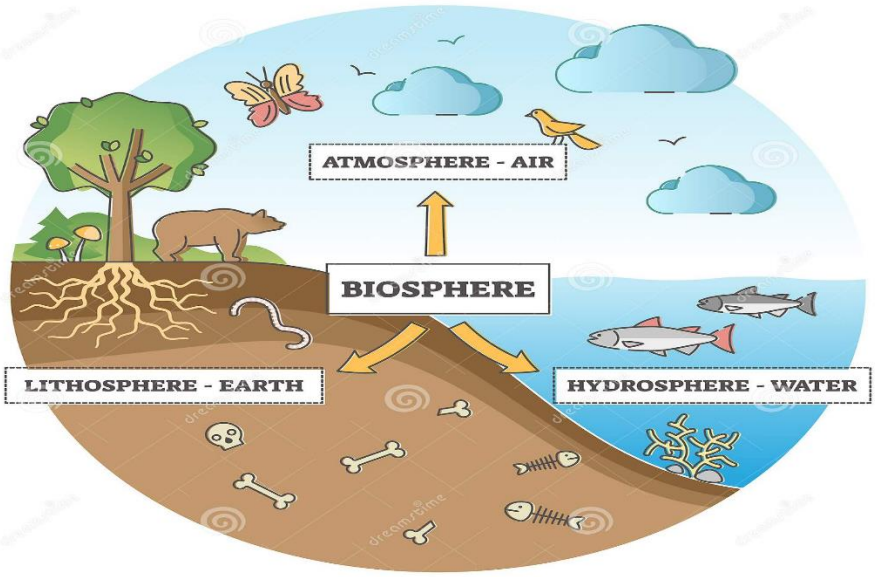
STRATIFICATION AND COMPOSITION OF ATMOSPHERE

Earth is elliptical in shape and has three spheres

The spheres of earth: -

1. The Atmosphere: the gaseous portion (Air)
2. The Lithosphere: the solid portion (Earth)
3. The Hydrosphere: the liquid portion (Water)



ATMOSPHERE:

The atmosphere is the colourless, odourless and tasteless physical mixture of gasses which surrounds earth on all sides. It is mobile, compressible and expandable. It contains huge number of solid and liquid particles called aerosol. Some gases are permanent atmospheric constituents in fixed proportions to the total gas volume. Others very from place and time to time.

The lower atmosphere where the chemical composition of gas is uniform is called homosphere. At higher levels the chemical composition of air changes considerably and known as heterosphere.

USES OF ATMOSPHERE

1. Provides oxygen which is useful for respiration in crops.

2. Provides carbon-dioxide to build biomass in photosynthesis.

3. Provides nitrogen which is essential for plant growth.

4. Acts as a medium for transportation of pollen.

5. Protects crops plants on earth from harmful U.V rays.

6. Maintains warmth to plant life.

7. Provides rain to field crops as it is a source of water vapour, cloud, etc.

COMPOSITION OF ATMOSPHERE

The following all the different gases that are present in percentage by volume approximately.

Nitrogen (N_2) = 78.08 Oxygen (O_2) = 20.95

Argon (Ar) = 0.93 CO_2 = 0.03

Neon (Ne) = 0.0018 Helium (He) = 0.0005

Ozone (O_3) = 0.00004 Hydrogen (H_2) = 0.00006

Methane (CH_4) = 0.00017

VERTICAL LAYERS OF ATMOSPHERE BASED ON TEMPERATURE

On the basis of vertical temperature variation, the atmosphere is divided into different spheres or layers.

A. TROPOSPHERE

1. The word “Trop” means mixing or turbulence and “sphere” means region.

2. The average height of this lower most layer of the atmosphere is about 14 km above the men sea level; at the equator it is 16 km and 7-8 km at the poles.

3. Under normal conditions the height of the troposphere changes from place to place and season to season.

4. Various types of clouds, thunderstorms, cyclone and anticyclones occur in this sphere because of the concentration of almost all the water vapour and aerosols in it. So, this layer is called as “seat of weather phenomena”.

5. The wind velocities increase with height and attain the maximum at the top of this layer.

6. Another striking feature of the troposphere is that there is a decrease of temperature with increasing elevation at a mean lapse rate of about 6.5°C per km.

So, Lapse rate, The decrease in air temperature with height is known as the normal / environmental lapse rate and it is 6.5°C/km.

7. Most of the radiation received from the sun is absorbed by the earth’s surface. So, the troposphere is heated from below.

8. In this layer, about 75 per cent of total gases and most of the moisture and dust particles present.

9. At the top of the troposphere there is a shallow layer separating it from the stratosphere which is known as the “Tropopasue “.

10. The tropospause layer is thin and its height changes according to the latitudes and it is a transitional zone and distinctly characterized by no major movement of air.

B. STRATOSPHERE

1. This layer exists above the tropopause (around 20 km onwards) and extends to altitudes of about 50-55 km.

2. This layer is called as "Seat of photochemical reactions"

3. The temperature remains practically constant at around 20 km and is characterized as isothermal because air is thin, clear, cold and dry near tropopause.

So, isothermal process is a thermodynamic process in which the temperature of a system remains constant.

4. The temperature of this layer increases with height and also depends upon the troposphere because the troposphere is higher at the equator than at the poles.

5. In the upper parts of the stratosphere the temperatures are almost as high as those near the earth's surface, which is due to the fact that the ultra-violet radiation from the sun is absorbed by ozone in this region.

6. There is also persistence of circulation patterns and high wind speeds.

7. The upper boundary of the stratosphere is called the stratopause.

C. MESOSPHERE/OZONOSPHERE

1. There is a maximum concentration of ozone between 30 and 60 km above the surface of the earth and this layer is known at the ozonosphere.

2. A property of the ozone is that it absorbs UV rays. Had there been no layer of the ozone in the atmosphere, the ultraviolet rays might have reached the surface of the earth and no life can exist.

3. Temperature of the ozonosphere is high (warm) due to selective absorption of U.V radiation by ozone.

4. Because of the preponderance of chemical process this sphere is called as the "chemosphere"

5. In this layer the temperature increases with height at the rate of 5°C per km.

6. According to some leading scientists the ionosphere is supposed to start at a height of 80 km above the earth's surface. In this layer the temperature decreases with height. The upper boundary of this layer is called the "Mesospause".

7. Mesosphere is the coldest region in the atmosphere with temperature reaching the lowest value of nearly -95°C at the mesopause (80km)

D. THERMOSPHERE (IONOSPHERE)

1. According to some leading scientists the ionosphere is supposed to start at a height of 80 km above the earth's surface. In this layer the temperature decreases with height. The lower boundary of this layer is called the "Mesospause".

2. The thermosphere layer lies beyond the ozonosphere (mesosphere) at a height of about 80 km above the earth's surface and extends up to 400 km.

3. The atmosphere in the ionosphere is partly ionised enriched ion zones exist in the form of distinct ionised layers. So, this layer is called as the ionosphere.

E. EXOSPHERE

1. The outer most layer of the earth's atmosphere is named as the exosphere and this layer lies between 400 and 1000 km.

2. At such a greater height the density of atoms in the atmosphere is extremely low.
3. Hydrogen and Helium gases predominate in this outer most region.

4. At an altitude of about 500 to 600 km the density of the atmosphere becomes so low that collisions between the natural particles become extremely rare.