

Atmosphere

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Q. 1. Explain the composition of the atmosphere.

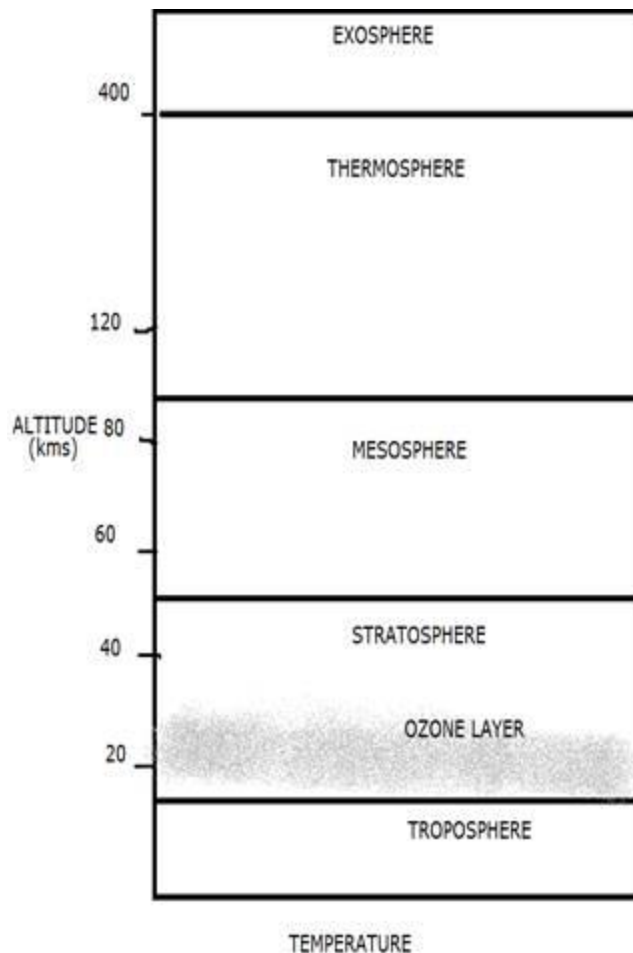
Answer : The earth's atmosphere is the mixture of gases and other particles that surrounds the earth. It is the air that we are surrounded by. It is the layer of the blanket that surrounds the earth and ensures the operation of gravity. The atmosphere consists of a combination of different gases, water vapour, and other particles.

Nitrogen has the highest dominance in the composition of gases in the atmosphere. It accounts for 78% of the atmospheric gases. Next comes oxygen that accounts for just 21% of the atmosphere. Apart from this, other gases like argon, neon, carbon dioxide, methane, ozone, and other gases make up a total of 0.03% of gases. Apart from these, the atmosphere also consists of water vapour. It can also be considered as a gas that accounts for 0.4% of the total volume of the atmosphere.

Other than the combination of gases, the atmosphere also consists of other dust particles known as particulate matter. They can be the results of a natural process like storms or forest fires and human interferences like the burning of fossil fuels. They also determine the life in the ecosystem. They are responsible for the colourful sunsets and sunrises and the drizzling of hailstones during rainfall. They can have many negative consequences like disruption of photosynthesis due to the excessive composition of the particulate matter.

Q. 2. Discuss the structure of the atmosphere with a diagram.

Answer : The earth's atmosphere is the mixture of gases and other particles that surrounds the earth. It is the air that we are surrounded by. It is the layer of the blanket that surrounds the earth and ensures the operation of gravity. The atmosphere consists of a combination of different gases, water vapour, and other particles.



The atmosphere consists of many layers. On the basis of chemical composition and the presence of different components, the atmosphere is divided into two basic layers that are, homosphere and heterosphere.

- **Homosphere** - This layer extends up to an altitude of 90 km. This layer is characterized by a homogeneous and uniform composition of gases and particles such as nitrogen, oxygen, argon and carbon dioxide. It can be divided into three layers. They are:

- **Troposphere**- It is the lowest layer of the atmosphere extending to an average altitude of 13 km. it has an average height of 8 km near the pole s and 1 km at the equator. It has the majority of the composition of gases, water vapour, and particulate matter. All natural phenomenon like rainfall, condensation, evaporation and other weather phenomenon occur in this range. Passenger aircraft and hot air balloons travel through this range.

- **Stratosphere**- This layer extends to an altitude of 50 km. The initial layer of stratosphere contains the ozone layer that protects the earth from the harmful ultraviolet radiations. Lightning and cloud formation occurs in the lower range of this layer. The

upper crust of stratosphere is free from clouds making it convenient for the flying of jet and fighter aircraft and weather balloons.

- **Mesosphere**- This layer ends at an altitude of 80 km. Space crafts are launched into this zone. Meteor burning and its combustion occur in this range of the atmosphere. Polar lights and meteor shower occur in this range.

- Heterosphere:

This layer extends above the 90 km of the atmosphere. It has a heterogeneous combination of gaseous matter and particles thus making it the heterosphere. It can be divided into two layers:

- **Thermosphere**- It extends up to 400 km. The temperature rises in the thermosphere with the altitude increase. The radio waves transmitted from the earth is reflected back through this sphere. Hence it is also known ionosphere. The range comprises of polar lights and meteor shower. Radio waves, artificial satellites, and rockets are found in the region.

- **Exosphere**- The remaining range of the atmosphere comes under the exosphere. Polar lights are found in the range. Artificial satellites and space stations are found.

Q. 3. Differentiate weather and climate.

Answer :

Basis	Weather	Climate
Meaning	Weather is the atmospheric condition which changes daily. It can even change within a day.	Climate indicates the standard pattern of weather condition of a particular area or place over a long period.
Duration	It is a short period analysis that changes daily or even within a day.	It changes over a long period. It can be months or years.
Study	It needs a minute by minute study of atmosphere in an area over a short period (climatology).	It is an average of the weather over a long period (meteorology).
Affecting components	Temperature, humidity, air, pressure, cloudiness, precipitation etc.,	Temperature, wind pattern, ocean surface temperature and precipitation.
Variability	It varies constantly.	It variability is relatively lesser

Q. 4. Compare and contrast convectional and orographic rainfall.

Answer :

Basis	Conventional rainfall	Orographic rainfall
Occurrence	Occurs when moist air over the heated ground becomes warmer than the surroundings. The hot air rises expand, cools and condenses forming rain.	Occurs when moist windblown over the sea is forced to rise over a mountain or other elevation in its path.
Required conditions	It generally occurs in the tropics where temperature and evaporation are high.	It generally occurs in the upwind sides of the mountain ranges.
Extent of rain	It generally results in heavy rainfall accompanied by thunder and lightning.	The leeward side of the mountain gets very less rainfall because of the lack of moisture in the clouds.
Locations	Equatorial regions and the interiors of continents experience rainfall.	High-pressure belt to the sub-polar low-pressure mountainous regions experience the rainfall
Examples	Countries near the equator	Western Ghats

Q. 5. Describe the distribution of world rainfall.

Answer : The most common form of precipitation is rainfall. But the distribution of rainfall is not uniform throughout the world. Some areas receive heavy rainfall compared to others. It can be summarised as follows:

- The eastern coast between 10° N and 30° N and 10° S and 30° S of the equator receives more rainfall because of the operation of trade winds. Compared to the eastern coast the western coast receives lesser rainfall.
- The western coast between 40° N and 60° N and 40° S and 60° S of the equator receives more rainfall because of the operation of westerlies. Compared to the west coast the eastern coast receives lesser rainfall.
- The low-pressure areas around the equator receive more rainfall than the subsequent high-pressure areas.
- Oceans receive more rainfall compared to the continents.

Q. 6. How do the climatic changes influence human life?

Answer : The climate has a very important role in the human day to day activities. This affects many factors of human life in many ways. Some of them are:

- Human settlement

An extreme climate such very hot and very cold makes uncomfortable for the human habitation. Hilly regions make harsh climate for transportation and network facility which will make very difficult to make human habitation in such places.

- Global warming

Extreme climatic changes will lead to worse condition towards global warming. Increase in global warming leads to an increase in diseases due to the rise in gases such as CFCs and other harmful gases.

- Increase in skin diseases

When there is an increase in the adverse gases which makes the depletion the ozone layer, increases the temperature in the earth and also raise the humidity. This makes an increase in diseases such as skin rashes, etc.

Q. 7. Explain relative humidity?

Answer : Humidity is the amount of availability of water vapour in the atmosphere. Humidity is expressed through the concept of relative humidity. The relative humidity is the ratio between the two things:

- The maximum water vapour that the air can hold at a given temperature and pressure, and
- The actual amount of water vapour it holds at any given time.

Relative humidity increases with a decrease of temperature or addition of water vapour. Relative humidity decreases with an increase in temperatures and decrease of water vapour. The critical temperature at which saturation level reached is called dew point. If the atmosphere has 100% relative humidity, it is known as the saturation level. When the relative humidity exceeds 100%, the excess of water vapour present in the atmosphere gets condensed as minute droplets of water.

Q. 8. Why does the amount of water vapour decrease rapidly with altitude?

Answer : Altitude and height play an important role in vaporization of the water as water vapours are heavy and at higher altitude, the air density decreases. Thus, it becomes difficult for heavier particles that make water vapours to get vaporized. Hence, the rate of water vaporization decreases with increase in altitude.

Q. 9. What is Coriolis force? And explain its effects.

Answer : The winds move in a straight line from north to south, or south to north from the temperate the tropic zone. But actually, the winds move slightly to the right (towards east) in the northern hemisphere and to the left (towards the west) in the southern hemisphere. This is because of the impact of Earth's rotation on its own axis. This effect is called the Coriolis Effect, having '0' effect near the equator and maximum effect near the poles.

Thus, the atmosphere is always in circulation all around the world. The winds play a very important role in the weather and climate patterns around the world. This wind makes this Coriolis effects. The main effects of Coriolis force are:

- The most important effect of the Coriolis force in terms of geography is the deflection of winds and currents in the ocean. It also has a considerable effect on man-made items like planes and missiles. In terms of affecting the wind, as air rises off of the earth's surface, its speed over the surface increases because there's less drag as the air no longer has to move diagonally the earth's many types of landforms. Because the Coriolis force increases with an item's growing speed, it significantly deflects air flows and as a result the wind.
- The Coriolis force also affects the movement of the ocean's currents. Many of the ocean's largest currents circulate around warm, high-pressure areas called gyres. Though the circulation is not as important as that in the air, the deflection caused by the Coriolis Effect is what creates the spiraling pattern in these gyres.

Q. 10. Identify the given local winds in the world map?

- a. Chinook
- b. Loo
- c. Simoon
- d. Yoma
- e. Norwester
- f. Mistral
- g. Puna
- h. Pampero

Answer : a. Chinook- Southern part of Colorado to British Columbia in Canada (North America)

b. Loo- Northern India (Asia)

c. Simoon- Arabian desert (Western Asia)

d. Yoma- Japan (Asia)

e. Norwester- Northern New Zealand (Australia)

f. Mistral- Spain and France (Europe)

g. Puna- Peru (South America)

h. Pampero- Brazil, Argentina, Uruguay, Paraguay and Bolivia (South America)

