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Subject : Environmental Science.

=> Q. No. 1 : What is the greenhouse effect? What is the mechanism of the greenhouse effect? Which major air pollutants are responsible for causing global warming? Why is Pakistan considered more vulnerable to the effects of climate change when its contribution is less than 1% in total global GHG emissions?

(1) => What is the greenhouse effect:-

The greenhouse effect is a process that occurs when gases in Earth's atmosphere trap the sun's heat. This process makes Earth much warmer than it would be without an atmosphere.

Definition

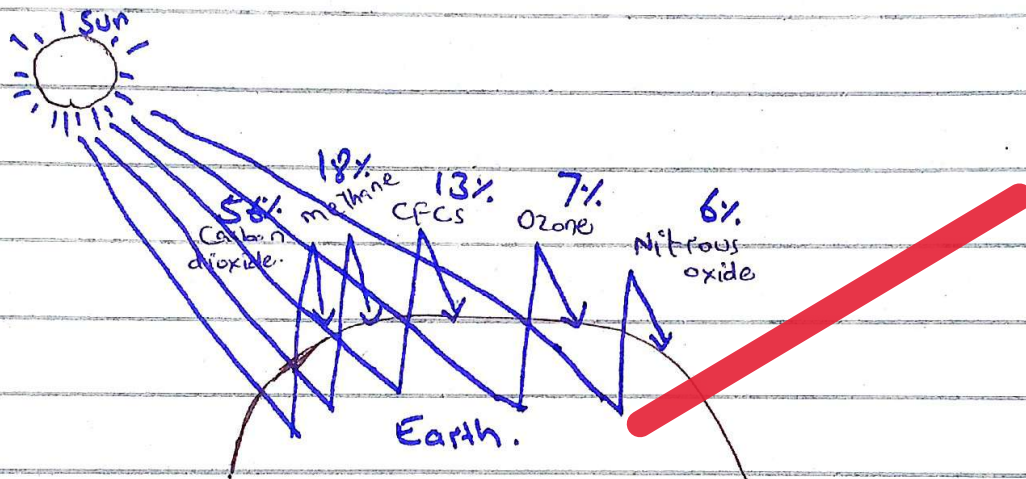
During the day the sun heats up the earth's atmosphere. At night, when the earth cools down the heat is radiated back into the atmosphere. During this process, the heat is absorbed by the greenhouse gases in the earth's atmosphere. This is what makes the surface of the earth warmer, that makes that makes

By?

the survival of living beings on earth possible.

(2) $\Rightarrow$ Greenhouse Gases:-

"Greenhouse gases are the gases that absorb the infrared radiations and create a greenhouse effect. For example carbondioxide and chlorofluorocarbons.



(The diagram shows Greenhouse Gases such as carbon dioxide are the primary cause of the Greenhouse effect)

(3) $\Rightarrow$ What is the mechanism of Greenhouse effect?

The Greenhouse effect is a natural process that occurs when certain gases in the Earth's atmosphere, such as carbon dioxide, methane, and water vapor,

trap heat from the sun, keeping the planet warm enough to support life.

→ Step 1. Solar Radiation:-

The sun emits solar radiation, which enters the Earth's atmosphere. This radiation is essential for life on Earth. Solar radiation includes visible light and ultraviolet radiation. The Earth's atmosphere filters out some of the UV radiation. The remaining radiation reaches the Earth's surface.

→ Step 2. Absorption and Reflection:-

The Earth's surface absorbs some of the solar radiation, while some is reflected back into the atmosphere. The absorbed radiation warms the surface. The reflected radiation is either absorbed by the atmosphere or escape into space. This process determines the Earth's energy balance.

⇒ Step 3. Infrared Radiation:-

The absorbed radiation is converted into infrared radiation, which is emitted

back into the atmosphere. Infrared radiation is a type of heat energy. This process occurs naturally, as the Earth's surface cools. Greenhouse gases play a crucial role in trapping infrared radiation.

⇒ Step 4: Greenhouse Gases:-

Greenhouse gases, such as CO_2 and CH_4 , absorb some of the infrared radiation, trapping heat in the atmosphere. These gases occur naturally in the atmosphere. Human activities have increased their concentration, enhancing greenhouse effect.

⇒ Step 5:- Heat Retention:-

The trapped heat warms the Earth's surface, maintaining a habitable temperature. This natural process supports life on Earth. However, excessive heat retention due to human activities leads to global warming.

(S)

⇒ Human Impact:-

Human activities, such as burning fossil

Fuels and deforestation, have increased the concentration of greenhouse gases in the atmosphere, enhancing the natural greenhouse effect and leading to global warming.

⇒ Which major air pollutants are responsible for causing global warming?

The major air pollutants responsible for causing global warming are:

⇒

1. Carbon Dioxide (CO_2), CO_2 is released through human activities like burning fossil fuels (coal, oil, gas), deforestation, and land-use changes. It is a potent greenhouse gas that contributes significantly to global warming.

2. Methane (CH_4), Methane is released through agriculture (especially rice and cattle farming), natural gas production and transport, and landfills. It is a highly potent greenhouse gas that with a significant impact on global warming.

3. Nitrous Oxide (N_2O):-

N_2O is released through agriculture, industrial processes, and fossil fuel combustion. It's a long-lived greenhouse gas that contributes to global warming and ozone depletion.

4. Fluorinated Gases:-

Fluorinated gases are released through air conditioning, refrigeration, and electrical equipment. They are potent greenhouse gases with a long atmosphere lifetime, contributing significantly to global warming.

5. Black Carbon:- Black carbon is released through fossil fuel combustion, biomass burning, and diesel engines. It is a short-lived climate pollutant that contributes to global warming and has negative health impacts.

6. Ozone:- Ozone is created in the troposphere through reactions involving other pollutants. It is a greenhouse gas that contributes to global warming and has negative impacts on human health and crops.

⇒ Why is Pakistan considered more unbearable to the effects of climate change when its contribution is less than 1% in total global GHG emissions?

Pakistan vulnerability to climate change is not directly related to its contribution to global ~~greenhouse~~ greenhouse gas emissions. Pakistan is disproportionately affected by climate change, despite its low GHG emissions, due to several factors including its vulnerability to extreme weather events, limited resources for adaptation.

⇒ 1. Geographic Location:-

1.

Mountainous terrain:- Pakistan's mountainous regions, such as the Himalayas and Karakoram, are particularly vulnerable to climate change impacts like glacial melting and increased risk of natural disasters.

2.

Coastal areas:- Pakistan's coastline along the Arabian Sea is exposed to sea-level rise, coastal erosion, and saltwater intrusion.

2. Socio-Economic Factors:-

1.

Limited resources:- Pakistan's economic resources are limited, making it challenging to invest in climate-resilient infrastructure to adapt to climate change, and respond to climate-related disasters.

2.

Agricultural dependence:- Agriculture is a significant sector in Pakistan's economy, and climate change impacts on agriculture can have far-reaching consequences for food security and economic stability.

3. Climate Change Impacts:-

1.

'Increased frequency of extreme weather events:-

Pakistan is experiencing more frequent and intense heatwaves, floods, and droughts, which can have devastating impacts on infrastructure, agriculture and human health.

2. Water Scarcity:-

Changes in precipitation patterns and increased evaporation due to warmer temperatures are exacerbating water scarcity in Pakistan, affecting agriculture, industry, and human consumption.

Concise conclusion

Incorporate diagrams

=> Conclusion:-

The greenhouse effect is a natural process that occurs when certain gases in the Earth's atmosphere, such as carbon dioxide, methane, and water vapor, trap heat from the Sun, keeping the planet warm enough to support life. Human activities, such as burning fossil fuels and deforestation, have increased the concentration of these gases, leading to global warming. Pakistan is considered more vulnerable to the effects of climate change due to its geographic location, socio-economic factors, and limited institutional capacity. Despite contributing less than 1% to global GHG emissions, Pakistan is taking steps to address climate change, enhancing climate resilience.