

CSS 2016 Q

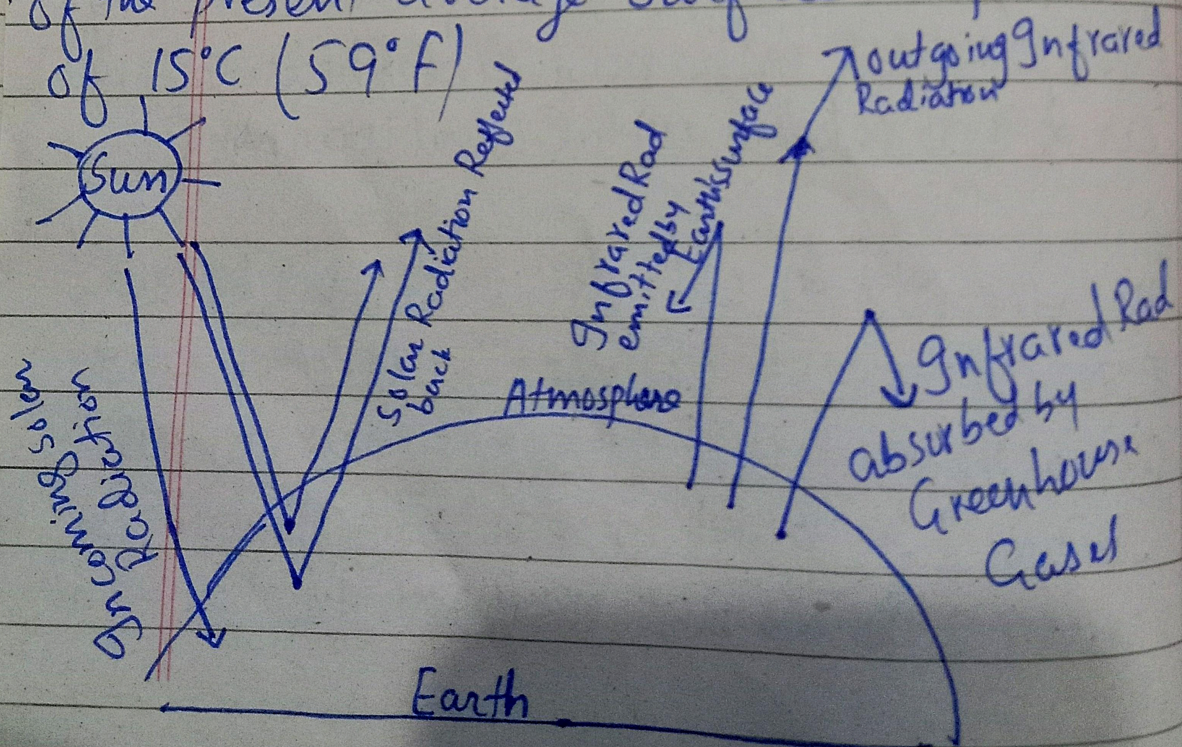
Comment, Greenhouse effect is a blessing. Also discuss enhanced Greenhouse effect and its relation with Global Warming.

Ans. Greenhouse effect is a blessing, because, in the absence of greenhouse effect, the earth's atmosphere would not be warm enough to make life possible on earth. The greenhouse produces the warmth necessary for survival.

of life on earth. Without greenhouse effect, the earth would be very cold, hence it is a blessing

PROCESS OF GREENHOUSE EFFECT

When sunlight reaches Earth's surface, it can either be reflected back into space or absorbed by Earth. Once absorbed, the planet releases some of the energy back into the atmosphere as heat (Infrared Radiation). Greenhouse gases (GHGs) like Water vapours (H_2O), Carbon dioxide (CO_2), and Methane (CH_4) absorb energy preventing the loss of heat to space. In this way, GHGs acts like a blanket, making earth warmer than it would otherwise be. This process is Greenhouse effect. Without GHGs, heat energy absorbed and reflected from Earth's surface would easily radiate back out to space, leaving the planet with an inhospitable temperature of close to $-19^{\circ}C$ ($2^{\circ}F$) instead of the present average surface temperature of $15^{\circ}C$ ($59^{\circ}F$)



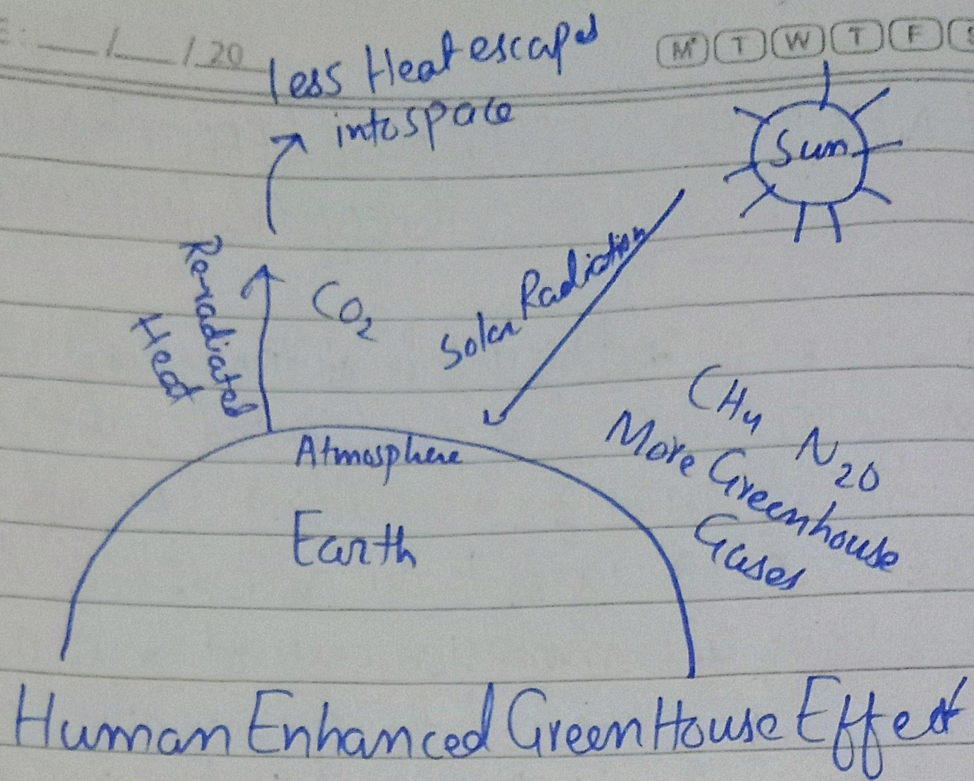
ENHANCED GREENHOUSE EFFECT AND GLOBAL WARMING

Since the Industrial Revolution around 1750, human activities has contributed substantially to climate change by adding CO_2 and other heat-trapping gases to the atmosphere. These greenhouse gas emission beyond the normal range have increased the greenhouse effect and caused Earth's surface temperature to rise. This is called Enhanced Greenhouse effect.

This enhanced Greenhouse effect is the major cause of Global Warming as increased level of Carbon dioxide and other heat absorbing gases ~~are~~ in atmosphere due to man's activities has significantly increased the Earth's temperature. This change from natural greenhouse effect to enhanced Greenhouse effect has increased Earth's temperature resulting in Global Warming.

As per ~~IPCC~~ IPCC Report:

"About 1.2°C temperature has increased from 1850 till 2022".



SIGNIFICANT FACTORS CONTRIBUTING TO ENHANCED GREENHOUSE EFFECT

1. Deforestation to reduce and store CO_2
- 2) Production of CO_2 from burning of fossil fuels
- 3) Release of CO_2 from cement production
- 4) Release of nitrogen oxide from the use of high nitrogen fertilizers
5. Intensive production of livestock, which produce methane

CSS 2017

What do you mean by Ozone depletion and how we can prevent its depletion?

OZONE LAYER

Ozone, a gas found in atmosphere ~~intra~~ can be both beneficial or detrimental depending on where it is located. The ozone layer is a region in earth's stratosphere that contains high concentration of ozone and protect the earth from harmful ^{ultraviolet} radiations of the Sun. The ozone layer was discovered in 1913 by the French Physicists Charles Fabry and Henri Buisson. It can absorb 97% to 99% of harmful ∇ UV radiations from Sun. It's a belt of naturally occurring ozone gas that sits 9.3 to 18.6 (15 to 30 km) above Earth and serves as shield against UV radiations.

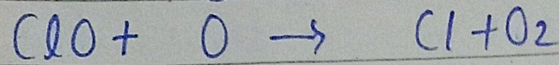
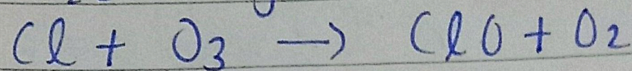
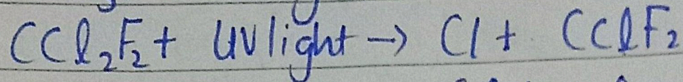
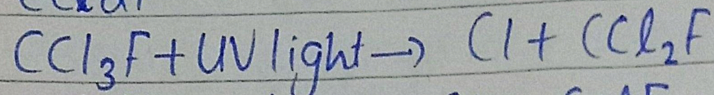
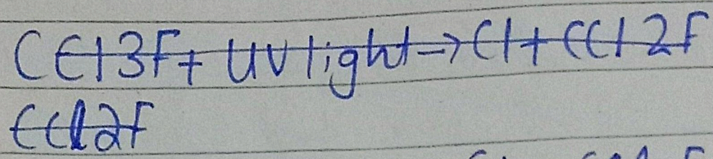
OZONE LAYER DEPLETION

Ozone layer depletion is the thinning of the ozone layer present in stratosphere layer of atmosphere.

CAUSES OF OZONE LAYER DEPLETION

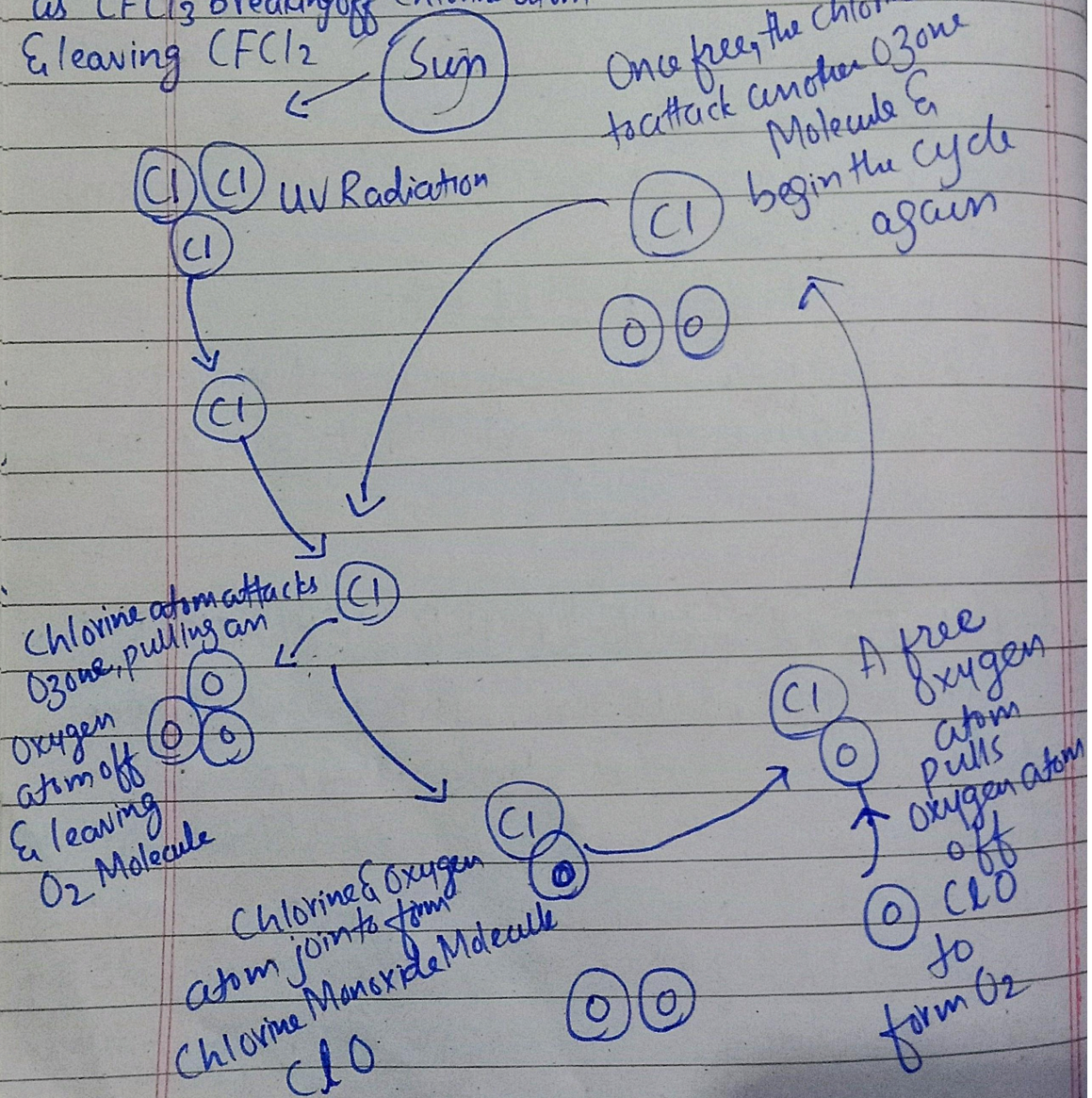
This happens when Chlorine and Bromine atoms come in contact with Ozone and destroy the ozone molecules. One chlorine atom can destroy 10,000 molecules of ozone. Chlorofluorocarbons themselves do not destroy ozone molecules but they decay Chlorine & bromine on exposure to high UV rays, which

Contributes to ozone layer depletion. Such compounds are called Ozone Depleting Substances (ODS)



UV light hits CFC molecule such as $CFCl_3$ breaking off Chlorine atom & leaving $CFCl_2$

Once free, the chlorine atom is off to attack another Ozone Molecule & begin the cycle again



Ozone Depletion

Ozone Depleting Substances

Sources

- | | |
|---|--|
| 1. Chlorofluorocarbons (CFCs) → Accounts for 80% of Stratospheric Ozone Depletion | Refrigerators, air conditioners, solvents, dry cleaning agents |
| 2. Halons | Fire extinguishers |
| 3. Carbon Tetrachloride | Fire extinguishers, solvents. |
| 4. Methyl chloroform | Adhesives, aerosols |
| 5. Hydrofluorocarbons (HFCs) | Fire extinguishers, air conditioners, solvent |

SOLUTION TO OZONE LAYER DEPLETION

The depletion of ozone layer is a serious issue and various programs have been launched by the government of various countries to prevent it such as:

Montreal Protocol: proposed in 1987 to stop the use, production, and import of ozone depleting substances and minimize their concentrations in the atmosphere.

→ The London Agreement June 1990

→ Copenhagen Treaty, Nov 1992

PROPOSED STEPS AT INDIVIDUAL LEVEL

1. Reduce the use of ODS E.g = Hydrofluoroolefin (HFO) refrigerators should be used

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as they have lowest Global Warming potential.

- 2) Minimize the use of vehicles.
- 3) Use eco-friendly cleaning products.
- 4) Use of Nitrous Oxide should be banned.