

Environmental Pollution

Atmospheric Pollution

Water Pollution

Soil Pollution

Tropospheric Pollution

Stratospheric pollution

Gaseous pollutants

eg: $\text{SO}_x, \text{NO}_x, \text{CO}_x, \text{H}_2\text{S}, \text{C}_x\text{H}_y$

Green house effect:

Trapping of infrared radiation by green house gas will lead to heating of earth atmosphere

Green house gases:

$\text{CO}_2, \text{CH}_4, \text{O}_3, \text{CFC}$, Nitrous oxide and water vapour.

Global warming:

Increase in concentration of green house, will lead to rise in global temperature, which again leads to melting of polar ice caps & flooding in low areas.

Acid Rain:

Normal rain has pH = 5.6

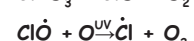
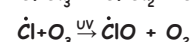
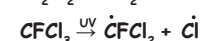
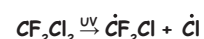
When pH of rainwater is less than 5.6, it is acid rain. It is due to the presence of $\text{HNO}_3, \text{H}_2\text{SO}_4$

Effect:

1. Harmful for agriculture
 2. Damages aquatic ecosystem
 3. Respiratory Illness
 4. Damage building made up of stone, marble, metal.
- eg: Tajmahal and Acid Rain (discolouration and lustreless)

Ozone layer depletion

Main reason for depletion is CFC's (AC, Fridge)



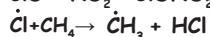
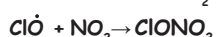
1 molecule of CFC's destroys 1000 ozone molecule.

Ozone hole

In September and October each year ozone hole develops over Antarctica

• In summer

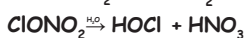
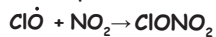
$\dot{\text{ClO}}$ reacts with NO_2 & CH_4 to form chlorine sink



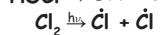
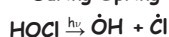
This prevents ozone layer depletion.

• In winter

Special type of clouds are formed called polar stratospheric clouds which contains $\text{HNO}_3, 3\text{H}_2\text{O}$ or ice



• During Spring



The chlorine radicals thus formed initiate the chain reaction for ozone depletion.

Biological Oxygen Demand (B.O.D)

oxygen required by bacteria to break down organic matter in a certain volume of water.

Pure water- BOD < 5 ppm

Highly polluted water- BOD > 17ppm

Eutrophication

Process in which nutrient enriched water bodies support a dense plant population, which kills animal life by depriving it of oxygen and results in subsequent loss of biodiversity is known as Eutrophication.

International standard of drinking water

Fluoride: 1ppm. Above 2ppm:- brown molting of teeth, over 10ppm :bones and teeth damage.

Lead: 50ppb. >50ppb- damages kidney, liver, reproductive system.

Nitrate: 50ppm. >50ppm- blue baby syndrome(methemoglobinemia)

Sulphate: 500ppm. >500ppm: laxative effect

Green Chemistry

Dry cleaning of clothes:

Earlier used: $\text{Cl}_2\text{C}=\text{CCl}_2$ (carcinogenic)

Replaced by: liquid CO_2

Presently used: H_2O_2

Bleaching of paper:

Earlier used: Cl_2 gas

Presently used: H_2O_2

Ethanal preparation

Done in a harmful method previously

Presently used: $\text{Pd/Cu/H}_2\text{O}$



Particulate pollutants

Smog:

Smog = smoke + fog

Classical smog or London smog	Photochemical smog/ Los Angeles smog
Cool and humid climate	Warm and dry climate
Contains oxides of sulphur	Contains oxides of Nitrogen
Contains primary pollutant	Contains secondary pollutant
Reducing nature/ Reducing smog	Oxidising nature/ oxidising smog

Formation of Photochemical Smog

Both NO_2 and O_3 are strong oxidising agent and reacts with unburnt hydrocarbon to produce formaldehyde, acrolein, PAN (peroxy acetyl nitrate)

ENVIRONMENTAL CHEMISTRY

?

Which one of the following is not a common component of photochemical smog ?

- (a) Ozone (b) Acrolein
(c) Peroxyacetyl nitrate (d) Chlorofluorocarbons

?

Which oxide of nitrogen is not a common pollutant introduced into the atmosphere both due to natural and human activity?

- (a) N_2O_5 (b) NO_2
(c) N_2O (d) NO

?

Among the following, the one that is not a green house gas is:

- (a) sulphur dioxide (b) nitrous oxide
(c) methane (d) ozone