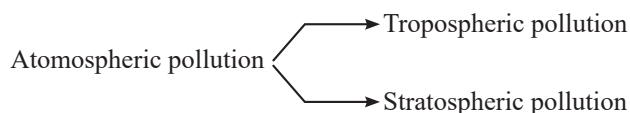


**Pollutant**

Substance which cause pollution is known as pollutant.



Tropospheric pollution occurs due to presence of undesirable solid or gaseous particles in air.

**Gaseous Pollutant**

**SO<sub>2</sub>:** Cause respiratory diseases of asthma, bronchitis emphysema etc & irritate to eyes.

**NO<sub>2</sub>:** Form by fossil fuel burn, Damage lungs.

Higher concentration of NO<sub>2</sub> damage the leaves of plant and retard rate of photosynthesis.

**Hydrocarbon:** Form by incomplete combustion of fuel of automobile, Carcinogenic.

**Oxide of Carbon**

**CO:** Blocks the delivery of oxygen to organs and tissues.

Carboxy hemoglobin is 300 times more stable than oxy hemoglobin about 3-4% of carboxy hemoglobin the oxygen carrying capacity is highly reduced.

**CO<sub>2</sub>:** Main source is respiration, burning of fossil fuels, decomposition of lime stone in cement industry.

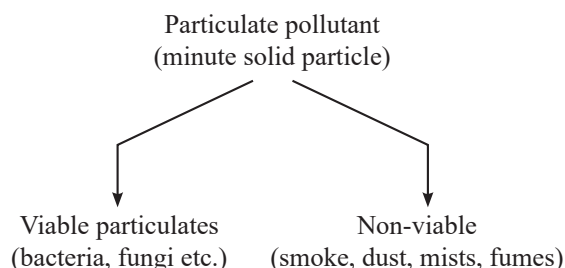
Increase of CO<sub>2</sub> cause global warming.

**Global Warming and Green House Effect**

Some of the gases such as CO<sub>2</sub>, CH<sub>4</sub>, O<sub>3</sub>, CFC(s) and water vapour trap the heat and does not radiate back to the atmosphere. This cause global warming.

**Acid Rain**

- ❖ Normally the pH of rain water is 5.6 due to the reaction between rain water and CO<sub>2</sub>.
- ❖ When pH less than 5.6 then it is called acid rain.
- ❖ **Source:** Burning of fuel (contain N & S) form SO<sub>2</sub> & NO<sub>2</sub>.
- ❖ Harmful to agriculture, tree and plants.
- ❖ Taj Mahal is affected by acid rain.

**Particulate Pollutant**

**Smoke:** Solid/mixture of solid and liquid particles formed from burning of fossil fuel, oil smoke etc.

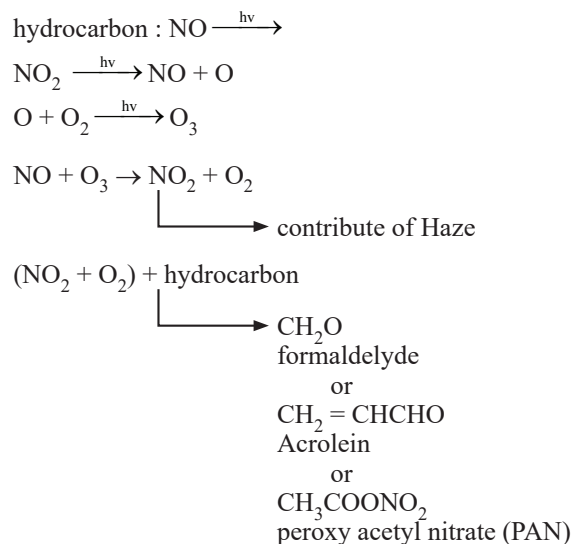
**Dust:** Fine solid particle over 1µm diameter, produced by crushing, grinding etc.

**Mist:** Mist are produced by particle of spray liquid condensation of vapours, eg. herbicides, mist etc.

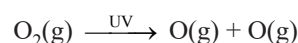
**Note:** Pb is major air pollutant.

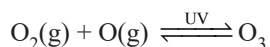
**Smog (Smoke + Fog)**

**Classical smog:** (Smoke + fog + CO<sub>2</sub>) also called reducing smog

**Photochemical smog:****Stratospheric Pollution**

Formation & decomposition of ozone.



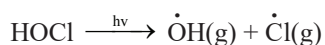
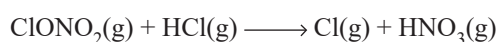
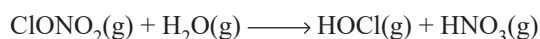
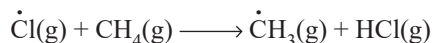
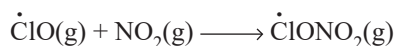
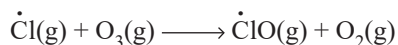
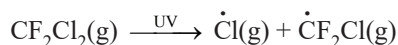


Ozone is thermodynamically unstable and thus dynamic equilibrium exist between production.

### Ozone Hole

The main reason of ozone layer depletion the release of CFC(s) (also called as freons).

### Reaction of Ozone Depletion



## Water pollution

### Cause of Water Pollution

- (i) Pathogen
- (ii) Organic waste
- (iii) Organic waster

**BOD:** The amount of oxygen required by bacteria to break down the organic matter present in a certain volume of a sample of water, is called Biochemical **Oxygen Demand**

**(BOD).** Clean water would have BOD value of less than 5 ppm where as highly polluted water could have a BOD value of 17 ppm or more.

**Fluoride:** Soluble fluoride is often added to drinking water to bring its concentration upto 1 ppm or  $1 \text{ mg dm}^{-3}$ .

However,  $\text{F}^-$  ion concentration above 2 ppm causes brown mottling of teeth. At the same time, excess fluoride (over 10 ppm) causes harmful effect to bones and teeth.

**Lead:** The prescribed upper limit concentration of lead in drinking water is about 50 ppm. Lead can damage kidney, liver, reproductive system etc.

**Sulphate:** Excessive sulphate ( $>500$  ppm) in drinking water causes laxative effect, otherwise at moderate levels it is harmless.

**Nitrate:** The maximum limit of nitrate in drinking water is 50 ppm. Excess nitrate in drinking water can cause disease such as methemoglobinemia ('blue baby' syndrome).

**Table:** Maximum Prescribed Concentration of Some Metals in Drinking Water

Metal	Maximum concentration (ppm or $\text{mg dm}^{-3}$ )
Fe	0.2
Mn	0.05
Al	0.2
Cu	3.0
Zn	5.0
Cd	0.005