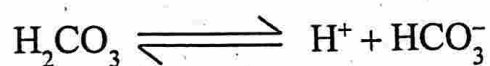


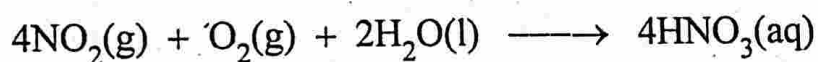
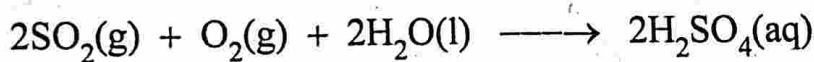
Acid Rain

Rain water has a normal p^H of 5.6 due to the formation of H^+ ions formed by the reaction between atmospheric CO_2 and rain water.



When the pH of rain water falls below 5.6, it is called acid rain

SO_2 and NO_2 present in polluted air are the major contributors to acid rain. Polluted air contains particulates that catalyse their oxidation and they dissolve in water to form acids



Acid rain is harmful to vegetation and aquatic life. It corrodes water pipes and dissolve heavy metals from soil and rocks. Metals such as copper, lead and iron are washed out of the soil (as ions) by acid rain which enter wells and ponds. The historic monument Taj Mahal is being slowly eaten away and the marble is getting discoloured due to acid rain. Marble of Taj Mahal reacts with acid rain resulting in the formation of soluble compounds.

Particulate air pollutants

They are tiny solid or liquid particles suspended in air. Particulate pollutants are divided as viable and non-viable.

- (a) **Viable particulates** are minute living organisms such as bacteria, fungi, mould, algae etc. which are dispersed in the atmosphere. They can produce allergy in human beings and diseases in plants.
- (b) **Non-viable particulates** are mist, fumes, smoke and dust.
 - (i) **Mist**- It may be sprayed liquid or condensed vapour.
 - (ii) **Fumes**- They are generally formed by condensation of vapours during sublimation, boiling etc.
 - (iii) **Smoke**-During the combustion of organic matter, very small particles of soot get dispersed in the air forming smoke.
 - (iv) **Dust**-During the crushing and grinding of materials, very fine solid particles get dispersed in the air forming dust.

On inhalation, larger particles of particulate pollutants (>5 micron) are held in the nasal passage. Smaller particles penetrate into the lungs.

SMOG

Smog is a mixture of smoke and fog. There are two types of smogs.

(i) Classical smog

This is a mixture of smoke, fog and sulphur dioxide. Classical smog occurs in cool humid climate and it causes throat irritation. Classical smog is a reducing smog due to the reducing action of SO_2 .

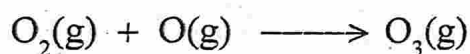
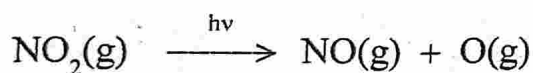
(ii) Photochemical smog

This occurs in warm dry and sunny climate and is the result of the action of sun light on the nitrogen oxides and unsaturated hydrocarbons produced by automobiles and factories. Photochemical smog is an oxidising smog mainly due to the presence of NO_2 , ozone and some other oxidants.

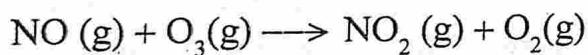
Formation of photochemical smog

At high temperatures present in petrol and diesel engines, some N_2 and O_2 combine to form nitric oxide (NO) which is emitted into the atmosphere along with unburnt hydrocarbons. Nitric

oxide is then oxidised in air to form NO_2 . This NO_2 then absorbs energy from sun light and breaks up into NO and free oxygen atom. The oxygen atoms being reactive combine with oxygen to form ozone.



The ozone so formed reacts readily with NO formed by the photochemical decomposition of nitrogen dioxide.



NO_2 and ozone are strong oxidising agents and they can react with the unburnt hydrocarbons in the polluted air to form substances such as formaldehyde (HCHO), acrolein ($\text{CH}_2 = \text{CH} - \text{CHO}$) and peroxy acetyl nitrate (PAN- $\text{CH}_3 - \text{C} - \text{OONO}_2$).

