TOPIC : ENVIRONMENTAL CHEMISTRY
EXERCISE # 1

SECTION (A)

4. SO_2 and NO_2 after oxidation and reaction with water convert into acids. Acids come down from the atmosphere in the form of H_2SO_4, HNO_3.

6. Carbon monoxide combine to haemoglobin to form carboxy haemoglobin which is about 300 times more stable than oxyhaemoglobin. This stable complex reduces the oxygen carrying capacity of blood. This oxygen difficiency causes headach, weak eyesight nervousness and cardiovascular disorder.

7. When fossil fuel burnt in automobile engines different oxides like NO, NO_2, SO_2, SO_3 are produced. In the presence of moisture these oxides convert in the acids. THese acids comes down from the atmosphere in the form of rain, called acid rain.

S (from fossil fuel) + $O_2 \longrightarrow SO_2$

$SO_2 + O_3 \longrightarrow SO_3 + O_2$

$SO_2 + H_2O_2 \longrightarrow H_2SO_4$

$SO_3 + H_2O \longrightarrow H_2SO_4$

$2NO_2 + H_2O \longrightarrow HNO_3 + HNO_2$

9. Chlorofluoro carbons (CFC's) come in contact with atmospheric gases and enventually reach stratosphere where they cause depletion in ozoen layer.

$CF_2Cl_2(g) \xrightarrow{UV} \dot{C}l(g) + \dot{C}F_2Cl(g)$; $\dot{C}l + O_3 \longrightarrow Cl\dot{O}(g) + O_2(g)$; $Cl\dot{O}(g) \longrightarrow \dot{C}l(g) + O_2(g)$

12. Classical smog contains smoke, fog and sulpher dioxide. It occurs in cool and humid climate.

14. Photochemical somg is occures in warm, dry and sunny climate. It has high concentration of NO, NO_2 and O_3. Their low concentration causes irritation in nose and throat and their high concentration causes headache, chest pain, cough and diffculty in breathing.

15. Green house gases are, CO_2, CH_4, O_3 N_2O and CFCS water vapours.

16. Green chemistry is the way by which the pollution or deterioration to the environment is minimises, nuclear chemistry is not the part of green chemistry.

17. Ultraviolet radiation from sum produces ozone.

$3O_2 \xrightarrow{UV} 2O_3$.

20. During photosynthesis CO_2 is used by plants to make food for their growth.

22. Ozone layer absorbs the UV radition comming from the sum and save the earth.

23. In fuel gases the presence of carbon monoxide is tested for the conformation of complete combustion.

SECTION (B)

1. Pathogens include bacteria and other oganisms that enter water from domestic sewage and animal excreta. PCBs (Polyuchlorinated biphenyls) are used as a fluids in transformers and capacitators. The presence of these PCBs in water causes skin disorder in human. These act as carcinogenic.

2. Clean water has BOD value of less than 5 ppm.

3. Detergents are widely used by human population and these detergents are easily mixed with water through drains and domestic sewage.

4. Drained sewags has BOD value more than 17 ppm while clean water has less than 5 ppm.

5. The process in which nutrient enriched water, 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.

6. CO_2 increase the BOD of water.

7. Micro-organisms oxidise the organic contents of sewage water. Thus sewage water becomes free from organic substances.

8. Phospate is not a herbicide it is a fertiliser.

9. DDT is non-biodegradable pollutant.

10. Domestic waste generally contains organic matter which is biodegradable.

11. The presence of fertilizers and household wastes in water enhances the growth of algae. This algae cover the surface of water and reduces the oxygen concentration in water, thus fishes die in water bodies due to the lack of oxygen gas.

13. Oil slick in sea water disconect the water surface of sea with atmosphere so there become lack of dissolved oxygen gas.

15. Sewage consists food materials which contains phosphate and also agriculture fertilizers contain phosphate which are added in excess in corn fields.

16. In large cities pollution can be controlled by accepting green chemistry.

EXERCISE # 2

PART - I

2. Freons are gases named as chlorofluoro carbons CF_2Cl_2 etc.

3. CFS's are chemically most stable, colourless, adourless and harmless gases.

4. $\dot{C}l$ radical obtained from CFC's reacts with O_3 present in stratosphere.

$CF_2Cl_2(g) \xrightarrow{UV} \dot{C}l(g) + CF_2\dot{C}l(g)$

$\dot{C}l(g) + O_3(g) \longrightarrow Cl\dot{O}(g) + O_2(g)$

$Cl\dot{O}(g) + O(g) \longrightarrow \dot{C}l(g) + O_2(g).$

7. When water is high in nutrients like phosphates enhances the growth of algae, which cover the water surface and reduces the oxygen concentration in water which kills animal life and subsiquent loss of biodiversity is known as eutrofication.

9. Photo chemical smong result from the action of sunlight on unsaturated hydrocarbons and nitrogen oxides produced by automobiles and fuctories.

11. CFC's gets broken by the action of UV radiation comming from the sun and produced $\dot{C}l$ radicals.

$CF_2Cl_2 \;\; CF_2\dot{C}l + \dot{C}l$

20. Sodium chlorate and sodium arsenate are weedicides while DDT and BHC are pesticides.

23. Lead, Mercury and cadmium are toxic and pollutants.

24. Ozone, Methane, Carbon di oxide and water vapours nitrous oxide, CFCs are green house gases.

PART - II

1. All reactions are responsible for the depletion of ozone layer.

2. (4) Its (i.e.,ozone) advantage over chlorine is that it avoids the unpleasant smell and taste of chlorine.
(3) True, $O_2 \xrightarrow{2500^oC} 2O$; $O + O_2 \xrightarrow{quenching} O_3$.

3. (1) The dark blue colour of ozone is due to intense absorption of red light.
(2) Oxides of nitrogen and the halogen can damage the O_3 layer.

(3) $2\,I_2 + 9[O_3] \longrightarrow I_4O_9 + 9O_2$

(4) $2\,KOH + 5\,O_3 \longrightarrow 2\,KO_3 + 5\,O_2 + H_2O$

EXERCISE # 3

1. Photochemical smog is caused by oxides of sulphur and nitrogen.

2. Freons or chlorofluoro carbons are responsible for depletion of the ozone layer in the upper strata of the atmosphere. They are used as propellants, aerosol spray caps, refrigerents, fire fighting reagents etc. They are stable and chemically inert compounds. They absorb UV-radiation and break down liberating free atomic chlorine which causes decomposition of ozone through free radical reaction. This results in the depletion of the ozone layer.

Freons are mainly Freon-1 ($CFCl_3$) and Freon-12 (CF_2Cl_2). They form free radical of chlorine in presence of UV-radical decomposes O_3 as follows :

$Cl^{\bullet} + O_3 \longrightarrow ClO^{\bullet} + O_2$

$ClO^{\bullet} + O_3 \longrightarrow \underset{\text{chlorine free radical}}{Cl^{\bullet}} + 2O_2$

3. Chlorofluorocarbons (CFCs or freons like CF_2Cl_2) are responsible for depletion of the ozone layer in the upper strata of atmosphere. They are stable and inert compounds. They absorb UV rays and break down liberating free atomic chlorine which causes depletion of ozone through free radical reaction.

$\dot{C}l + O_3 \longrightarrow ClO^{\bullet} + O_2$

$ClO^{\bullet} + O_3 \longrightarrow \dot{C}l + 2O_2$

12. Green chemistry involves such reactions which reduce the use and production of hazardous or toxic chemical to reduce pollution from environment.

18. Micro organisms present in the soil is biggest source and sink.

20. Green house gas is not SO_2

NCERT P.No. 401 (Chapter [Environmental chemistry])

…… Beside carbondioxide, other green house gases are CH_4, water vapour, N_2O, CFCs and ozone.