

# ENVIRONMENTAL CHEMISTRY

## FACT/DEFINITION TYPE QUESTIONS

- The type of pollution caused by spraying of DDT is  
(a) air and soil (b) air and water  
(c) air (d) air, water and soil
- What is DDT among the following ?  
(a) Greenhouse gas  
(b) A fertilizer  
(c) Biodegradable pollutant  
(d) Non-biodegradable pollutant
- The uppermost region of the atmosphere is called  
(a) Ionosphere (b) Stratosphere  
(c) Troposphere (d) Exosphere
- Which of the following is the coldest region of atmosphere ?  
(a) Thermosphere (b) Mesosphere  
(c) Troposphere (d) Stratosphere
- The region which is greatly affected by air pollution is  
(a) Thermosphere (b) Stratosphere  
(c) Troposphere (d) Mesosphere
- The region containing water vapour is  
(a) thermosphere (b) stratosphere  
(c) troposphere (d) mesosphere
- High concentration of which of the following in atmosphere leads to stiffness of flower buds which eventually fall off from plants?  
(a)  $\text{NO}_2$  (b)  $\text{SO}_2$   
(c) CFC (d) Smog
- The irritant red haze in the traffic and congested places is due to presence of which of the following ?  
(i) Oxides of sulphur  
(ii) Oxides of nitrogen  
(iii) Carbon dioxide  
(iv) Mists, smoke and dust  
(v) Smog  
(a) (i), (iv) and (v) (b) (iii) only  
(c) (ii) only (d) (ii) and (v)
- The quantity of  $\text{CO}_2$  in atmosphere is  
(a) 3.34% (d) 6.5%  
(c) 0.034% (d) 0.34%
- The substance which is not regarded as a pollutant?  
(a)  $\text{NO}_2$  (b)  $\text{CO}_2$   
(c)  $\text{O}_3$  (d) Hydrocarbons
- Which of the following is/are the hazardous pollutant(s) present in automobile exhaust gases?  
(i)  $\text{N}_2$  (ii) CO  
(iii)  $\text{CH}_4$  (iv) Oxides of nitrogen  
(a) (ii) and (iii) (b) (i) and (ii)  
(c) (ii) and (iv) (d) (i) and (iii)
- The gas emitted by supersonic jet planes that slowly depletes the concentration of ozone layer is  
(a) CO (b) NO  
(c)  $\text{SO}_2$  (d)  $\text{O}_2$
- Carbon monoxide (CO) is harmful to man because  
(a) it forms carbolic acid  
(b) it generates excess  $\text{CO}_2$   
(c) it is carcinogenic  
(d) it competes with  $\text{O}_2$  for haemoglobin
- Increase in global temperature increases the incidence of which of the following infectious disease(s)  
(i) Sleeping sickness (ii) Yellow fever  
(iii) Malaria (iv) Dengue  
(a) (ii) only (b) (i) and (ii)  
(c) (iii) and (iv) (d) (i), (ii), (iii) and (iv)
- The green house effect is caused by  
(a)  $\text{CO}_2$  (b)  $\text{NO}_2$   
(c) NO (d) CO
- Which is related to 'Green House Effect'?  
(a) Farming of Green plants  
(b) Farming of Vegetables in Houses  
(c) Global Warming  
(d) Biodegradable pollutant

17. Green house gases
- allow shorter wavelength to enter earth's atmosphere while doesn't allow longer wavelength to leave the earth's atmosphere.
  - allow longer wavelength to enter earth atmosphere while doesn't allow shorter wavelength to leave the surface
  - don't have wavelength specific character.
  - show wavelength specific behaviour near the earth while far from earth these have wavelength independent behaviour.
18. Today the concentration of green house gases is very high because of
- use of refrigerator
  - increased combustion of oils and coal
  - deforestation
  - All of the above
19. The greenhouse effect is because of the
- presence of gases, which in general are strong infrared absorbers, in the atmosphere
  - presence of  $\text{CO}_2$  only in the atmosphere
  - pressure of  $\text{O}_3$  and  $\text{CH}_4$  in the atmosphere
  - $\text{N}_2\text{O}$  and chlorofluorohydrocarbons in the atmosphere
20. The greenhouse gas is
- $\text{CO}_2$
  - $\text{SO}_2$
  - $\text{N}_2$
  - $\text{H}_2\text{S}$
21. Which of the following gases is not a green house gas?
- $\text{CO}$
  - $\text{O}_3$
  - $\text{CH}_4$
  - $\text{H}_2\text{O}$  vapour
22. Which of the following strategy is not a correct approach to reduce global warming ?
- Reducing the green house gas emission by limiting the use of fossil fuels
  - Increase the vegetation cover particularly the forest for photosynthetic utilization of  $\text{CO}_2$
  - Minimizing the use of nitrogen fertilizers in agriculture for reducing  $\text{N}_2\text{O}$  emission
  - Increasing the use of air conditioners, refrigeration unit and production of plastic foams and propellants in aerosol spray cans
23. The substance having the largest concentration in acid rain
- $\text{H}_2\text{CO}_3$
  - $\text{HNO}_3$
  - $\text{HCl}$
  - $\text{H}_2\text{SO}_4$
24. When rain is accompanied by a thunderstorm, the collected rain water will have a pH value
- slightly lower than that of rain water without thunderstorm
  - slightly higher than that when the thunderstorm is not there
  - uninfluenced by occurrence of thunderstorm
  - which depends upon the amount of dust in air
25. Acid rain is due to
- $\text{CH}_3$
  - $\text{SO}_2$  and  $\text{NO}_2$
26. The pH of normal rain water is
- 6.5
  - 5.6
  - 3.5
27. Which of the following statements is incorrect ?
- Smoke particulates consist of solid or mixture of solid and liquid particles formed during combustion of organic matter.
  - Herbicides and insecticides that miss their target and travel through air form mists.
  - Organic solvents, metals and metallic oxides form fume particles
  - None of these
28. Which of the following green house gas is released in paddy field ?
- CFCs
  - $\text{CH}_4$
  - $\text{SO}_2$
- Only I
  - Only II
  - Only III
  - I and II
29. Photochemical smog is due to the presence of
- oxides of sulphur
  - oxides of nitrogen
  - oxides of carbon
  - lead
30. The secondary precursors of photochemical smog are
- $\text{SO}_2$  and  $\text{NO}_2$
  - $\text{SO}_2$  and hydrocarbons
  - $\text{NO}_2$  and hydrocarbons
  - $\text{O}_3$  and PAN
31. The main element of smog is
- $\text{O}_3$  and PAN
  - $\text{O}_3$
  - PAN
  - PPN and PBN
32. Classical smog occurs in places of
- excess  $\text{SO}_2$
  - low temperature
  - high temperature
  - excess  $\text{NH}_3$
33. The smog is essentially caused by the presence of
- Oxides of sulphur and nitrogen
  - $\text{O}_2$  and  $\text{N}_2$
  - $\text{O}_2$  and  $\text{O}_3$
  - $\text{O}_3$  and  $\text{N}_2$
34. Air pollution causing photochemical oxidants production include
- Carbon monoxide, sulphur dioxide
  - Nitrous oxide, nitric acid fumes, nitric oxide
  - Ozone, peroxyacetyl nitrate, aldehydes
  - Oxygen, chlorine, fuming nitric acid
35. Photochemical smog formed in congested metropolitan cities mainly consists of
- ozone, peroxyacetyl nitrate and  $\text{NO}_x$
  - smoke, peroxyacetyl nitrate and  $\text{SO}_2$
  - hydrocarbons,  $\text{SO}_2$  and  $\text{CO}_2$
  - hydrocarbons, ozone and  $\text{SO}_x$



36. In almost all Indian metropolitan cities like Delhi, the major atmospheric pollutant(s) is/are
- suspended particulate matter (SPM)
  - oxides of sulphur
  - carbon dioxide and carbon monoxide
  - oxides of nitrogen
37. The non-viable particulate among the following is
- Dust
  - Bacteria
  - Moulds
  - Fungi
38. Photochemical smog occurs in warm, dry and sunny climate. One of the following is not amongst the components of photochemical smog, identify it.
- NO<sub>2</sub>
  - O<sub>3</sub>
  - SO<sub>2</sub>
  - Unsaturated hydrocarbon
39. The pollutants which came directly in the air from sources are called primary pollutants. Primary pollutants are sometimes converted into secondary pollutants. Which of the following belongs to secondary air pollutants?
- CO
  - Hydrocarbon
  - Peroxyacetyl nitrate
  - NO
40. The main element of smog is
- O<sub>3</sub> and PAN
  - O<sub>3</sub>
  - PAN
  - Both (a) and (b)
41. Which of the following statements is not true about classical smog?
- Its main components are produced by the action of sunlight on emissions of automobiles and factories.
  - Produced in cold and humid climate.
  - It contains compounds of reducing nature.
  - It contains smoke fog and sulphur dioxide
42. Which of the following statements about photochemical smog is wrong?
- It has high concentration of oxidising agents
  - It has low concentration of oxidising agent
  - It can be controlled by controlling the release of NO<sub>2</sub>, hydrocarbons ozone, etc.
  - Plantation of some plants like pinus helps in controlling photochemical smog.
43. Select the process that does not add particulate materials to air.
- Use of air conditioner
  - Burning of fossil fuels
  - Paper industry
  - Incomplete combustion of coal
44. The biggest particulate matter is
- HNO<sub>3</sub> droplets
  - Soot
  - H<sub>2</sub>SO<sub>4</sub> droplets
  - Fly ash
45. The viable particulate among the following is
- Fumes
  - Algae
  - Smoke
  - Mist
46. The aromatic compounds present as particulates are
- Polycyclic aromatic hydrocarbons
  - Benzene
  - Toluene
  - Nitrobenzene
47. Which of the following can control the photochemical smog ?
- Use of catalytic converters in automobiles.
  - Plantation of trees like pinus, pyrus vitis etc.
  - Using less sulphur containing fossil fuels.
- A and C
  - B
  - A and B
  - A, B and C
48. The gas responsible for ozone depletion :
- NO and freons
  - SO<sub>2</sub>
  - CO<sub>2</sub>
  - CO
49. Identify the incorrect statement from the following :
- Ozone absorbs the intense ultraviolet radiation of the sun.
  - Depletion of ozone layer is because of its chemical reactions with chlorofluoro alkanes.
  - Ozone absorbs infrared radiation.
  - Oxides of nitrogen in the atmosphere can cause the depletion of ozone layer.
50. Identify the wrong statement in the following:
- Chlorofluorocarbons are responsible for ozone layer depletion.
  - Greenhouse effect is responsible for global warming.
  - Acid rain is mostly because of oxides of nitrogen and sulphur.
  - Ozone layer does not permit infrared radiation from the sun to reach the earth.
51. Which of the following chemical, harmful to ozone, is released by chlorofluoro carbon?
- Sulphur dioxide
  - Fluorine
  - Chlorine
  - Nitrogen dioxide
52. In Antarctica ozone depletion is due to the formation of following compound
- acrolein
  - peroxyacetyl nitrate
  - SO<sub>2</sub> and SO<sub>3</sub>
  - chlorine nitrate
53. Depletion of ozone layer causes
- breast cancer
  - blood cancer
  - lung cancer
  - skin cancer
54. Select the one that has an adverse effect on ozone layer.
- Carbon dioxide
  - Chlorofluorocarbons
  - Soil
  - Dust particles
55. Ozone hole refers to
- Increase in concentration of ozone
  - Hole in ozone layer
  - Reduction in thickness of ozone layer in troposphere
  - Reduction in thickness of ozone layer in stratosphere

56. Which of the following statements is wrong?
- Ozone is not responsible for green house effect.
  - Ozone can oxidise sulphur dioxide present in the atmosphere to sulphur trioxide.
  - Ozone hole is thinning of ozone layer present in stratosphere.
  - Ozone is produced in upper stratosphere by the action of UV rays on oxygen.
57. Which of the following statements is correct?
- Ozone hole is a hole formed in stratosphere from which ozone oozes out.
  - Ozone hole is a hole formed in the troposphere from which ozone oozes out.
  - Ozone hole is thinning of ozone layer of stratosphere at some places.
  - Ozone hole means vanishing of ozone layer around the earth completely.
58. Ozone is an important constituent of stratosphere because it
- Destroys bacteria which are harmful to human life
  - Prevents the formation of smog over large cities
  - Removes poisonous gases of the atmosphere by reacting with them
  - Absorbs ultraviolet radiation which is harmful to human life
59. The gas(es) not responsible for ozone depletion :
- NO and freons
  - SO<sub>2</sub>
  - CO<sub>2</sub>
  - Both (b) and (c)
60. What is the concentration of dissolved oxygen in cold water ?
- 5 ppm
  - 10 ppm
  - 200,000 ppm
  - 100 ppm
61. Water pollution is caused by
- pesticides
  - SO<sub>2</sub>
  - O<sub>2</sub>
  - CO<sub>2</sub>
62. Minamata disease of Japan is due to pollution of
- Arsenic
  - Lead
  - Cynide
  - Mercury
63. The high amount of E. coli in water is the indicator of
- hardness of water
  - industrial pollution
  - sewage pollution
  - presence of chlorine in water
64. A lake with an inflow of domestic sewage rich in organic waste may result in
- drying of the lake very soon due to algal bloom
  - an increase production of fish due to lot of nutrients
  - death of fish due to lack of oxygen
  - increased population of aquatic food web organisms
65. Which of the following does not occur when the sewage is discharged into water ?
- Increase in O<sub>2</sub>
  - Cyanophycean blooms occur
  - Depletion of O<sub>2</sub> layers
  - Eutrophication
66. Which of the following metal is a water pollutant and causes sterility in human being
- As
  - Mn
  - Mg
  - Hg
67. Sewage mostly constitutes
- Non-biodegradable pollutants
  - Biodegradable pollutants
  - Effluents
  - Air pollutants
68. Sewage containing organic waste should not be disposed in water bodies because it causes major water pollution. Fishes in such a polluted water die because of
- large number of mosquitoes
  - increase in the amount of dissolved oxygen
  - decrease in the amount of dissolved oxygen in water
  - clogging of gills by mud
69. Sewage water is purified by
- aquatic plants
  - microorganisms
  - light
  - fishes
70. Water is often treated with chlorine to
- remove hardness
  - increase oxygen content
  - kill germs
  - remove suspended particles
71. Which causes death of fish in water bodies polluted by sewage?
- Foul smell
  - Pathogens
  - Herbicides
  - Decrease in D.O.
72. B.O.D. test or biochemical oxygen demand test is made for measuring
- air pollution
  - water pollution
  - noise pollution
  - soil pollution
73. Brewery and sugar factory waste alters the quality of a water body by increasing
- temperature
  - turbidity
  - pH
  - COD and BOD
74. Which one of the following statement is **not** true ?
- pH of drinking water should be between 5.5 – 9.5.
  - Concentration of DO below 6 ppm is good for the growth of fish.
  - Clean water would have a BOD value of less than 5 ppm.
  - Oxides of sulphur, nitrogen and carbon are the most widespread air pollutant.



75. Limit of BOD prescribed by Central pollution Control Board for the discharge of industrial and municipal waste waters into natural surface waters, is
- (a) < 100 ppm (b) < 30 ppm  
(c) < 3.0 ppm (d) < 10 ppm
76. Biochemical Oxygen Demand, (BOD) is a measure of organic material present in water. BOD value less than 5 ppm indicates a water sample to be \_\_\_\_\_.
- (a) rich in dissolved oxygen  
(b) poor in dissolved oxygen  
(c) highly polluted  
(d) not suitable for aquatic life
77. Phosphate fertilizers when added to water leads to
- (a) Increased growth of decomposers  
(b) Reduced algal growth  
(c) Increased algal growth  
(d) Nutrient enrichment (eutrophication)
78. BOD of pond is connected with
- (a) Microbes & organic matter  
(b) Organic matter  
(c) Microbes  
(d) None of these
79. The maximum prescribed concentration of cadmium in drinking water in ppm is
- (a) 0.05 (b) 3  
(c) 2 (d) 0.005
80. Excess nitrate in drinking water can cause
- (a) methemoglobinemia (b) kidney damage  
(c) liver damage (d) laxative effect
81. Eutrophication causes reduction in
- (a) dissolved oxygen (b) nutrients  
(c) dissolved salts (d) All of the above
82. Water pollution is caused by
- (a) pesticides (b) fly ash  
(c) auto exhausts (d) aeroplanes
83. Which causes death of fishes in water bodies polluted by sewage?
- (a) Foul smell (b) Pathogens  
(c) Clogging of gills by silt (d) Decrease in D.O.
84. Chief source of soil and water pollution is
- (a) mining (b) agro industry  
(c) thermal power plant (d) All of the above
85. What is DDT among the following ?
- (a) Greenhouse gas  
(b) A fertilizer  
(c) Biodegradable pollutant  
(d) Non-biodegradable pollutant
86. The quantity of DDT in food chain
- (a) decreases (b) \_\_\_\_\_  
(c) increases (d) \_\_\_\_\_
87. The effect of polluted water on soil
- (a) it decreases fertility  
(b) it contaminates ground water  
(c) it renders soil acidic or basic  
(d) all of the above
88. Soil is polluted by
- I. pesticides  
II. synthetic fertilizers  
III. green manure
- Choose the correct option.
- (a) I and III (b) I and II  
(c) II and III (d) I, II and III
89. Which of the following trophic level has least concentration of toxins deposition ?
- (a) Aquatic plant (b) Small fish  
(c) Human being (d) Largest fish
90. Green chemistry means such reactions which :
- (a) produce colour during reactions  
(b) reduce the use and production of hazardous chemicals  
(c) are related to the depletion of ozone layer  
(d) study the reactions in plants
91. Which of the following practices will not come under green chemistry?
- (a) If possible, making use of soap made of vegetable oils instead of using synthetic detergents.  
(b) Using  $H_2O_2$  for bleaching purpose instead of using chlorine based bleaching agents.  
(c) Using bicycle for travelling small distances instead of using petrol/ diesel based vehicles.  
(d) Using plastic cans for neatly storing substances.
92. "Reducing potentially hazardous waste through smarter production".  
This represents a great step forward for
- (a) green revolution (b) green chemistry  
(c) industrial revolution (d) green biotechnology
93. Use of which of the following solvent in dry cleaning will result in less harm to ground water ?
- (a)  $Cl_2C=CCl_2$  (b) Liquid  $CO_2$   
(c)  $H_2O_2$  (d) None of these
94. Synthesis of ethanal commercially from which of the following reagent is the part of green chemistry ?
- (a)  $CH_3CH_2OH$  (b)  $CH_2=CH_2$   
(c)  $HC \equiv CH$  (d) All of these

### STATEMENT TYPE QUESTIONS

95. Which of the following sequence of T and F is correct for given statements. Here T stands for True statement and F stands for False statement.

- (i) Troposphere is the lowest region of atmosphere in which the human beings along with other organisms live.
- (ii) Troposphere extends up to the height of 10 km from sea level.
- (iii) Stratosphere lies above troposphere, between 10 and 20 km above sea level.
- (iv) Troposphere contains much little water vapour, dinitrogen, dioxygen and ozone
- (v) Stratosphere contains ozone, and cloud formation also takes place in this region.

- (a) TTTTT (b) TFTFF  
(c) TFFFF (d) TFTFT

96. Which of the following statement(s) is / are correct ?

- (i) Sulphuric acid, nitric acid as well as ammonium salts are components of acid rain.
- (ii) Formation of acid rain can be reduced by using less sulphur content fossil fuels for power plants and industries.
- (iii) Catalytic converters must be used in cars to reduce the harmful effect of exhaust.
- (iv) Main component of catalytic converter is ceramic honey comb coated with metals like – Au, Ag, Pt etc.

- (a) (i), (ii) and (iii) (b) (ii) and (iii)  
(c) (ii), (iii) and (iv) (d) (i), (ii), (iii) and (iv)

97. Which of the following statement(s) is/are correct ?

- (i) Classical smog is a mixture of smoke, fog and sulphur dioxide.
- (ii) Classical smog is also called oxidising smog
- (iii) Hydrocarbons,  $\text{NO}_2$  and PAN are components of photochemical smog.

- (a) (i) and (iii) (b) (i) and (ii)  
(c) (iii) only (d) (i), (ii) and (iii)

98. Which of the following statements are not correct?

- (i)  $\text{F}^-$  ion concentration above 2ppm causes brown mottling in teeth.
- (ii) Excessive  $\text{F}^-$  (over 10 ppm) causes harmful effect to bones and teeth.
- (iii) Excessive lead in drinking water causes disease methemoglobinemia
- (iv) Deficiency of sulphate in drinking water causes laxative effect.

- (a) (ii) and (iv) (b) (ii) and (iii)  
(c) (ii), (iii) and (iv) (d) (iii) and (iv)

99. Which of the following statement(s) is/are true about waste recycling ?

- (i) Clothes can be made from recycled plastic waste.
- (ii) Fuel that has high octane rating and contains no lead can be obtained from plastic waste.

(iii) Technology has now been developed to produce electricity from the garbage

- (a) (ii) only (b)  
(c) (iii) only (d)

### MATCHING TYPE QUESTIONS

100. Match the columns

**Column - I** **Column - II**

- |   |            |
|---|------------|
| (A) Concentration of dissolved oxygen in cold water                             | (p) 6 ppm  |
| (B) Concentration of dissolved oxygen below which growth of fish gets inhibited | (q) 17 ppm |
| (C) BOD value of clean water  | (r) 5 ppm  |
| (D) BOD value of polluted water.  | (s) 10 ppm |
- (a) A – (s), B – (s), C – (q), D – (p)  
(b) A – (p), B – (q), C – (r), D – (s)  
(c) A – (s), B – (p), C – (r), D – (q)  
(d) A – (p), B – (s), C – (q), D – (r)

101. Match the columns

**Column I** **Column II**

- |                                  |                                    |
|----------------------------------|------------------------------------|
| (A) Acid rain                    | (p) $\text{CHCl}_2 - \text{CHF}_2$ |
| (B) Photochemical smog           | (q) CO                             |
| (C) Combination with haemoglobin | (r) $\text{CO}_2$                  |
| (D) Depletion of ozone layer     | (s) $\text{SO}_2$                  |
|                                  | (t) Unsaturated hydrocarbons       |
- (a) A – (r, s), B – (t, s), C – (q), D – (p)  
(b) A – (r), B – (s), C – (q), D – (p)  
(c) A – (t, s), B – (s), C – (q), D – (r)  
(d) A – (r), B – (t), C – (q), D – (p)

102. Match the columns

**Column-I** **Column-II**

- |                               |   |
|-------------------------------|---|
| (A) Oxides of sulphur         | (p) Global warming                          |
| (B) Nitrogen dioxide          | (q) Damage to kidney                        |
| (C) Carbon dioxide            | (r) 'Blue baby' syndrome                    |
| (D) Nitrate in drinking water | (s) Respiratory diseases                    |
| (E) Lead                      | (t) Red haze in traffic and congested areas |
- (a) A – (t), B – (p), C – (r), D – (s), E – (q)  
(b) A – (s), B – (t), C – (p), D – (r), E – (q)  
(c) A – (s), B – (q), C – (p), D – (t), E – (r)  
(d) A – (q), B – (s), C – (t), D – (r), E – (p)



103. Match the columns

Column-I	Column-II
(A) Nitrous oxide from car exhausts	(p) Secondary pollutant
(B) Chlorofluorocarbon (CFCs)	(q) Combustion of fossil fuels, wood, etc
(C) Methane	(r) Denitrification
(D) Ozone (O <sub>3</sub> )	(s) Refrigerators, aerosol, sprays
(E) Carbon dioxide	(t) Cattle, rice fields, toilets.
(a) A – (r), B – (s), C – (t), D – (p), E – (q)	
(b) A – (t), B – (p), C – (r), D – (s), E – (q)	
(c) A – (s), B – (t), C – (p), D – (q), E – (r)	
(d) A – (p), B – (r), C – (s), D – (t), E – (q)	

104. Match the columns

Column-I	Column-II
(A) Releasing gases to the atmosphere after burning waste material containing sulphur	(p) Water pollution
(B) Using carbamates as pesticides	(q) Photochemical smog, damage to plant life, corrosion to building material, induce breathing problems, water pollution
(C) Using synthetic detergents for washing clothes	(r) Damaging ozone layer
(D) Releasing gases produced by automobiles and factories in the atmosphere.	(s) May cause nerve diseases in human
(E) Using chlorofluoro-carbon compounds for cleaning computer parts	(t) Classical smog, acid rain, water pollution, induce breathing problems, damage to buildings, corrosion of metals.
(a) A – (t), B – (s), C – (p), D – q, E – (r)	
(b) A – (s), B – (t), C – (q), D – (p), E – (r)	
(c) A – (q), B – (t), C – (r), D – (p), E – (s)	
(d) A – (r), B – (s), C – (p), D – (q), E – (t)	

105. Match the columns

Column I	Column II
(A) Phosphate fertilisers in water	(p) BOD level of water increases
(B) Methane in air	(q) Acid rain
(C) Synthetic detergents in water	(r) Global warming
(D) Nitrogen oxides in air	(s) Eutrophication

- (a) A – (p,s), B – (r), C – (p), D – (q)  
 (b) A – (p), B – (s), C – (r), D – (q)  
 (c) A – (s), B – (r), C – (q), D – (p)  
 (d) A – (p), B – (q), C – (s), D – (r)

### ASSERTION-REASON TYPE QUESTIONS

**Directions :** Each of these questions contain two statements, Assertion and Reason. Each of these questions also has four alternative choices, only one of which is the correct answer. You have to select one of the codes (a), (b), (c) and (d) given below.

- (a) Assertion is correct, reason is correct; reason is a correct explanation for assertion.  
 (b) Assertion is correct, reason is correct; reason is not a correct explanation for assertion  
 (c) Assertion is correct, reason is incorrect  
 (d) Assertion is incorrect, reason is correct.

106. **Assertion :** Uncatalysed oxidation of sulphur dioxide is a slow process.

**Reason :** Particulate matter in polluted air catalyses the oxidation of sulphur dioxide.

107. **Assertion :** Dinitrogen and dioxygen do not react with each other at a normal temperature.

**Reason :** At high altitudes dinitrogen combines with dioxygen to form oxides of nitrogen

108. **Assertion :** CO<sub>2</sub> causes green house effect.

**Reason :** Other gases do not show such effect.

109. **Assertion :** Green house effect was observed in houses used to grow plants and these are made of green glass.

**Reason :** Green house name has been given because glass houses are made of green glass.

110. **Assertion :** The pH of acid rain is less than 5.6.

**Reason :** Carbon dioxide present in the atmosphere dissolves in rain water and forms carbonic acid.

111. **Assertion :** Photochemical smog is oxidising in nature.

**Reason :** Photochemical smog contains NO<sub>2</sub> and O<sub>3</sub>, which are formed during the sequence of reactions.

112. **Assertion :** Suspended particulate matter (SPM) is an important pollutant released by diesel vehicles.

**Reason :** Catalytic converters greatly reduce pollution caused by automobiles.

113. **Assertion :** Carbon dioxide is one of the important greenhouse gases.

**Reason :** It is largely produced by respiratory function of animals and plants.

114. **Assertion :** Ozone is destroyed by solar radiation in upper stratosphere.

**Reason :** Thinning of the ozone layer allows excessive UV radiations to reach the surface of earth.

115. **Assertion :** Excessive use of chlorinated synthetic pesticides causes soil and water pollution.

**Reason :** Such pesticides are non-biodegradables.

116. **Assertion :** If BOD level of water in a reservoir is less than 5 ppm it is highly polluted.

**Reason :** High biological oxygen demand means low activity of bacteria in water.

117. **Assertion :** Eutrophication shows increase in productivity in water.

**Reason :** With increasing eutrophication, the diversity of the phytoplankton increases.

118. **Assertion :** The  $F^-$  ions make the enamel on teeth much harder.

**Reason :**  $F^-$  ions converts hydroxyapatite  $[3(Ca(PO_4)_2 Ca(OH)_2)]$  into fluorapatite  $[3(Ca_3(PO_4)_2 CaF_2)]$ .

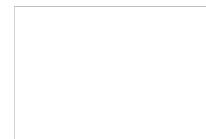
### CRITICAL THINKING TYPE QUESTIONS

119. In which of the following regions hydrogen and helium are found ?  
(a) Stratosphere (b) Mesosphere  
(c) Exosphere (d) Troposphere
120. Which one of the following pairs is mismatched ?  
(a) Fossil fuel burning - release of  $CO_2$   
(b) Nuclear power - radioactive wastes  
(c) Solar energy - Greenhouse effect  
(d) Biomass burning - release of  $CO_2$
121. Which of the following acts as a sink for  $CO_2$ ?  
(a) Plants  
(b) Haemoglobin  
(c) Microorganisms present in the soil  
(d) Oceans
122. How many times oxyhaemoglobin is less stable than carboxyhaemoglobin?  
(a) 50 (b) 200  
(c) 500 (d) 300
123. Dinitrogen and dioxygen are main constituents of air but these do not react with each other to form oxides of nitrogen because \_\_\_\_\_.  
(a) the reaction is endothermic and requires very high temperature.  
(b) the reaction can be initiated only in presence of a catalyst.  
(c) oxides of nitrogen are unstable.  
(d)  $N_2$  and  $O_2$  are unreactive
124.  $SO_2$  is one of the air pollutants.  $SO_2$  \_\_\_\_\_  
(a) is a lung irritant  
(b) dissolves in water to form acid rain  
(c) both (a) and (b)  
(d) none of the above
125. The greatest affinity for haemoglobin is shown by which of the following :  
(a) NO (b) CO  
(c)  $O_2$  (d)  $CO_2$
126. Which pollutant is harmful for 'Taj Mahal'?  
(a) Hydrogen (b) \_\_\_\_\_  
(c)  $SO_2$  (d) \_\_\_\_\_
127. The beauty of Taj Mahal is endangered by \_\_\_\_\_  
(a) degradation of marble due to \_\_\_\_\_  
(b) discharge of industrial waste in Yamuna river  
(c) air pollutants released from oil refinery  
(d) riparian erosion
128. Acid rain is caused by or recent reports of acid rain in some industrial cities are due to the effect of atmospheric pollution by \_\_\_\_\_  
(a) excessive release of  $CO_2$  by burning of fuels like wood and charcoal, cutting of forests and increased animal population  
(b) excessive release of  $NO_2$  and  $SO_2$  in atmosphere by burning of fossil fuel  
(c) excessive release of  $NH_3$  by industrial plants and coal gas  
(d) excessive release of CO in atmosphere by incomplete combustion of coke, charcoal and other carbonaceous fuel in paucity of oxygen.
129. Which of the following is the major cause of global warming?  
(a) re-radiation of U.V. rays by  $CO_2$  and  $H_2O$   
(b) re-radiation of I.R. rays by  $CO_2$  and  $H_2O$   
(c) re-radiation of I.R. rays by  $O_2$  and  $N_2$   
(d) re-radiation of U.V. rays by  $O_2$  and  $N_2$
130. Formation of London smog takes place in \_\_\_\_\_  
(a) winter during day time  
(b) summer during day time  
(c) summer during morning time  
(d) winter during morning time
131. The false statement among the followings :  
(a) The average residence time of NO is one month  
(b) Limestone acts as a sink for  $SO_x$   
(c)  $SO_x$  can be removed from flue gases by passing through a solution of citrate ions  
(d) Ammonia acts as a sink for  $NO_x$
132. Which of the following statements about polar stratosphere clouds (PSCs) is not correct?  
(a) PSCs do not react with chlorine nitrate and HCl  
(b) Type I clouds are formed at about  $-77^\circ C$  and contain solid  $HNO_3 \cdot 3H_2O$   
(c) Type II clouds are formed at about  $-85^\circ C$  and contain some ice  
(d) A tight whirlpool of wind called Polar Vortex is formed which surrounds Antarctica
133. Which of the following is/are formed when ozone reacts with the unburnt hydrocarbons in polluted air ?  
(i) Formaldehyde (ii) Acrolein  
(iii) Peroxyacetyl nitrate (iv) Formic acid  
(a) (i) and (iv) (b) (ii) only  
(c) (iii) only (d) (i), (ii) and (iii)



134. Thermal pollution affects mainly
- (a) vegetation (b) aquatic creature  
(c) rocks (d) air
135. A dental disease characterised by mottling of teeth is due to presence of a certain chemical element in drinking water. Which is that element?
- (a) Boron (b) Chlorine  
(c) Fluorine (d) Mercury
136. Frequent occurrence of water blooms in a lake indicates
- (a) nutrient deficiency  
(b) oxygen deficiency  
(c) excessive nutrient availability  
(d) absence of herbivores in the lake
137. Which one of the following statements is correct ?
- (a) Extensive use of chemical fertilizers may lead to eutrophication of nearby water bodies  
(b) Both Azotobacter and Rhizobium fix atmospheric nitrogen in root nodules of plants  
(c) Cyanobacteria such as Anabaena and Nostoc are important mobilizers of phosphates and potassium for plant nutrition in soil  
(d) At present it is not possible to grow maize without chemical fertilizers
138. Lichens do not like to grow in cities
- (a) because of absence of the right climate  
(b) because of lack of moisture  
(c) because of SO<sub>2</sub> pollution  
(d) because natural habitat is missing
139. BOD of pond is connected with
- (a) microbes & organic matter  
(b) organic matter  
(c) microbes  
(d) None of these
140. Which is known as 'Third poison of environment' and also creates 'Blue baby syndrome'
- (a) Nitrate present in water  
(b) Phosphate and detergents found in water  
(c) Cyanide  
(d) Pesticides
141. Negative soil pollution is
- (a) reduction in soil productivity due to erosion and over use  
(b) reduction in soil productivity due to addition of pesticides and industrial wastes  
(c) converting fertile land into barren land by dumping ash, sludge and garbage  
(d) None of the above

## HINTS AND SOLUTIONS



### FACT/DEFINITION TYPE QUESTIONS

1. (d) DDT causes air, water and soil pollution.
2. (d) DDT is a non-biodegradable pollutant.
3. (d) The uppermost region of atmosphere is exosphere.
4. (b) The coldest region is mesosphere (temp.  $-27^{\circ}\text{C}$  to  $-92^{\circ}\text{C}$ )
5. (c) Air pollution greatly affect the troposphere.
6. (c) Troposphere contains water vapour.
7. (b) High concentration of  $\text{SO}_2$  leads to stiffness of flower buds.
8. (c) The irritant red haze in the traffic and congested places is due to presence of oxides of nitrogen.
9. (c)
10. (b)  $\text{CO}_2$  is generally not regarded as pollutant.
11. (c) CO and oxides of Nitrogen are poisonous gases present in automobile exhaust gases.
12. (b) Nitric oxide (NO) which may be produced at the ground level due to human activity or natural sources or is produced in large amounts in the exhaust gases by the engine of super transports in the planes and introduced directly into the stratosphere.  

$$\text{NO} + \text{O}_3 \longrightarrow \text{NO}_2 + \text{O}_2$$
13. (d) CO is highly toxic and impairs respiration. CO combine with haemoglobin of blood and reduces its  $\text{O}_2$  carry capacity.
14. (d)
15. (a)  $\text{CO}_2$  causes green house effect.
16. (c)
17. (a) Radiation coming from sun or outerspace have high energy or short wavelength, which are allowed to enter by green house gases. However, radiation emitted by earth is in infrared region, having long wavelength, are reflected back by the envelope of green house gases.
18. (d)
19. (a) Green house gases such as  $\text{CO}_2$ , ozone, methane, the chlorofluorocarbon compounds and water vapour form a thick cover around the earth which prevents the IR rays emitted by the earth to escape. It gradually leads to increase in temperature of atmosphere.
20. (a)  $\text{CO}_2$  is a green house gas.
21. (a)      22. (d)
23. (d) Acid rain contains  $\text{H}_2\text{SO}_4 > \text{HNO}_3 > \text{HCl}$ .
24. (a) Normal rain water has pH 5.6. Thunderstorm results in the formation of water with pH 5.6. Thunderstorm results in the formation of water with pH 5.6. Thunderstorm results in the formation of water with pH 5.6.
25. (c) Acid rain is rain or any other form of precipitation that is unusually acidic. It has harmful effects on plants, aquatic animals, and infrastructure. Acid rain is mostly caused by human emissions of sulfur and nitrogen compounds which react in the atmosphere to produce acids. In recent years, many governments have introduced laws to reduce these emissions.
26. (c) pH of normal rain water is 5.6 as  $\text{CO}_2$  present in atmosphere combines with moisture to form  $\text{H}_2\text{CO}_3$ .
27. (d)
28. (b) Large amounts of  $\text{CH}_4$  are released in paddy fields, coal mines and by fossil fuels.
29. (b) The oxidised hydrocarbons and ozone in presence of humidity cause photochemical smog.  

$$\text{Hydrocarbons} + \text{O}_2, \text{NO}_2, \text{NO}, \text{O}, \text{O}_3 \rightarrow \text{Peroxides}$$
30. (d)      31. (a)      32. (b)
33. (a) Smog is caused by oxides of sulphur and nitrogen.
34. (c)      35. (a)      36. (a)      37. (a)      38. (c)
39. (c)      40. (a)      41. (a)      42. (b)      43. (a)
44. (d)      45. (b)
46. (a) PAH (Poly Aromatic Hydrocarbon)
47. (c) Usually catalytic converters are used in the automobiles, which prevent the release of nitrogen oxide and hydrocarbons to the atmosphere. Certain plants e.g., Pinus, Juniparus, Quercus, Pyrus and Vitis can metabolise nitrogen oxide and therefore, their plantation could help in this matter.
48. (a) NO and freons are responsible for ozone depletion.
49. (c) The ozone layer, existing between 20 to 35 km above the earth's surface, shield the earth from the harmful U. V. radiations from the sun.  
 Depletion of ozone is caused by oxides of nitrogen  

$$\text{N}_2\text{O} + h\nu \longrightarrow \text{NO} + \text{N}$$

reactive nitric oxide

$$\text{NO} + \text{O}_3 \longrightarrow \text{NO}_2 + \text{O}_2$$

$$\text{O}_3 + h\nu \longrightarrow \text{O}_2 + \text{O}$$

$$\text{NO}_2 + \text{O} \longrightarrow \text{NO} + \text{O}_2$$

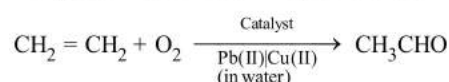
$$2\text{O}_3 + h\nu \longrightarrow 3\text{O}_2 \text{ (Net reaction)}$$
 The presence of oxides of nitrogen increase the decomposition of  $\text{O}_3$ .
50. (d) Ozone layer acts as a shield and does not allow ultraviolet radiation from sun to reach earth. It does not prevent infra-red radiation from sun to reach earth, thus option (d) is wrong statement and so it is the correct answer.
51. (c) 
$$\text{CF}_2\text{Cl}_2 \xrightarrow{h\nu} \text{CF}_2\text{Cl} + \dot{\text{C}}\text{l}$$

$$\dot{\text{C}}\text{l} + \text{O}_3 \longrightarrow \text{Cl}\dot{\text{O}} + \text{O}_2$$



52. (a) In antarctica ozone depletion is due to formation of acrolein.
53. (d) Depletion of ozone layer causes skin cancer.
54. (b) They create holes in ozone layer.
55. (d) Ozone hole is reduction in ozone layer in stratosphere.
56. (a) 57. (c)
58. (d) Ozone absorbs U.V. radiations harmful to human life.
59. (d)
60. (b) In cold water, dissolved oxygen can reach a concentration upto 10 ppm, whereas oxygen in air is about 200, 000 ppm.
61. (a) Pesticides cause water pollution.
62. (d) Minamata is caused by Hg poisoning.
63. (c) 64. (c) 65. (a) 66. (b)
67. (b) Domestic sewage constitute biodegradable pollutants.
68. (c)
69. (b) Sewage water is purified by micro-organisms.
70. (c) Water is often treated with  $\text{Cl}_2$  to kill germs.
71. (d) Decrease in D.O causes death of fish.
72. (b) Strength of sewage or degree of water pollution is measured in terms of BOD (Biochemical oxygen demand) value.
73. (d)
74. (b) The ideal value of D.O for growth of fishes is  $8 \text{ mg}/\ell$ .  $7 \text{ mg}/\ell$  is desirable range, below this value fishes get susceptible to disease. A value of  $2 \text{ mg}/\ell$  or below is lethal for fishes.
75. (b) Water pollution is mainly caused by industrial wastes, sewage, insecticide, herbicides, etc.
76. (a)
77. (d) Addition of phosphate fertilizers to water leads to nutrient enrichment (eutrophication).
78. (a) BOD of pond is connected with microbes and organic matter.
79. (d)
80. (a) Excessive concentration of nitrate in drinking water is harmful and can cause methemoglobinemia (blue baby syndrome).
81. (a) Eutrophication causes reduction in D.O
82. (a) Pesticides cause water pollution.
83. (d) Decrease in D.O causes death of fish
84. (d)
85. (d) DDT is a non-biodegradable pollutant.
86. (c) 87. (d)
88. (b) Pesticides and synthetic fertilizers pollute the soil.
89. (a) Lower trophic level has lower toxins deposition than higher trophic level.
90. (b) Green chemistry may be defined as the programme of developing new chemical products and chemical processes or making improvements in the already existing compounds and processes so as to make less harmful to human health and environment. This means the same as to reduce the use and production of hazardous chemicals.

91. (d)
92. (b) This represents a great step in green chemistry.
93. (b) Replacement of earlier used solvent for dry cleaning by less harm to ground water.
94. (b) Ethanal is commercially prepared by one step oxidation of ethene in the presence of ionic catalyst in aqueous medium with a yield of 90%.



### STATEMENT TYPE QUESTIONS

95. (c) For statement (iii), Stratosphere lies above troposphere between 10 and 50 km above sea level cloud formation takes place in troposphere. For statement (iv), Troposphere is a turbulent, dusty zone containing air, much water vapour and clouds. For statement (v), Stratosphere contains dinitrogen, dioxygen, ozone and little water vapour.
96. (d)
97. (a) Classical smog is also called reducing smog.
98. (d) For statement (iii), Methemoglobinemia (blue baby syndrome) is caused due to excess of nitrate in drinking water. For statement (iv), Excessive sulphate ( $> 500 \text{ ppm}$ ) in drinking water causes laxative effect, otherwise at moderate levels it is harmless.
99. (d) All the given statements are true for about waste recycling.

### MATCHING TYPE QUESTIONS

100. (c) 101. (a) 102. (b)  
103. (a) 104. (a) 105. (a)

### ASSERTION-REASON TYPE QUESTIONS

106. (a) The presence of particulate matter in polluted air catalyses the oxidation of  $\text{SO}_2$  to  $\text{SO}_3$
107. (b) At high altitudes when lightning strikes dinitrogen and dioxygen combine to form oxides of nitrogen.
108. (c) Other gases like CFCs, ozone, water vapour and nitrous oxide also show green house effect.
109. (c) 110. (b) 111. (a)
112. (b) SPM (Suspended Particulate Matter) is defined as particles floating in the air with a diameter below  $10 \mu\text{m}$ . Studies have shown that high SPM concentrations in the air can have a detrimental impact on respiratory organs. SPM is generated from natural sources (e.g., volcanoes or dust storms) and human activities (vehicles, incinerators and industrial plants).

SPM	Other aerosols
Less than 10 $\mu\text{m}$	Less than 100 $\mu\text{m}$
Tend to float longer in air due to small size	Tend to settle fairly quickly due to comparative heaviness

Catalytic converters is a device designed to reduce the amount of emissions from automobiles. The current (so-called three-way) systems use a heated metal catalyst to reduce the emissions of carbon monoxide (CO), hydrocarbons, and nitric oxide (NO), all of which contribute to the formation of photochemical smog. In an automobile's exhaust system, a catalytic converter provides an environment for a chemical reaction where unburned hydrocarbons completely combust.

113. (b)    114. (d)    115. (a)    116. (c)
117. (b) Eutrophication is a natural process which literally means well nourished or enriched. It is a natural state in many lakes and ponds which have a rich supply of nutrients. Eutrophication become excessive, however when abnormally high amount of nutrient from sewage, fertilizers, animal waste and detergent, enter streams and lakes causes excessive growth or blooms of microorganisms. With increasing eutrophication, the diversity of the phytoplankton community of a lake increases and the lake finally becomes dominated by blue-green algae.
118. (a) The  $\text{F}^-$  ions make the enamel on teeth much harder by converting hydroxyapatite,  $[\text{3}(\text{Ca}_3(\text{PO}_4)_2) \cdot \text{Ca}(\text{OH})_2]$ , the enamel on the surface of the teeth, into much harder fluorapatite,  $[\text{3}(\text{Ca}_3(\text{PO}_4)_2) \cdot \text{CaF}_2]$ .

### CRITICAL THINKING TYPE QUESTIONS

119. (c)  $\text{H}_2$ , He and ionic oxygen are present in exosphere.
120. (c) Solar energy is not responsible for green house effect instead it is a source of energy for the plants and animals.
121. (c) CO is converted into  $\text{CO}_2$  by microorganism present in soil.
122. (d) Carboxyhaemoglobin is 300 times more stable than oxyhaemoglobin.
123. (a)    124. (c)
125. (a) Haemoglobin has great affinity for oxygen.
126. (c)
127. (c) The beauty of Taj Mahal is endangered due to air pollutants like  $\text{SO}_2$  released from oil refinery.
128. (b) When  $\text{SO}_2$  pollution in air is much higher. Sometimes,  $\text{SO}_2$  mixes in the air with small particles of metals near the factories and gets oxidised into sulphur trioxide  $\text{SO}_3$ . These gases are harmful and they react with water to form sulphuric acid ( $\text{H}_2\text{SO}_4$ ) or sulphurous acid ( $\text{H}_2\text{SO}_3$ ) and come down to earth with rain water, it is called acid rain or acid precipitation.
129. (b)
130. (d) London smog is formed in morning during winter.
131. (a) The average residence time of NO is 4 days.
132. (a) PSCs react with chlorine nitrate and HCl to give HOCl and  $\text{Cl}_2$ .
133. (d) 
$$3\text{CH}_4 + 2\text{O}_3 \rightarrow 3\underset{\text{Formaldehyde}}{\text{CH}_2= \text{O}} + 3\text{H}_2\text{O}$$

$$\text{CH}_2= \underset{\text{O}}{\text{CHCH}} = \text{OCH}_2\text{COONO}_2$$
 Acrolein Peroxyacetyl nitrate (PAN)
134. (b) Thermal pollution is caused by power plants. Power plant requires a larger quantity of water for cooling. The water after cooling is left in the water body. The temperature of left water is generally very high and affects aquatic life.
135. (c) The excess of fluoride in water causes fluorosis. The symptoms of fluorosis are mottling of teeth (yellowish streaks) and abnormal bones liable to fracture etc. It is an example of endemic disease.
136. (b)    137. (a)
138. (c) Because they are very sensitive to sulphur dioxide and in cities the amount of  $\text{SO}_2$  is high so lichen do not grow in cities.
139. (a) BOD of pond is connected with microbes and organic matter.
140. (b)    141. (a)