PRAADIS EDUCATION

CHEMISTRY-XII

ENVIRONMENTAL CHEMISTRYT

OBJECTIVE

1. A substance, which causes pollution, is known as which of the following?
a) Pollutant
b) Carcinogen
c) Polluting element
d) Irritant
Answer: a
Explanation: A substance, causing pollution, is called as a pollutant. Pollutants can be solid, liquid, or gaseous substances present in greater concentrations than in natural abundance and are produced due to human activities or due to natural happenings. Carcinogens are substances, if exposed to, which can cause cancer. Irritants normally cause irritations to skin.

2. Identify the degradable pollutant from the following.
a) Chemicals
b) Metals
c) Discarded vegetables
d) Plastic
Answer: c
Explanation: Discarded vegetables are degradable pollutants. Since they are organic, they can be rapidly broken down by micro-organisms through natural processes. Chemicals, metals, and plastics are inorganic and they will slowly

degrade, thereby, remaining in an unchanged form in the environment for many decades.

3. What is the full form of DDT?
a) Diphenyldichlorotrichloroethane
b) Dichlorodiphenyltrichloroethane
c) Dichlorodiphenyltriphenylethane
d) Dichlorodiphenyltrichloroethene
Answer: b

Explanation: The full form of DDT is dichlorodiphenyltrichloroethane. It is a colorless, tasteless, and almost odorless crystalline chemical compound. It was originally developed as an insecticide, but then, its use was stopped due to its harmful effect on environment as well as on the living organisms. If exposed to high concentrations, it can cause vomiting, seizures or tremors in human beings.

4. An average human being requires nearly 12-15 times more air than the food.
a) True
b) False
Answer: a
Explanation: An average human being requires nearly 12-15 times more air than the food. So, even small amounts of pollutants in the air become significant compared to similar levels present in the food. Therefore, the amount of people suffering various diseases due to contaminants in air is more than that suffering due to contaminants in food.

5. Which of the following is not a constituent of DDT?
a) Carbon
b) Fluorine

c) Chlorine
d) Hydrogen
Answer: b
Explanation: Fluorine is not a constituent of DDT. DDT is dichlorodiphenyltrichloroethane which has a chemical formula of $C_{14}H_9Cl_5$. Therefore, DDT does not contain fluorine, which is evident from the chemical formula. It also contains impurities in small quantities, i.e., about 15% of its composition. The major component which comprises of 77% of the substance is its para isomer.

6. Identify the correct order of the different regions of the atmosphere.

a)Stratosphere<mesosphere<troposphere<thermosphere<exosphere

b)Troposphere<mesosphere<stratosphere<exosphere<thermosphere

c)Troposphere<stratosphere<mesosphere<thermosphere<exosphere

d)Exosphere>mesosphere>thermosphere>stratosphere>troposphere

Answer: c

Explanation: The troposphere is the lowest region of the atmosphere in which human beings and other living organisms live. Above the troposphere, between 10 and 50 km above sea level lies the stratosphere. Then comes the mesosphere, followed by the thermosphere and finally the exosphere.

7. Which of the following is not a gaseous air pollutant?

a) Ozone

b) Fumes

c) Hydrogen sulphide

d) Carbon

View Answer

Answer: b

Explanation: Fumes come under the category of particulate pollutants and not gaseous air pollutants. It consist of solid particles in the form of suspension in the air. Such particulate pollutants can be released from different types of human activities. Fumes can be released from industries and other chemical plants as well. The other examples of particulate pollutants are dust, mist, smoke, smog, etc.

8. The irritant red haze in traffic and congested places is due to the oxides of which of the following?

a) Nitrogen

b) Sulphur

c) Carbon

d) Hydrocarbons

Answer: a

Explanation: The irritant red haze in traffic and congested paces is due to the oxides of nitrogen. Haze can refer to aerosols of the wet type that causes reduction in visibility. Nitrogen gas is abundantly found in the atmosphere. This nitrogen will combine with oxygen which is also present in

the atmosphere and form nitrogen dioxide. Nitrogen gas has a deep red color. Now, nitrogen dioxide will combine with the aerosols and thus, form the red haze that occur in traffic and congested places.

9. CO has high affinity for haemoglobin.

a) True

b) False

Answer: a

Explanation: Carbon monoxide (CO) is highly poisonous has a high affinity for haemoglobin. It binds with haemoglobin to form carboxyhaemoglobin, which is about 300 times more stable than the oxygen-haemoglobin complex. In blood, when the concentration of carboxyhaemoglobin reaches about 3-4 per cent, the oxygen carrying capacity of blood is greatly reduced. This oxygen deficiency, results in headache, weak eyesight, nervousness, and cardiovascular disorder.

10. Identify the correct method by which carbon dioxide is produced.

a) By the incomplete combustion of coal or petrol

b) During volcanic eruptions

c) Mainly by automobile exhaust

d) By burning sulfur containing fossil fuels.

Answer: b

Explanation: Volcanic eruptions produce carbon dioxide. The gas is released either during eruptions or through underground magma. Carbon dioxide through underground magma is released through vents, porous rocks, etc. that feeds volcanic

lakes. Due to the production of significant amounts of carbon dioxide, volcanoes also contribute to global warming.

11. The amount of carbon dioxide should not cross the delicate proportion of which of the following?

a) 0.01%

b) 0.04%

c) 0.3%

d) 0.03%

Answer: d

Explanation: The amount of carbon dioxide optimum for the environment should be 0.03 per cent. If this per cent is crossed, then the natural greenhouse balance may get disturbed since carbon dioxide is the major contributor to global warming. But, low concentrations are also not desirable. It can lead to kidney diseases. This condition can cause the body's blood acid level to go up due to the lack of insulin to digest sugars in the body.

12. Which of the following are the main constituents of acid rain?

a) Carbon, nitrogen

b) Sulphur, oxygen

c) Sulphur, nitrogen

d) Nitrogen, hydrogen

Answer: c

Explanation: Acid rain comprises of the oxides of sulphur and nitrogen. Oxides of nitrogen and sulfur which are acidic in

nature can be blown by wind along with solid particles in the atmosphere and finally settle down either on the ground as dry deposition or in water, fog, and snow as wet deposition.

13. When the pH of rain water is above 5.6, then it is called acid rain.

a) True

b) False

Answer: b

Explanation: On the pH scale, 7 is neutral; below 7 is said to be acidic and above 7 is said to be alkaline. Rain water normally has a pH of 5.6 due to the presence of H+ ions formed by the reaction of rain water with carbon dioxide present in the atmosphere.When the pH of rain water falls below 5.6, then it is called as acid rain.

$H_2O\ (l) + CO_2\ (g) \rightarrow H_2CO_3\ (aq)$

$H_2CO_3\ (aq) \rightarrow H^+\ (aq) + HCO_3^-\ (aq)$

14. Which of the following is the suitable climate for photochemical smog to occur?

a) Cool, humid

b) Dry, warm

c) Sunny, humid

d) Cool, dry

Answer: b

Explanation: Photochemical smog occurs in warm, dry, and sunny climate. The main components of the photochemical smog results from the action of sunlight on unsaturated

hydrocarbons and nitrogen oxides produced by automobiles and factories.

15. What is the full form of PAN?

a) Peroxyacetyl nitrate

b) Peroxyacetyl nitrite

c) Peroxyacetylene nitride

d) Peroxyacetyl nitride

Answer: a

Explanation: The full form of PAN is peroxyacetyl nitrate. It is a secondary pollutant present in photochemical smog and is unstable. They dissolve more easily in water than in ozone. It has a chemical formula of $C_2H_3NO_5$ and a boiling point of 105°C. PAN is formed by oxidation of non-methane volatile organic compounds.

16. Which is the gas that causes eye irritation as a result of photochemical smog?

a) CO_2

b) O_2

c) CH_4

d) Acrolein

Answer: d

Explanation: Acrolein is a colorless, clear liquid with a pungent, suffocating odor. It is a toxic gas, to which if exposed, can cause severe irritations in the eye, skin, and also causes respiratory tract irritations. Acrolein is highly

flammable and produces toxic concentrations at room temperature.

17. What is the major reason of ozone depletion?

a) Release of CO

b) Release of CO2

c) Release of CFC

d) Release of CH4

Answer: c

Explanation: Chlorofluorocarbons (CFCs), also known as freons, are the major reason for depletion of the protective ozone layer which protects us from the harmful UV radiations, which can be hazardous to human beings and other living organisms. Exposure to UV radiations can cause skin cancer in humans. CFCs, when they reach the stratosphere, will be broken down into free radicals by the UV radiations to liberate chlorine free radical. This chlorine free radical will combine with the stratospheric ozone to form chlorine monoxide and molecular oxygen. In this way, the ozone gets used up and there will be lack of ozone available for protection against UV radiations. Thus, ozone gets depleted.

18. Where does the ozone hole occur?

a) North pole

b) South pole

c) The arctic

d) Stratosphere

Answer: b

Explanation: In the 1980s, depletion of ozone layer, known as ozone hole, over the South Pole. In the summer season, NO_2 and CH_4 react with chlorine monoxide and chlorine atoms forming chlorine sinks, preventing much ozone depletion. In winter season, special clouds called polar stratospheric clouds are formed over Antarctica.

19. Identify the viable pollutant from the following.

a) Moulds

b) Dry leaves

c) Fly ash

d) Oil smoke

Answer: a

Explanation: Moulds is an example of viable pollutant. These are in the category of minute living organisms dispersed in the atmosphere. These can lead to plant diseases. They can also turn out to be allergic to human beings. Changes in temperature or increase in humidity can cause the development of moulds.

20. Pick out the one that is not one of the effects of ozone depletion.

a) Cataract

b) Damages paints and fibers

c) Sunburn

d) Increase in the moisture content of soil

Answer: d

Explanation: Ozone depletion leads to increase in the evaporation of surface water through the stomata of the leaves and decreases the moisture content of the soil. In addition to this, plant proteins get easily affected by UV radiations and therefore, leads to harmful mutation of cells. Thus, ozone depletion has adverse effects on plant life.

21. What is an easily identified source of pollution called as?

a) Specific source

b) Point source

c) Non-point source

d) Polluting source

Answer: b

Explanation: Easily identified source or place of pollution is called as point source. The examples of point sources are municipal and industrial discharge pipes where the pollutants enter the water-source as treated wastewater. A point source has a negligible extent, distinguishing it from other pollution source geometries.

22. Pick out the source of organic wastes pollutant from the following.

a) Industries

b) Erosion of soil by agriculture and strip mining

c) Water used for cooling in factories

d) Discharge from food processing factories

Answer: d

Explanation: Organic wastes, also known as biodegradable wastes, are natural wastes of plants and animals. The source of organic wastes include domestic sewage, animal excreta and waste, decaying animals and plants, as well as discharge from food processing factories. They can ultimately lead to harm when they use up the oxygen in the water body that they are dumped into.

23. Identify the bacteria not found in human excreta that causes gastrointestinal diseases.

a) Staphylococcus aureus

b) Escherichia coli

c) Streptococcus faecalis

d) Shigella

Answer: a

Explanation: Staphylococcus aureus is not found in human excreta. It is a round-shaped bacterium that is a member of the Firmicutes. It is mainly found on the upper respiratory tract and/or on skin. But they can also spread through the bloodstream and infect distant organs. Infections caused due to this bacterium can be transferred through the air, skin contact, etc.

24. Plants always take in carbon dioxide and release oxygen.

a) True

b) False

Answer: b

Explanation: Plants do not always take in carbon dioxide and release oxygen. Plants take in carbon dioxide during the day for the process of photosynthesis and release oxygen into the atmosphere. But at night, photosynthesis does not occur, due to the absence of sunlight, and therefore plants take in oxygen for breathing and give out carbon dioxide.

25. What is the amount of oxygen required by bacteria to break down organic matter present in certain volume of sample of water is called?

a) Bacterial oxidation

b) Bacterial decomposition

c) Biochemical oxygen demand

d) Biological oxygen demand

Answer: c

Explanation: 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 as Biochemical Oxygen Demand (BOD). The amount of BOD in water is a measure of the amount of organic material in the water, in terms of how much oxygen will be required to break it down biologically. Clean water has BOD value less than 5 ppm whereas highly polluted water has BOD value of 17 ppm or more.

26. What does the addition of phosphate fertilizers into water lead to?

a) Increased algae growth

b) Decreased algae growth

c) Increased growth of decomposers

d) Nutrient enrichment

Answer: d

Explanation: Addition of phosphate fertilizers into water bodies lead to nutrient enrichment. This condition is also known as eutrophication. When excess nutrients are formed, this, in turn, will lead to the growth of algae in the water body. These algae will consume the oxygen that is present in the water and thus, there will not be sufficient oxygen left for use of the aquatic organisms inhabiting the water body. As a result, death of these aquatic organisms will take place in large quantities. And therefore, leads to pollution.

27. What is the full form of PCB(in the context of chemistry)?

a) Printed Circuit Boards

b) Polychlorinated biphenyls

c) Polychemical biphenyls

d) Primary Chemical Bacteria

Answer: b

Explanation: The full form of PCB is Polychlorinated biphenyls. It is used as a cleansing solvent. PCBs are also suspected to be carcinogenic (can lead to cancer). Bacteria responsible for degrading biodegradable detergent feed on these and grow rapidly. While growing, they use up all the oxygen dissolved in water. Thus, the lack of oxygen kills all other forms of aquatic life such as fish and plants.

28. Water should be tested for fluoride ion concentration for drinking purposes.

a) True

b) False

Answer: a

Explanation: For drinking purposes, water should be tested for fluoride ion concentrations. Its deficiency in drinking water is harmful to man and causes diseases such as tooth decay. But, if present in higher concentrations, it causes brown mottling of teeth. It can also lead to harmful effects in bones.

29. The maximum limit of which of the following in drinking water should be 50 ppb?

a) Lead

b) Sulphate

c) Nitrate

d) Fluoride

Answer: a

Explanation: The maximum prescribed upper limit concentration of lead in drinking water is about 50 ppb. Drinking water gets contaminated with lead when lead pipes are used for the transportation of drinking water. Lead is a harmful substance and can cause damage in kidneys, liver, reproductive system, etc.

30. The excess of which ion in drinking water can lead to blue baby syndrome?

a) Aluminum ion

b) Copper ion

c) Sulphate ion

d) Nitrate ion

Answer: d

Explanation: Blue baby syndrome (methemoglobinemia) is a disease that is caused when the baby consumes drinking water which is rich in nitrates. It is caused when the maximum limit of nitrate in water, i.e. 50ppm, is crossed. When the baby drinks nitrate-rich water, then the nitrates get converted to nitrites and this will go and bind with the haemoglobin present in the blood, forming methemoglobin, which does not have the ability to carry oxygen. This is the reason for the blue color of the skin of the baby.

31. Which of the following produces fly ash?

a) Steam power plant

b) Thermal power plant

c) Steel power plant

d) Nuclear power plant

Answer: b

Explanation: Thermal power plants produce fly ash. Fly ash contains particles of silica, alumina, and oxides of iron, calcium, and magnesium, and toxic heavy metals like lead, cobalt, arsenic, and copper. The thermal power plants in India use bituminous coal and produce large quantities of ash.

32. Which among the following do not produce mud and tailings?

a) Steel plants

b) Aluminum manufacturing industries

c) Zinc manufacturing industries

d) Copper manufacturing industries

Answer: a

Explanation: Industries manufacturing aluminum, zinc and copper produce mud and tailings. So, that leaves the answer, i.e., steel plants. Tailings are the by-products left over from mining and extracting resources, such as extracting bitumen from oil sands or minerals such as copper or gold from ores.

33. Pick out the method employed for destroying large amounts of industrial wastes.

a) Burning them along with garbage in open bins

b) Dumping them in landfills

c) Transferring them to other industries

d) Controlled incerination

Answer: d

Explanation: Large quantities of industrial toxic wastes are usually destroyed by controlled incerination. Whereas, small quantities are burned along with the garbage in open bins. Therefore, the disposal of non-degradable industrial solid wastes, if not done by a proper and suitable method, may cause serious threat to the environment.

34. New technology has been developed to produce electricity from garbage.

a) True

b) False

Answer: a

Explanation: Yes, new technology has been developed to produce electricity from garbage. Since, in India, power cuts and the increasing piles of rotting garbage are an everyday concern, this new development aims at getting rid of both the problems in one go. A pilot plant has been set up, where after removing ferrous metals, plastic, glass, paper, etc. from garbage, it is mixed with water. It is then cultured with bacterial species for producing methane, commonly known as biogas. The remaining product is used as manure and biogas is used to produce electricity.

35. What the name for fuel obtained from plastic waste?

a) White fuel

b) Black fuel

c) Green fuel

d) Yellow fuel

Answer: c

Explanation: Fuel obtained from plastic waste has high octane rating. It contains no lead and, therefore, is known as green fuel. Due to recent developments made in chemical and textile industries, clothes will be made from recycled plastic waste. These will be available soon in the global textile market.

36. Which of the following is a major cause of environmental degradation?

a) Sewage treatment

b) Improper waste disposal

c) Microwave-assisted reactions

d) Bioamplification

Answer: b

Explanation: Disposing of waste has huge environmental impacts as a certain type of wastecan be hazardous and can contaminate the environment if not handled properly. Some waste generates methane gas, which contributes to the greenhouse effect.

37. Identify the type of waste which can be degraded by composting, vermicomposting and landfills method.

a) Plastic

b) Tins and metals

c) Biodegradable

d) Non-biodegradable

Answer: c

Explanation: Biodegradable wastes are deposited in landfills and are converted into compost. These wastes mix with the soil and produce manure. Examples include paper, leaves and vegetable peels.

38. Dumping of sewage sludge into the sea is preferred and beneficial over dumping them into the land. State true or false.

a) True

b) False

Answer: b

Explanation: Dumping of sewer sludge into land is preferred. This is because it contains compounds of nitrogen and phosphorus which act as a good fertilizer for the soil.

39. Which method is best suitable for disposing of plastic wastes and polythene bags?

a) Burning and incineration

b) Digesting

c) Dumping

d) Recycling

Answer: d

Explanation: Recycling is the most useful method for plastic waste disposal as several waste materials can be used as raw materials to manufacture useful products again.

40. Which among the following is a biodegradable waste?

a) Polythene

b) Polystyrene

c) Cellulose

d) Butadiene

Answer: c

Explanation: Cellulose is an organic material derived from plants. Hence they are degraded in nature by microorganisms. They are deposited in landfills and are converted into compost.

41. Which of the following is a greener route to produce ethanal commercially?

a) Catalytic cracking of ethanol

b) Oxidation of ethene with an ionic catalyst

c) Steam reforming of methanol

d) Dehydrogenation of ethylene

Answer: b

Explanation: Ethanal can be prepared by oxidation of ethene, in the presence of an ionic catalyst in an aqueous medium. This is a greener method and gives 90% of yield.

42. Name the conventional solvent that was used for dry cleaning purposes which later confirmed to be a suspected carcinogen.

a) Supercritical CO2

b) Phenanthrene

c) Tetrachloroethene

d) Benzene aldehyde

Answer: c

Explanation: Tetrachloroethene was used as a solvent for dry cleaning purposes. It is a suspected carcinogen and groundwater contaminant. It is replaced by greener solvent like supercritical CO2.

43. Which of the following is not a principle of Green Chemistry?

a) Green solvents and auxiliaries

b) Use of renewable feedstock

c) Hazardous chemical synthesis

d) Design for energy efficiency

Answer: c

Explanation: Synthetic methods should avoid using or generating substances toxic to humans and/or the environment. Hence less hazardous chemical synthesis is an important principle.

44. Green chemistry is the design of chemical products and processes that reduce or eliminate the use and generation of hazardous substances. Identify the technique used in this area.

a) Bioamplification

b) Polymer manufacturing

c) Pesticide synthesis

d) Use of sunlight and Microwave-assisted reaction

Answer: d

Explanation: Photochemical reaction occurs when light energy gets absorbed by a substances' molecule. It is a green route as no byproduct will be formed. Vitamin D3 synthesis is assisted by a photochemical reaction.

45. Which of the following gas was traditionally used to bleach paper?

a) Sulfur

b) Carbon dioxide

c) Chlorine

d) Fluorine

Answer: c

Explanation: Chlorine gas was used to bleach paper. It has good oxidizing properties. Nowadays H2O2 with a suitable

catalyst is used for bleaching purposes as it does not contaminate groundwater.

46. Replacement of liquid CO2 by halogenated solvent will result in less harm to groundwater.

a) True

b) False

Answer: b

Explanation: Halogenated solvents contaminate groundwater. Whereas liquified CO2 leaves a lower amount of residue. It is also a non-toxic and attractive solvent for temperature-sensitive materials.

47. Which of the following is a green solvent used for bleaching clothes?

a) Hydrogen peroxide

b) Tetrachloroethene

c) Benzene

d) Toluene

Answer: a

Explanation: Hydrogen peroxide can easily breakdown into water and oxygen. It is a good oxidizing agent and a strong bleaching agent. Use of H2O2 gives better results and makes use of a lesser amount of water.

48. Identify the non-toxic and green solvent.

a) Liquified carbondioxide

b) Benzene

c) Carbon tetrachloride

d) Toluene

Answer: a

Explanation: When compared to conventional solvents, liquified CO2 leaves a lower amount of residue. It is also a non-toxic and attractive solvent for temperature-sensitive materials.