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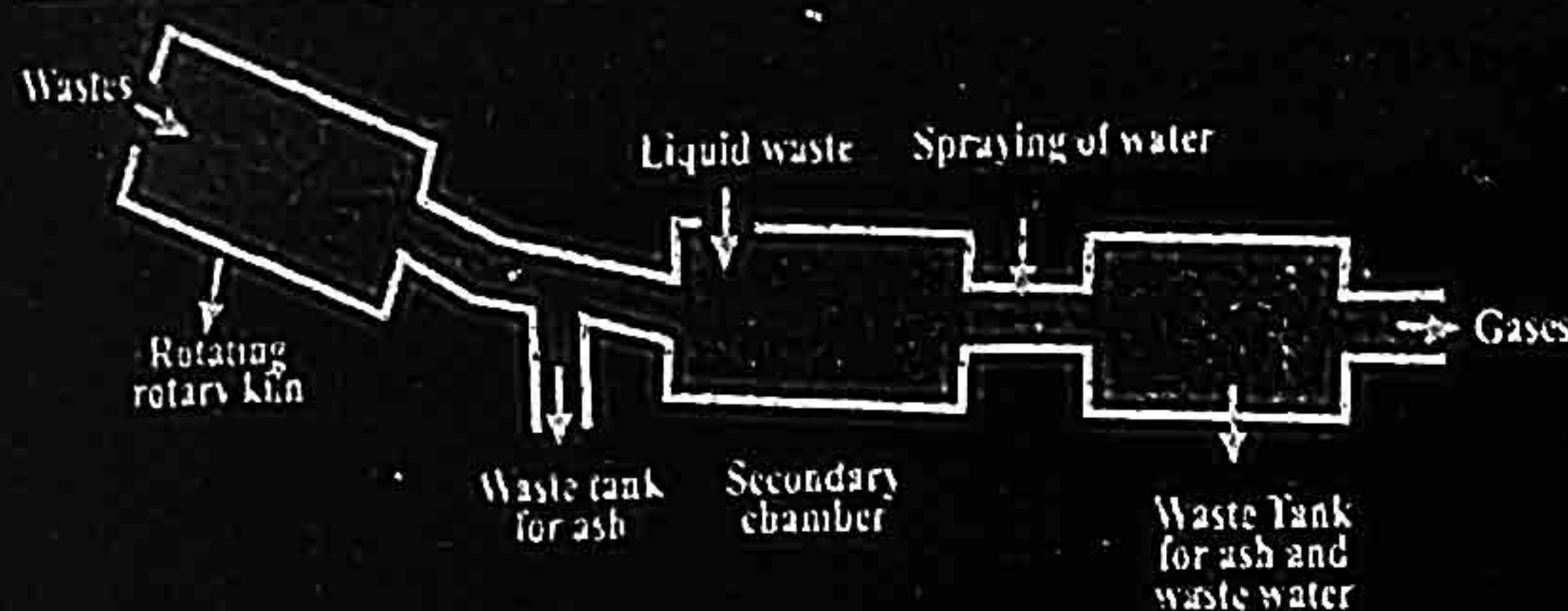
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# Chapter

# 16

## Environmental Chemistry

### KEY POINTS

#### Biosphere:

The earth, oceans and atmosphere with which the living organisms interact.

#### Carcinogenic:

The substances which cause cancer.

#### Chemotherapy:

Selective destruction or prevention of pathogenic organisms with the help of chemicals (medicine).

#### Coagulation:

Precipitation of the suspended solids present in a liquid by altering the surface characteristics of the solids.

#### Environmental chemistry:

The branch of chemistry which deals with the sources, reactions, transportation of the pollutants and their adverse effects on human beings.

#### Environmental pollution:

The substances in the environment which have adverse effects on the human health, quality of life or the natural functioning of the ecosystem.

#### Fungicide:

Materials used to prevent fungi attack on crops, wood, paper, etc.

#### Herbicides:

Materials used to control herbs.

#### Hydrosphere:

It consists of all the water resources.

#### Insecticides:

Materials used to control insects.

#### Lithosphere:

It consists of the earth's crust.

#### Pesticides:

The substances which can directly kill unwanted organisms or otherwise control them by interfering with their reproduction process.

#### Smog:

Combination of smoke and fog. If the concentration of sulphur dioxide is high it is called reducing smog and when the concentration of the oxidants is high it is known as oxidizing smog.

#### Weed killers:

Chemicals used to control selectively unwanted vegetation on agricultural land.



### TOPICAL MULTIPLE CHOICE QUESTIONS

#### 16.1 Introduction:

- (1) The branch of chemistry which deals with the study of chemicals and other pollutants in the environment is called
  - (a) Physical chemistry
  - (b) Space chemistry
  - (c) Environmental chemistry
  - (d) Industrial chemistry
- (2) Environmental chemistry is inter-related with
  - (a) Biology and medicine
  - (b) Physics and sanitary engineering
  - (c) Agriculture and public health
  - (d) All the branches of science
- (3) Environment consist of
  - (a) two components
  - (b) four components
  - (c) three components
  - (d) six components
- (4) The layer of gases surrounding the earth is called
  - (a) biosphere
  - (b) lithosphere
  - (c) atmosphere
  - (d) hydrosphere
- (5) Atmosphere contains argon (Ar)
  - (a) 0.6%
  - (b) 0.8%
  - (c) 0.7%
  - (d) 0.9%
- (6) The thickness of atmosphere above the surface of the earth is about.
  - (a) 900 Km
  - (b) 1000 Km
  - (c) 800 Km
  - (d) 1200 Km
- (7) Half of the mass of atmosphere is concentrated in the lower
  - (a) 5.6 Km
  - (b) 4.6 Km
  - (c) 3.6 Km
  - (d) 2.6 Km
- (8) How much percent of the surface of the earth is covered by hydrosphere?
  - (a) 50.7%
  - (b) 68.9%
  - (c) 70.8%
  - (d) 80.6%
- (9) How much earth's water is present in oceans?
  - (a) 97%
  - (b) 87%
  - (c) 77%
  - (d) 67%
- (10) The polar ice caps and glaciers consist of how much part of earth's total water supply.
  - (a) 3%
  - (b) 2%
  - (c) 4 %
  - (d) 5%
- (11) How much part of total earth's water resources are available as fresh water.
  - (a) 1%
  - (b) 0.5 %
  - (c) 1-5%
  - (d) 0.75%
- (12) The fresh water which is being used by agriculture is
  - (a) 49%
  - (b) 69%
  - (c) 59%
  - (d) 79%
- (13) The fresh water which is being used by industry is
  - (a) 13%
  - (b) 33%
  - (c) 43%
  - (d) 23%
- (14) That part of environment which consist of rocky crust of earth is called
  - (a) Atmosphere
  - (b) Lithosphere
  - (c) Biosphere
  - (d) None of given





- (15) How much fresh water is consumed for domestic purpose?  
 (a) 8% (b) 6%  
 (c) 10% (d) 7%
- (16) How much mass of lithosphere is made of eleven (11) elements?  
 (a) 85.5% (b) 90.5%  
 (c) 95.5% (d) 99.5%
- (17) The region of earth capable of supporting life is called:  
 (a) atmosphere (b) stratosphere  
 (c) biosphere (d) lithosphere
- (18) The element which is present in large extent in lithosphere is  
 (a) Oxygen (b) Iron  
 (c) Sodium (d) Magnesium
- 16.2 Types of Pollution**
- (19) Environmental pollutant adversely affects  
 (a) the human health (b) quality of life  
 (c) the natural functioning of ecosystem (d) all of these
- (20) Environmental pollution is spreading in almost every city of the world due to  
 (a) continuous rapid growth in population (b) urbanization  
 (c) industrialization and transportation (d) all of these
- (21) Which property of CO given below is incorrect?  
 (a) It is colourless gas (b) It is highly toxic gas  
 (c) It has pungent odour (d) It is soluble in water
- (22) How much CO is coming in the atmosphere by fuel burning in various types of transportation?  
 (a) 65% (b) 75%  
 (c) 85% (d) 95%
- (23) What is the effect of CO inhalation?  
 (a) sore throat (b) nose irritation  
 (c) suffocation (d) eyes irritation
- (24)  $\text{NO}_x$  formula represent which oxide of nitrogen  
 (a) NO and  $\text{N}_2\text{O}$  (b)  $\text{NO}_2$  and  $\text{N}_2\text{O}$   
 (c)  $\text{N}_2\text{O}$ , NO and  $\text{NO}_2$  (d) NO and  $\text{NO}_2$
- (25) Which oxide of nitrogen is mainly produced by bacterial action?  
 (a) NO (b)  $\text{NO}_2$   
 (c)  $\text{N}_2\text{O}$  (d)  $\text{N}_2\text{O}_3$
- (26) The residence time of NO in atmosphere is  
 (a) 2 days (b) 3 days  
 (c) 4 days (d) 1 day
- (27) The residence time of  $\text{NO}_2$  in the atmosphere is  
 (a) 3 days (b) 2 days  
 (c) 1 day (d) 5 days
- (28) Coal contain sulphur  
 (a) 1-3% (b) 2-5%  
 (c) 1-9% (d) 3-8%



- (29) The mean residence time of  $\text{CH}_4$  in atmosphere is about  
 (a) 2-5 years (b) 3-7 years  
 (c) 5-9 years (d) 4-8 years
- (30) How much  $\text{SO}_2$  is produced by volcanoes?  
 (a) 57% (b) 67%  
 (c) 87% (d) 77%
- (31) Reducing smog contains high contents of  
 (a)  $\text{NO}_2$  (b)  $\text{SO}_2$   
 (c) NO (d)  $\text{N}_2\text{O}$
- (32) The main cause of reducing smog is combustion of  
 (a) Oils (b) Coal  
 (c) Natural gas (d) Gasoline
- (33) The main reactants of photochemical smog are  
 (a)  $\text{SO}_2$  and NO (b)  $\text{SO}_2$  and unburnt hydrocarbons  
 (c) NO and unburnt hydrocarbons (d)  $\text{SO}_3$  and  $\text{NO}_2$
- (34) The yellow colour in photochemical smog is due to the presence of  
 (a) nitric oxide (b) sulphur dioxide  
 (c) nitrogen dioxide (d) ozone
- (35) Peroxyacetyl nitrate (PAN) is  
 (a) a nose irritant (b) a throat irritant  
 (c) an eye irritant (d) a skin irritant
- (36) Ozone is  
 (a) a gas having high boiling point (b) a liquid having low boiling point  
 (c) a solid having high boiling point (d) a gas having low boiling point
- (37) The normal amount of overhead ozone is about  
 (a) 250 DU (b) 350 DU  
 (c) 200 DU (d) 150 DU
- (38) By what type of reactions oxygen is converted into ozone  
 (a) oxidation reactions (b) photochemical reactions  
 (c) reduction reactions (d) redox reactions
- (39) The stratosphere where ozone layer exists in the atmosphere is approximately at  
 (a) 10-35 Km altitude (b) 5-30 Km altitudes  
 (c) 25-28 Km altitude (d) 15-40 Km altitudes
- (40) The temperature in troposphere decreases with increasing altitude from  
 (a) 10 to  $-51^\circ\text{C}$  (b) 15 to  $-56^\circ\text{C}$   
 (c) 20 to  $-61^\circ\text{C}$  (d) 12 to  $-53^\circ\text{C}$
- (41) The temperature in stratosphere increases with increase of altitude from  
 (a)  $-56$  to  $-2^\circ\text{C}$  (b)  $-46$  to  $-12^\circ\text{C}$   
 (c)  $-49$  to  $-25^\circ\text{C}$  (d)  $-56$  to  $-8^\circ\text{C}$
- (42) Which is the main chemical species present in stratosphere that absorbs UV-radiation:  
 (a)  $\text{NO}_2$  (b)  $\text{O}_2$   
 (c)  $\text{O}_3$  (d)  $\text{SO}_2$
- (43) Smog may be  
 (a) oxidizing (b) reducing  
 (c) neutralizing (d) both a and b





- (44) The over all result of photochemical smog in afternoon is built up of  
 (a) neutralization agent (b) oxidizing agent  
 (c) reducing agent (d) activating agent
- (45) Chromium (VI) is used in  
 (a) leather tanning (b) fertilizer industry  
 (c) cement industry (d) water purification
- (46) The ozone layer is  
 (a) 25 – 28km high (b) 20 – 25 km high  
 (c) 25 – 30 km high (d) 35 – 40 km high

**16.3 Factors Affecting the Quality of Water**

- (47) Chemical and bacterial contents in livestock waste can contaminate surface and ground water causing  
 (a) Dysentery (b) Typhoid  
 (c) Hepatitis (d) All of these
- (48) Which causes the contamination of both surface and ground water which is used for irrigation and potable water supply?  
 (a) toxic organic compounds (b) heavy metals  
 (c) metalloids (d) all of these
- (49) Which chromium is one of the water pollutant?  
 (a) Chromium (III) (b) Chromium (IV)  
 (c) Chromium (VI) (d) Chromium (V)
- (50) Chromium (VI) is highly toxic and is known to cause  
 (a) Typhoid (b) Cancer  
 (c) Hepatitis (d) Aids
- (51) Water is considered as polluted when amount of dissolved oxygen is less than  
 (a) 2ppm (b) 6ppm  
 (c) 4ppm (d) 8ppm
- (52) The amount of oxygen consumed as a result of biological oxidation of dissolved organic matter in the sample is called  
 (a) DO (b) COD  
 (c) BOD (d) DU
- (53) Amount of dissolved oxygen in water ranges from  
 (a) 3-7ppm (b) 4-8 ppm  
 (c) 5-9 ppm (d) 2-6ppm
- (54) Oxygen demand of water can be determined directly by treating it with  
 (a) manganate ion (b) dichromate ion  
 (c) chlorate ion (d) both 'a' and 'b'
- (55) Higher value of which indicate more pollution  
 (a) COD (b) BOD  
 (c) DO (d) Both 'a' and 'b'
- (56) Dissolved oxygen in water is measured in  
 (a) Dobson unit (b) ppm  
 (c) gram (d) cm<sup>3</sup>
- (57) BOD is the capacity of organic matter in natural water to consume oxygen within a period of  
 (a) two days (b) three days  
 (c) four days (d) five days



- (58) In aeration process some of the organic materials in the raw water can be easily oxidized with air to produce  
 (a) CO<sub>2</sub> (b) CO  
 (c) NO (d) SO<sub>2</sub>
- (59) How much, suspended particles can be removed by coagulation process  
 (a) More than 60% (b) More than 90%  
 (c) More than 80% (d) More than 70%
- (60) Hypochlorous acid is not stable thus it cannot be stored. Therefore, it is generated by dissolving  
 (a) Cl<sub>2</sub> gas in water (b) NaOCl in water  
 (c) Ca(OCl)<sub>2</sub> in water (d) All of given
- (61) In human, liver cancer is due to  
 (a) oxygen (b) chloroform  
 (c) carbon dioxide (d) methane

**16.4 Solid Waste Management**

- (62) The recycling of plastic is done by  
 (a) Reprocessing (b) Depolymerization  
 (c) Transformation (d) All of above
- (63) Polythene terephthalate can be recycled by  
 (a) reprocessing (b) depolymerization  
 (c) transformation (d) all of these

**MULTIPLE CHOICE QUESTIONS**

(From textbook exercise)

- (1) The pH range of the acid rain is  
 (a) 7-6.5 (b) 6.5-6  
 (c) 6-5.6 (d) less than 5
- (2) Peroxyacetylnitrate (PAN) is an irritant to human beings and it affects  
 (a) eyes (b) ears  
 (c) stomach (d) nose
- (3) To avoid the formation of toxic compounds with chlorine which substance is used for disinfection of water  
 (a) KMnO<sub>4</sub> (b) O<sub>3</sub>  
 (c) Alums (d) Chloramines
- (4) A single chloride free radical can destroy how many ozone molecules  
 (a) 100 (b) 100000  
 (c) 10000 (d) 10
- (5) Fungicides are the pesticides which  
 (a) control the growth of fungus (b) kill insects  
 (c) kill plants (d) kill herbs
- (6) Ecosystem is a smaller unit of  
 (a) lithosphere (b) hydrosphere  
 (c) atmosphere (d) biosphere
- (7) The main pollutant of leather tanneries in the waste water is due to the salt of  
 (a) lead (b) chromium(VI)  
 (c) copper (d) barium sulphate(III)





- (8) In purification of potable water, the coagulant used is  
 (a) nickel sulphate (b) copper sulphate  
 (c) barium sulphate (d) alum
- (9) The temperature in the non-rotating chamber in the incineration of industrial and hazardous waste process has a range  
 (a) 900 to 1000°C (b) 250 to 500°C  
 (c) 950 to 1300°C (d) 500 to 900°C
- (10) Newspaper can be recycled again and again by how many times?  
 (a) 2 (b) 3  
 (c) 4 (d) 5

**KIPS EXERCISE**

- (1) Oxidation reaction in natural water is catalyzed by  
 (a) Salts (b) Micro-organisms  
 (c) Organic matter (d) Both b and c
- (2) Which one of the following gas is produced during photosynthesis  
 (a) N<sub>2</sub> (b) O<sub>2</sub>  
 (c) CO<sub>2</sub> (d) CO
- (3) To avoid the formation of toxic compounds with chlorine, which one of the following is used for the disinfection of water  
 (a) Ozone (b) Chlorine dioxide  
 (c) Acetic acid (d) Both a and 'b'
- (4) Cracking of polyethylene at high temperature gives  
 (a) Allotropes (b) Isomorphs  
 (c) Polymers (d) Monomers
- (5) Fungicides are the pesticides which  
 (a) control the growth of fungus (b) kill insects  
 (c) kill plants (d) kill herbs
- (6) Which element is not present abundantly in the earth's crust?  
 (a) silicon (b) aluminum  
 (c) sodium (d) oxygen
- (7) A frog is swimming in the stream. In which component of environment, it is present  
 (a) lithosphere (b) hydrosphere  
 (c) atmosphere (d) mesosphere
- (8) A person is affected with carbon monoxide gas. How can we save him/her by adverse affect of the poisonous gas  
 (a) drink dilute solution of NaHCO<sub>3</sub> (b) drink dilute solution of CH<sub>3</sub>COOH  
 (c) supply pure O<sub>2</sub> for breathing (d) all are correct
- (9) Ozone depletion in stratosphere region is mainly due to the reaction of O<sub>3</sub> with  
 (a) O<sub>2</sub> (b) SO<sub>2</sub>  
 (c) CFCs (d) All of these
- (10) Chemical oxygen demand of water (COD) is measured by reacting water with  
 (a) permanganate ion (MnO<sub>4</sub><sup>-1</sup>) (b) chromate ion (CrO<sub>4</sub><sup>2-</sup>)  
 (c) dichromate ion (Cr<sub>2</sub>O<sub>7</sub><sup>2-</sup>) (d) sulphate ion (SO<sub>4</sub><sup>2-</sup>)



- (11) The quality of raw water is improved by:  
 (a) reduction (b) aeration  
 (c) dehydration (d) incineration
- (12) Colloidal material in raw water is removed by  
 (a) purification (b) coagulation  
 (c) chlorination (d) combustion
- (13) Cracking of polyethylene at high temperatures gives its monomers which are used for manufacturing  
 (a) toys (b) trays  
 (c) lubricants (d) all of the above

**MULTIPLE CHOICE QUESTIONS**

(From past papers 2005-2011)

(Lahore &amp; Gujranwala)

- (1) Disinfection of water by chlorine is done by the production of: (LHR 2005)  
 (a) NH<sub>2</sub>Cl (b) NCl<sub>3</sub>  
 (c) HOCl (d) NHCl<sub>2</sub>
- (2) To avoid the formation of toxic compounds with chlorine, the substance used for disinfecting water is: (GRW 2005)  
 (a) KMnO<sub>4</sub> (b) ozone  
 (c) alums (d) chloramines
- (3) The main pollutant of leather tanneries in the waste water is due to the salts of: (LHR 2007)  
 (a) lead (b) chromium (VI)  
 (c) copper (d) chromium (III)
- (4) Atmosphere contains carbon dioxide: (GRW 2007)  
 (a) 0.01% (b) 0.02%  
 (c) 0.03% (d) 0.04%
- (5) Ecosystem is a smaller unit of: (LHR 2008)/(GRW 2009)  
 (a) lithosphere (b) atmosphere  
 (c) biosphere (d) hydrosphere
- (6) Proxy acetyl nitrate (PAN) is an irritant to human beings and it affects: (LHR 2008,09)  
 (a) eyes (b) ears  
 (c) stomach (d) nose
- (7) Following is better to disinfect water: (LHR 2011)  
 (a) Cl<sub>2</sub> (b) O<sub>2</sub>  
 (c) O<sub>3</sub> (d) KMnO<sub>4</sub>
- (8) The residual ash after incineration of industrial waste is disposed off in a landfill, which is lined with: (LHR 2011)  
 (a) Portland cement (b) Clay and plastic  
 (c) Methyl silicone (d) Stone-ware
- (9) Which gas is not a pollutant? (GRW 2008)  
 (a) SO<sub>2</sub> (b) CO  
 (c) NO<sub>2</sub> (d) CO<sub>2</sub>





- (10) The temperature in the non – rotating chamber in the incineration of industrial and hazardous waste process has a range: (GRW 2008)  
 (a) 900 to 1000 °C (b) 250 to 500 °C  
 (c) 950 to 1300 °C (d) 500 to 900 °C
- (11) The pH range of acid rain is: (LHR 2009)  
 (a) 6.5 to 7 (b) 6.5 to 6  
 (c) 5.6 to 6 (d) 5 to 4
- (12) The thickness of atmosphere is: (GRW 2009)  
 (a) 1500 km (b) 1000 km  
 (c) 500 km (d) 100 km
- (13) The pH of rain water is: (LHR 2010+GRW 2010)  
 (a) 7-6.5 (b) 6.5-6  
 (c) 6-5.6 (d) Less than 5
- (14) A single chloride free radical can destroy how many ozones molecules: (LHR 2010)  
 (a) 100 (b) 10,000  
 (c) 10,000 (d) 10
- (15) The pH range of the acid rain is: (GRW 2011)  
 (a) 7-6.5 (b) 6.5-6  
 (c) 6-5.6 (d) Less than 5

**MULTIPLE CHOICE QUESTIONS**

(From Past Papers 2008-2011)

(Faisalabad + Sargodha + Rawalpindi Board)

- (1) How many times the news paper can be recycled? (FSD 2009)  
 (a) 3 (b) 5  
 (c) 4 (d) 2
- (2) Ecosystem is a smaller unit of (FSD 2009)  
 (a) Biosphere (b) Lithosphere  
 (c) Atmosphere (d) Hydrosphere
- (3) The main pollutant of leather tanneries in the waste water is due to the salt of (FSD 2009)  
 (a) lead (b) Chromium (vi)  
 (c) Copper (d) Chromium (iii)
- (4) Fungicides are the pesticides which (FSD 2009)  
 (a) Control the growth of fungus (b) Kill insects  
 (c) Kill plants (d) Kill herbs
- (5) The fresh water being used for domestic purpose is (FSD 2010)  
 (a) 8% (b) 23%  
 (c) 69% (d) 100%
- (6) The normal amount of overhead ozone is (FSD 2010)  
 (a) 300DU (b) 350 DU  
 (c) 400 DU (d) 450 DU
- (7) The number of zones through which the charge passes in a rotary kiln during manufacture of cement are (FSD 2011)  
 (a) 2 (b) 3  
 (c) 4 (d) 5
- (8) The main pollutant of leather tanneries in the waste water is due to the salt of (FSD 2011)  
 (a) Lead (b) Chromium (II)  
 (c) Copper (d) Chromium (VI)



- (9) The pH range of the acid rain is (SGD 2009)  
 (a) 7-6.5 (b) 6.5 – 6  
 (c) 6-5.6 (d) Less than 5
- (10) Peroxyacetal nitrate (PAN) is an irritant to human beings and it affects: (SGD 2009)  
 (a) Eyes (b) Ears  
 (c) Stomach (d) Nose
- (11) Fungicide are the pesticides which (SGD 2010)  
 (a) control the growth (b) Kill insects  
 (c) Kill plants (d) Kill herbs
- (12) The residence time of NO in atmosphere is (SGD 2010)  
 (a) Thirty minutes (b) One day  
 (c) Three days (d) Four days
- (13) pH range of acid rain is (SGD 2011)  
 (a) 7 – 6.5 (b) 6.5 – 6  
 (c) 6 – 5.6 (d) Less than 5
- (14) In purification of Potable water the Coagulant used is (SGD 2011)  
 (a) Nickle Sulphate (b) Copper Sulphate  
 (c) Barrium Sulphate (d) Alum
- (15) Bio chemical oxygen demand is the capacity of organic matter in natural water to consume oxygen with in a period of. (RWP 2008)  
 (a) Three days (b) Four days  
 (c) Five days (d) Six days
- (16) Proxy acetyl nitrate is an irritant to human beings and it affects. (RWP 2008)  
 (a) Eyes (b) Ears  
 (c) Stomach (d) Nose
- (17) Half of the mass of atmosphere is concentrated in lower (RWP 2009)  
 (a) 4.6 km (b) 5.6 Km  
 (c) 3.6 Km (d) 15 Km
- (18) Lithosphere extends in earth up to the depth of (RWP 2009)  
 (a) 50 K (b) 100 Km  
 (c) 150 Km (d) 30 Km
- (19) Proxy acetyl nitrate (PAN) is an irritant to human being and it effects (RWP 2010)  
 (a) Ears (b) Stomach  
 (c) Eyes (d) Nose
- (20) Newspaper can be recycled again and again by how many times? (RWP 2010)  
 (a) 2 (b) 3  
 (c) (d)
- (21) Chlorofluorocarbons play an effective role in removing O<sub>3</sub> in the: (RWP 2011)  
 (a) Troposphere (b) Stratosphere  
 (c) Polar region (d) Equator
- (22) Lithosphere is mainly made up of 11 elements, the element found in highest percentage is: (RWP 2011)  
 (a) Sodium (b) Calcium  
 (c) Carbon (d) Silicon



**MULTIPLE CHOICE QUESTIONS**

(From Past Papers 2008-2011)

(Multan + Bahawalpur + D.G. Khan Board)

- (1) One of the following is not the affect of acid rain. Point out that: (MTN 2008)  
 (a) It increases the percentage of  $\text{CO}_2$  in the atmosphere  
 (b) It leaches metal like aluminum, mercury and lead from soil  
 (c) It damages the buildings  
 (d) It decreases the pH of natural
- (2) Newspaper can be recycled again and again by how many times? (MTN 2008)  
 (a) 2 (b) 3  
 (c) 4 (d) 5
- (3) A single chloride free radical can destroy how many Ozone molecules? (MTN 2008)  
 (a) 100 (b) 100000  
 (c) 10000 (d) 10
- (4) The normal amount of overhead ozone is about: (MTN 2008)  
 (a) 150 DU (b) 250 DU  
 (c) 350 DU (d) 450 DU
- (5) How much earth's water is present in Oceans (MTN 2008)  
 (a) 97% (b) 87%  
 (c) 77% (d) 67%
- (6) Detergent greatly affect: (MTN 2009)  
 (a) Aquatic life (b) modern life  
 (c) Terrestrial life (d) plant's life
- (7) The Ozone layer is. (MTN 2009)  
 (a) 25-28 km high (b) 26-29 Km high  
 (c) 24-27 Km high (d) 20-28 Km high
- (8) Ecosystem is a smaller unit of (MTN 2009)  
 (a) Atmosphere (b) Lithosphere  
 (c) Biosphere (d) Hydrosphere
- (9) The normal amount of overhead Ozone is (MTN 2010)  
 (a) 250 DU (b) 350 DU  
 (c) 450 DU (d) None of these
- (10) Normal amount of overhead ozone in atmosphere is (MTN 2010)  
 (a) 150 DU (b) 250 DU  
 (c) 350 DU (d) 450 DU
- (11) The pH of acid rain is (MTN 2010)  
 (a) 7.0-8.5 (b) 0.5-6  
 (c) 6.0-5.6 (d) Less than 5
- (12) Newspaper can be recycled again and again by how many times? (MTN 2011)  
 (a) 5 (b) 4  
 (c) 3 (d) 2
- (13) To avoid the formation of toxic compounds with chlorine which substance is used for disinfecting water:- (MTN 2010)  
 (a)  $\text{O}_3$  (b)  $\text{KMnO}_4$   
 (c) Alums (d) Chlorines



- (14) The region of Earth capable of supporting life is called (BWP 2008)  
 (a) Atmosphere (b) Biosphere  
 (c) Lithosphere (d) Hydrosphere
- (15) Which one of these gas is not a pollutant? (BWP 2008)  
 (a) CO (b)  $\text{SO}_2$   
 (c)  $\text{NO}_2$  (d)  $\text{CO}_2$
- (16) The residence time of NO is (BWP 2009)  
 (a) 1-2 years (b) Few hours  
 (c) 4 days (d) One day
- (17) How much fresh water is used for domestic purpose (BWP 2009)  
 (a) 8% (b) 23%  
 (c) 69% (d) 100%
- (18) The element present in greatest proportion on earth crust is (BWP 2010)  
 (a) Magnesium (b) Nitrogen  
 (c) Oxygen (d) Iron
- (19) Eco system is a smaller unit of (BWP 2010)  
 (a) Lithosphere (b) Hydrosphere  
 (c) Atmosphere (d) Biosphere
- (20) The reaction between fat and NaOH is called: (BWP 2011)  
 (a) Esterification (b) Hydrogenolysis  
 (c) Fermentation (d) Saponification
- (21) Ecosystem is a smaller unit of (DGK 2008)  
 (a) Lithosphere (b) Hydrosphere  
 (c) Atmosphere (d) Biosphere
- (22) The normal amount of overhand Ozone is about. (DGK 2008)  
 (a) 150 DU (b) 250 DU  
 (c) 350 DU (d) 450 DU
- (23) The decrease in ozone concentration in overhead atmosphere is occurring due to human activity. Half of the ozone over Antarctica has been depleted up to the year (DGK 2009)  
 (a) 1960 (b) 1970  
 (c) 1980 (d) 1990
- (24) Incineration is a process in which solid-waste is burnt at high temperature following temperature range is most effective. (DGK 2009)  
 (a) 900 to 1000°C (b) 800 to 900°C  
 (c) 100 to 200°C (d) None of these
- (25) Components of environmental which consist of all water bodies is (DGK 2010)  
 (a) Biosphere (b) Hydrosphere  
 (c) Lithosphere (d) Atmosphere
- (26) Reducing smog contains high contents of: (DGK 2010)  
 (a)  $\text{NO}_2$  (b)  $\text{SO}_2$   
 (c) NO (d)  $\text{CO}_2$
- (27) A single chloride free radical can destroy ozone molecules (DGK 2011)  
 (a) 10 (b) 100  
 (c) 1000 (d) 100000



**ANSWER KEY**

(Topical Multiple Choice Questions)

1	c	11	b	21	c	31	b	41	a	51	c	61	b
2	d	12	b	22	b	32	b	42	c	52	c	62	d
3	b	13	d	23	c	33	c	43	d	53	b	63	b
4	c	14	b	24	d	34	c	44	b	54	b	KIPS COLLEGE AND SCHOOL	
5	d	15	a	25	a	35	c	45	a	55	a		
6	b	16	d	26	c	36	d	46	a	56	b		
7	b	17	c	27	a	37	b	47	d	57	d		
8	a	18	a	28	c	38	b	48	d	58	a		
9	b	19	d	29	b	39	c	49	c	59	c		
10	a	20	d	30	b	40	b	50	b	60	a		

(From textbook exercise)

1	d	2	a	3	b	4	b	5	a
6	d	7	b	8	d	9	c	10	d

(KIPS exercise)

1	b	5	a	9	c	13	c
2	b	6	c	10	c	KIPS SCHOOL	
3	d	7	b	11	b		
4	d	8	c	12	b		

(From past papers 2005-2011)

(Lahore &amp; Gujranwala Board)

1	c	2	b	3	b	4	c	5	c
6	a	7	c	8	b	9	d	10	c
11	d	12	b	13	d	14	b	15	d

(From Past Papers 2008-2011)

(Faisalabad + Sargodha + Rawalpindi Board)

1	b	4	a	7	c	10	a	13	d	16	a	19	c	22	d
2	a	5	a	8	d	11	a	14	d	17	b	20	d	KIPS SCHOOL	
3	b	6	b	9	d	12		15	c	18	b	21	b		

(From Past Papers 2008-2011)

(Multan + Bahawalpur + D.G. Khan Board)

1	a	3	b	5	a	7	a
2	d	4	c	6	a	8	c

**KIPS SHORT QUESTIONS**

(Including Text Book Questions)

**Q: 1** What is atmosphere?

**Ans:** The layer of gases surrounding the earth is called atmosphere. It consists of various gases in different proportions. i.e. N<sub>2</sub> (78%), O<sub>2</sub> (21%), Ar (0.9%), CO<sub>2</sub> (0.03%) and trace amounts of H<sub>2</sub>, O<sub>3</sub>, CH<sub>4</sub>, CO, He, Ne, Kr and Xe. It also contains various amount of water vapours.

**Q: 2** What is hydrosphere?

**Ans:** It includes all water bodies, mainly oceans, rivers, streams, lakes, polar ice caps, glaciers and ground water reservoirs. Ocean contains 97% of earth's water but not drinkable due to high salt contents. Only 1% of the total earth's water resources is fresh water.

**Q: 3** What is biosphere or ecosphere?

**Ans:** It is the region of earth capable of supporting life. It includes lower atmosphere, the oceans, rivers, lakes, soils and solid sediments that actively interchange materials with all types of living organism.

**Q: 4** What is Ecosystem?

**Ans:** Ecosystem is a smaller unit of biosphere which consists of community of organisms and their interaction with environment i.e. animals, plants and micro-organisms which lie in a definite zone and depend on the physical factors such as soil, water and air.

**Q: 5** What is environmental pollution? Why it is spreading?

**Ans:** Any substance in the environment which adversely affects the human health, quality of life and the natural functioning of ecosystem is known as environmental pollution. With continuous rapid growth in population, urbanization, industrialization and transportation, pollution is spreading in almost every city of the world.

**Q: 6** What are environmental pollutants?

**Ans:** All those substances which adversely affect the human health, quality of life and natural functioning of ecosystem are environmental pollutants. There are two types of pollutants

- Primary pollutants like CO, NO, unburnt hydrocarbons etc
- Secondary pollutants like acid rain, smog etc.

**Q: 7** What are primary pollutants?

**Ans:** The waste products given out from chimneys of industrial units and exhaust of automobiles contain gases such as sulphur dioxides, sulphur trioxide, nitrogen oxides, carbon monoxide, hydrocarbons, ammonia, compounds of fluorine and radioactive materials. These waste products are called primary pollutants.

**Q: 8** How carbon monoxide is a poisoning gas?

**Ans:** Carbon monoxide is a highly poisonous gas and causes suffocation if inhaled. It binds blood haemoglobin more strongly than oxygen thus excluding oxygen from normal respiration.

**Q: 9** How poisoning effect of carbon monoxide can be reversed?

**Ans:** The CO poisoning can be reversed by giving high pressure oxygen. Exposure to high concentration of CO results in headache, fatigue, unconsciousness and eventually death.





**Q: 10** What is acid rain or acid deposition?

**Ans:** Air is polluted with  $\text{SO}_2$  due to combustion of coal, crude oil and other fossil fuel in power plants and petroleum industry.



These gases through various reactions in the atmosphere form sulphate aerosols.  $\text{SO}_2$  is the major source of acid deposition in the atmosphere.

**Q: 11** What is smog? How it is formed?

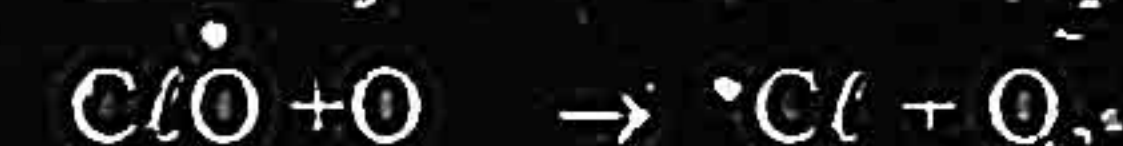
**Ans:** The word smog is a combination of smoke and fog. The main cause of smog is combustion of coal. The other cause is higher concentrations of oxidant like ozone,  $\text{NO}$  and unburnt hydrocarbons.

**Q: 12** What is ozone? How it acts as pollutant.

**Ans:** Ozone,  $\text{O}_3$  is a gas having low boiling point. It is present in small concentrations throughout the atmosphere. Ozone is produced in most of the tropical regions by the photochemical reactions of oxygen, from where it is transported to polar regions. It acts as a pollutant and causes various health problems. i.e. damages eyes and aggravates asthma, decreases the elasticity of lung tissues, coughing, chest discomfort etc. It is harmful to the plants and other material i.e. attacks rubber, reduces durability and appearance of paint and causes fabric dyes to fade.

**Q: 13** What is the role of CFC in depletion of ozone layer?

**Ans:** CFCs chlorofluorocarbons used as refrigerants in air-conditioning and in aerosol sprays are inert in the troposphere but slowly diffuse into stratosphere, where they are subjected to ultraviolet radiation generating  $\text{Cl}^\cdot$  free radicals. CFCs play an effective role in removing  $\text{O}_3$  in the stratosphere due to following reaction.



A single chloride free radical can destroy upto 100,000 ozone molecules.

**Q: 14** What is meant by term dissolved oxygen (DO)?

**Ans:** The most important oxidizing agent which is dissolved in water is molecular oxygen ( $\text{O}_2$ ). The organic matter is oxidized with the help of this dissolved oxygen in water. It is a parameter to determine the quality of water.

**Q: 15** What is Biochemical oxygen demand (BOD)?

**Ans:** It is the capacity of organic matter in natural water to consume oxygen within a period of five days. The value of BOD is the amount of oxygen consumed as a result of biological oxidation of dissolved organic matter in the sample.

**Q: 16** What is chemical oxygen demand (COD)?

**Ans:** The organic content of water which consumes oxygen during chemical oxidation is evaluated by chemical oxygen demand (COD).

**Q: 17** What is Aeration?

**Ans:** The quality of raw water is improved by aeration. In the process air is passed through water to remove the dissolved gases such as foul smelling  $\text{H}_2\text{S}$ , organosulphur compounds and volatile organic compounds.



**Q: 18** What is coagulation?

**Ans:** The materials which are suspended or present in the colloidal form in raw water are removed by coagulation. The coagulant such as aluminium sulphate or alum is added to the raw water, which causes the precipitation of suspended impurities.

**Q: 19** What is incineration? Give its advantages.

**Ans:** Incineration is a waste treatment process in which solid waste is burned at high temperature ranging from  $900$  to  $1000^\circ\text{C}$ . The burning of the solid waste in the incinerator consumes all combustible materials leaving behind the non-combustible materials and the ash residues. It could be disposed off on the land or landfills. The volume of waste is reduced by two third. The combustible components of garbage such as paper, plastics and wood provide fuel for the fire, in incineration the heat produced may be used to produce steam which runs the turbines to produce electricity.

**Q: 20** What is the importance of gases present in atmosphere?

**Ans:** The gases present in atmosphere are very important for the life on earth. These gases absorb most of the cosmic rays and the major portion of the harmful electromagnetic radiation which come from the sun. Thus life on earth is protected by this absorption of radiation. Other gases like  $\text{O}_2$  is required for breathing,  $\text{CO}_2$  is used by plants for photosynthesis,  $\text{N}_2$  by nitrogen fixing bacteria. Water vapours are responsible for sustaining various forms of life on the earth. Because of gases present in atmosphere it maintains the heat balance of the earth.

**Q: 21** What is Lithosphere?

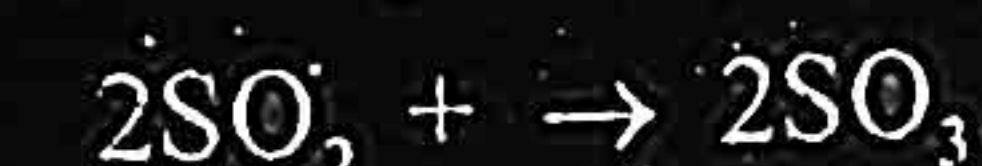
**Ans:** Lithosphere consists of rigid rocky crust of earth and extends to the depth of 100km. the mantle and core is the heavy interior of the earth, which constitutes the majority mass of earth. 99.5% mass of lithosphere is made up of 11 elements i.e.  $\text{O}_2$ , Si, Al, Fe, Ca, Na, K, Mg, and Ti,  $\text{H}_2$  and P (<1%). Few elements in trace quantities are C, Mn, S, Ba, Cl, Cr, F, Zr, Ni, Sr and V which occur in the form of minerals.

**Q: 22** What are secondary pollutants?

**Ans:** When primary pollutants in the atmosphere react due to some activity, they produce secondary pollutants such as sulphuric acid, nitrogen monoxide, carbonic acid, hydrofluoric acid, peroxyacetyl nitrate (PAN), ozone, aldehydes, ketones and proxy benzol. The above mentioned compounds are toxic and therefore their concentration in atmosphere has to be controlled.

**Q: 23** How sulphate aerosols are formed and how they affect?

**Ans:** Sulphur dioxide is produced by volcanoes (67%) and by oxidation of sulphur containing gases by decomposition of organic matter. Air is polluted with  $\text{SO}_2$  due to combustion of coal, crude oil and other fossil fuel in power plants and petroleum industry.



These gases have pungent odour hence are very irritant and suffocating. Through various reactions in the atmosphere they form sulphate aerosols. These aerosols cause severe respiratory troubles among old people.  $\text{SO}_2$  is the major source of acid deposition in the atmosphere. These aerosols cause severe respiratory troubles among old people.





Q: 24 What is reducing smog?

Ans: Smog is the combination of two words smoke and fog. If it contains high concentration of  $\text{SO}_2$ , it is chemically reducing in nature thus known as reducing smog. The main cause of reducing smog is combustion of coal.

Q: 25 What is photochemical smog?

Ans: Photochemical smog consists of higher concentrations of oxidants like ozone and is also termed as oxidizing smog, it is a yellowish brownish grey haze which is formed in the presence of water droplets and chemical reactions of pollutants in the air. It has unpleasant odour because of its gaseous components. The main reactants of photochemical smog are nitric oxide NO and unburnt hydrocarbons. Nitric oxide is oxidized to nitrogen dioxide within minutes to hours depending upon the concentration of pollutant gas. The yellow colour in photochemical smog is due to presence of  $\text{NO}_2$ .

Q: 26 What is ozone hole?

Ans: Ozone,  $\text{O}_3$ , is a gas having low boiling point and present in small concentrations throughout the atmosphere. It surrounds the globe filters harmful ultraviolet (UV) rays coming from the sun. The thickness of the ozone layer has been decreasing over Antarctica during the spring time. Since the mid 1970's by the mid 1980's loss in ozone at some altitudes over Antarctica resulted in about 50% depletion of the total overhead amount. The region in which ozone depletes substantially in every year during Sep-Nov is now termed as "ozone hole".

Q: 27 Why chlorination of water has harmful effects?

Ans: Chlorination of water containing organic materials also forms some organic compounds which are toxic. Like phenol if present in water reacts with chlorine to form chlorinated phenol with offensive odour and taste and is toxic as well. Hypochlorous acid reacts with organic water (humic acid) dissolved in water to form chloroform  $\text{CHCl}_3$ . This chloral form is suspected liver carcinogen and also has negative reproduction and development effects in humans. If chlorate water is used for drinking, it increases the risk of bladder and rectal cancer. To avoid the harmful effects of chlorination of water, ozone or chlorine dioxide is used as disinfectant of water.

Q: 28 What are the bad effects of drinking chlorinated water?

Ans: Drinking chlorinated water increases the risk of bladder and rectal cancer. It is also suspected liver carcinogenic as chloroform is formed when hypochlorous acid reacts with organic acid (humic acid) which is dissolved in water.

Q: 29 How formation of toxic compounds can be avoided?

Ans: The formation of toxic compounds due to chlorination of water can be avoided by using ozone or chlorine for the disinfection of water.

Q: 30 What is reprocessing of plastic?

Ans: The recycling of plastics is done by reprocessing, depolymerization or transformation. In reprocessing the used plastics are remelted and styrene which is used for manufacturing of different products, e.g. the original use of polystyrene is for the manufacturing of foam, packaging cutlery, furniture etc, but after reprocessing it is used mostly for the manufacture of toys, trays, etc.



Q: 31 What is depolymerization?

Ans: The polymerization is a process in which the used plastics are converted back into their original components by a chemical or thermal process so that these can be subsequently polymerized again. e.g. polyethylene terephthalate can be thermally depolymerized in the presence of a catalyst and heat into its original components.

Q: 32 Carbon monoxide is a main primary air pollutant. Give its effects on the human beings.

Ans: Carbon monoxide:

Human Activities:

Fuel burns in various types of transportations i.e motor vehicles, railways, and air crafts. These sources release 75% of total carbon monoxide in the atmosphere.

Poisoning effect of CO:

During breathing, we inhale oxygen which binds with Haemoglobin to form oxyhaemoglobin. Oxyhaemoglobin being unstable complex, decomposes to release oxygen which is used in cell activities. When CO is inhaled, it binds with haemoglobin to form carboxyhaemoglobin which is a stable complex. As a result, haemoglobin will not be available to transport oxygen for normal respiration.

Harmful effect of CO:

Exposure to high concentration of CO results in

- (i) headache
- (ii) fatigue
- (iii) unconsciousness

Exposure to CO for longer period eventually leads to death.

Q: 33 What is the unit used to measure the amount of Ozone in the atmosphere and give its normal amount.

Ans: Units of ozone measurement:

The amount of ozone in the atmosphere is expressed in Dobson units (DU). The normal amount of overhead ozone is about 350 DU.

Q: 34 How detergents are threat to aquatic animal life?

Ans: Detergents:

Detergents are excessively used in industries and household as cleaning agents. The amount of detergents being released in waste water is increasing day by day. This waste water when discharged in rivers or sea greatly affects the aquatic life. Furthermore, the detergent contents of waste water mobilize the bound toxic ions of heavy metals such as Pb, Cd and Hg from sediments into water.

Q: 35 How is oil spillage affecting the marine life?

Ans: Petroleum Products and Plant Life:

When oil is spilled on the surface of sea water, the oily layer affects the transmission of light through the surface of water. This results in two problems

- (i) Process of photosynthesis is affected
- (ii) Dissolved oxygen in water is decreased.





**Q: 36** Explain the process of incineration of industrial waste.

**Ans:** Incineration is a process in which a solid waste is burnt at high temperature. All the combustible material is burnt and the non-combustible material in the ash is left behind as residue.

**Explanation:**

The important points of the incineration process are given below.

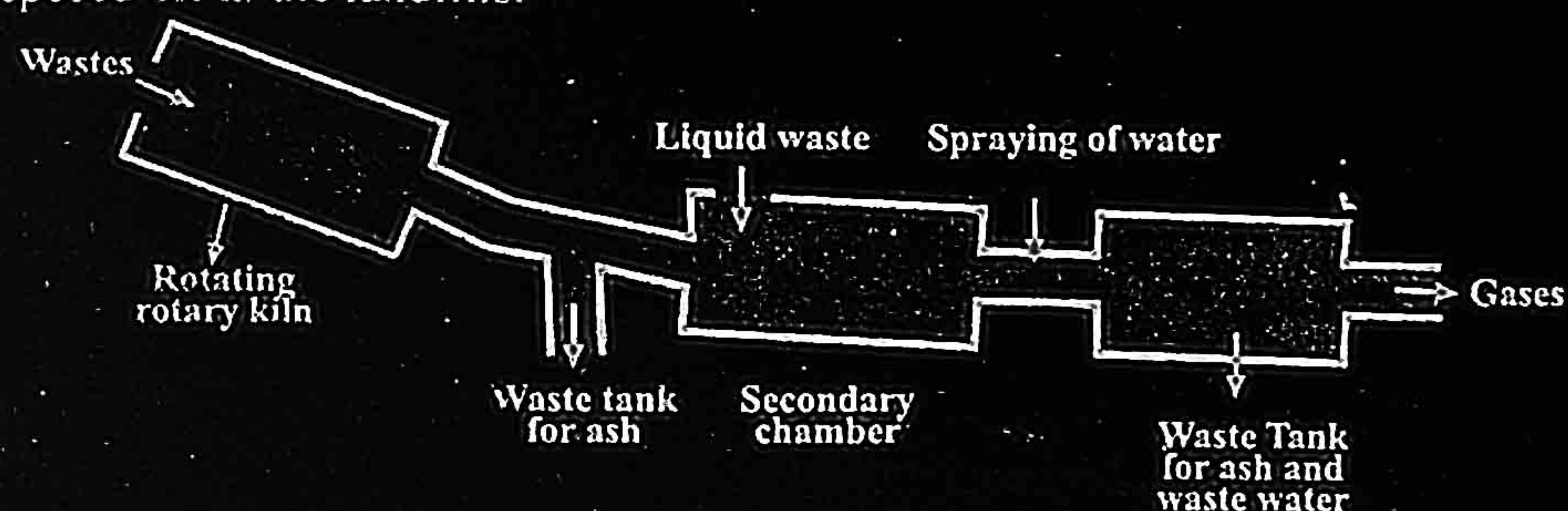
(i) The high temperature incineration system consists of consists of a rotary kiln which accepts all types of wastes including liquid, solid or sludge. The wastes are burned at temperature between  $650^{\circ}\text{C}$  to  $1100^{\circ}\text{C}$ .

(ii) Ash from the rotating chamber is collected at waste tank and the remaining liquid gaseous materials are passed to the secondary chamber.

(iii) The secondary chamber is non-rotating and hence the temperature range of  $950$  to  $1300^{\circ}\text{C}$  is maintained and the organic molecules are completely destroyed. The gases produced are then cooled to  $230^{\circ}\text{C}$  by evaporating water spray.

(iv) The cooled gases are then passed through scrubber system which eliminates the surviving particles and acid forming components like  $\text{CO}_2$ .

(v) Ash residues and waste water produced in the rotating and secondary chamber are disposed off in the landfills.



**Q: 37** What is acid rain? Give one of its harm to building.

**Ans:** Acid Rain (Acid Deposition):

Acid rain which now-a-days is termed as acid deposition, was first discovered by Angus Smith in Great Britain in the mid 17<sup>th</sup> century.

**pH of acid rain:**

The pH of unpolluted rain water should be 5.6. The rain water having pH less than 5 is considered truly acidic.

The acid rain also damages building materials such as

- (a) steel      (b) paint      (c) plastic      (d) cement  
(e) sculptural work      (f) material especially of marble and lime stone.

**SHORT QUESTIONS**

(From past papers 2005-2011)

(Lahore & Gujranwala)

- (1) Carbon monoxide is a main primary air pollutant. Give its effects on the human beings. (LHR 2005) (LHR-2006)
- (2) What is acid rain and how does it affect our environment? (GRW 2005)
- (3) What is lithosphere? (LHR 2007)
- (4) What is the unit used to measure the amount of Ozone in the atmosphere and give its normal amount. (GRW 2007)
- (5) What are primary pollutants? Give their names. (LHR 2009)
- (6) Define acid rain. What is the effect of acid rain on earth? (LHR 2009)
- (7) Why is ozone layer depleting? What will happen when the concentration of ozone will decrease? (GRW 2009)
- (8) How acid rain and temporary acid rain are produced? How they pollute water bodies? (LHR 2010)
- (9) What is smog? (LHR 2010)
- (10) How detergents are threat to aquatic animal life? (GRW 2010)
- (11) What are health hazards of acid rain for human and animals? (GRW 2010)
- (12) What is acid rain? Give one of its harm to building. (LHR 2011)
- (13) Detergents are threat to aquatic life. Explain. (GRW 2011)

**MULTIPLE CHOICE QUESTIONS**

(From Past Papers 2008-2011)

(Faisalabad + Sargodha + Rawalpindi Board)

- (1) How detergents are threat to aquatic animal life? (FSD 2009)
- (2) What is chemical oxygen demand (COD)? (FSD 2009)
- (3) What is Smog? What conditions are required for its formation? (FSD 2009)
- (4) Name the components of environment. (FSD 2010)
- (5) What is Hydro sphere? (FSD 2010)
- (6) Discuss photochemical smog and give its properties. (FSD 2011)
- (7) What is the effect of acid rain on earth? (SGD 2009)
- (8) What is lithosphere? Give its composition. (SGD 2009)
- (9) Name the oxides of nitrogen which causes air pollution. (SGD 2010)
- (10) Write the names of treatments for purification of  $\text{H}_2\text{O}$  in various stages. (SGD 2010)
- (11) Name four components of environment. (SGD 2011)
- (12) Define solid waste management. (RWP 2008)
- (13) What are the components of environment? (RWP 2009)
- (14) What is COD? How it is measured? (RWP 2010)
- (15) Detergents are threat to aquatic life. Explain. (RWP 2011)

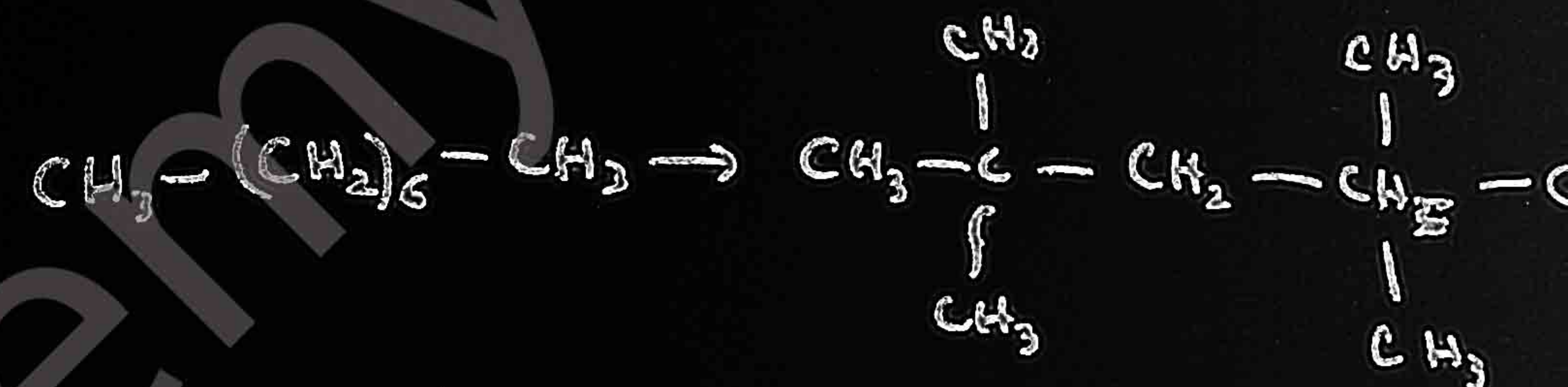
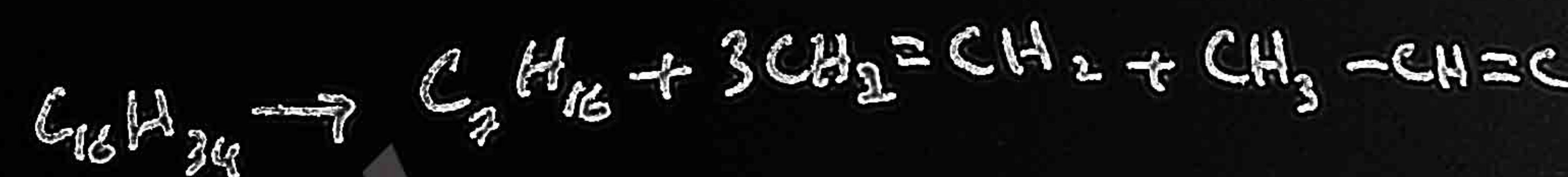


**SHORT QUESTIONS**

(From Past Papers 2008-2011)

(Multan + Bahawalpur + D.G. Khan Board)

- (1) How COD is measured? (MTN 2008)
- (2) Mention the side effects of incineration. (MTN 2008)
- (3) Define Bio Chemical Oxygen demand. (MTN 2008)
- (4) Define transformation and Depolymerization. (MTN 2009)
- (5) What is Incineration and give its two advantages and two disadvantages? (MTN 2009)
- (6) What do you mean by Aeration of Raw Water? (MTN 2009)
- (7) What are the primary Pollutants? (MTN 2009)
- (8) What are the effects of CO on human health? (MTN 2010)
- (9) What is meant by Aeration? (MTN 2010)
- (10) What is biochemical oxygen demand (BOD)? (MTN 2011)
- (11) What is meant by Lithosphere and biosphere? (BWP 2008)
- (12) Write down the role of chlorofluoro carbons in destroying ozone. (BWP 2009)
- (13) What do you mean by the term: (a) BOD (b) COD (BWP 2009)
- (14) NO<sub>2</sub> is a Pollutant, comment. (BWP 2010,2011)
- (15) Give brief idea about primary air pollutants. (BWP 2011)
- (16) Just name various sources which contaminate water. (DGK 2008)
- (17) Why is ozone layer depleting? (DGK 2009)
- (18) What are the primary air pollutants? (DGK 2009)
- (19) Discuss livestock waste as water pollutant. (DGK 2010)
- (20) Define water pollution. Mention only human activities which causes water pollution. (DGK 2010)
- (21) Manipulate the reactions taking place between 1 to 7 days during the setting of cement. (DGK 2011)
- (22) What is the primary pollutant? Also give their four names. (DGK 2011)



Because



Kneez. Zainab

$$\begin{array}{r} 250 \\ 0250 \\ 13 \\ \hline 68 \end{array}$$

$$\begin{array}{r} 795 \\ 635 \\ \hline 160 \end{array}$$