CHEMISTRY

WORKSHEET-10

STEP

A PROJECT BY PUNJAB GROUP

Worksheet-10

(B. Inorganic Chemistry)

Compounds of Nitrogen and Sulphur And Environmental Chemistry

Q.1 Contact process for the preparation of H_2SO_4 on the commercial scale has following steps.

I. Sulphur burners

II. Drying tower

III. Contact tower

IV. Absorption unit

In which one of the following above steps, SO_2 is oxidized to SO_3?

A) I only C) III only

B) II only D) IV only

Q.2 Which of the following is not secondary pollutant?

A) PAN C) Peroxybenzol

B) Ketones D) SO_2

Q.3 All of the following are physical properties of NH_3 gas EXCEPT:

A) It is colourless gas with pungent odour

B) It is lighter than air

C) When it is inhaled suddenly, it brings tears into the eye

D) It is insoluble in water

Q.4 Which of the following is not use of ammonia?

A) It is used to prepare nitric acid by Birkeland and Eyde's process

B) It is used in the manufacture of urea and rayon

C) It is used as a refrigerant in ice plants

D) It is used in the manufacture of Na_2CO_3 by Solvay's process

Q.5 The second most widely used fertilizer in Pakistan is:

A) Potassium nitrate C) Diammonium phosphate

B) Ammonium nitrate D) Urea

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Q.6 Mark the correct statement about SO_2:

A) It is colorless gas with irritating smell

B) It can act as an oxidizing as well as reducing agent

C) Both A and B

D) Neither A nor B

Q.7 Which of the following is not correctly matched statement?

Options	Name of fertilizer	%age of nitrogen
A)	Urea	46
B)	Diammonium phosphate	14
C)	Ammonium nitrate	33 – 33.5
D)	Liquid ammonia	82

Q.8 SO_3 crystals on warming change directly to a gas. This is called:

A) Diffusion C) Evaporation

B) Sublimation D) Decomposition

Q.9 Which one is incorrect about $H_2S_2O_7$?

A) It is obtained by dissolution of SO_3 in water

B) It is obtained by dissolution of SO_3 in conc. H_2SO_4

C) It is called oleum (pyrosulphuric acid)

D) It contain one O-O bond in its molecule

Q.10 Which one of the following is not property of a good fertilizer?

A) It may not be stable

B) It is not injurious to the plants

C) It is soluble in water

D) It is readily available to the plants

Q.11 Which of these is not a property of dilute sulphuric acid?

A) It is an electrolyte

B) It reacts with some metals to give off hydrogen gas

C) Its sulphate salts are always soluble in water

D) It contains ions

Q.12 All of the following properties shown by nitrogen and other elements of group VA are correct EXCEPT:

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Options	Nitrogen	Other elements
A)	(N_2) Gas	Solid
B)	Diatomic ($N \equiv N$)	Tetra atomic molecules
C)	Has no allotropic form	Have allotropic forms
D)	Low ionization energy	High ionization energy

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Q.13 Identify the property which is not shown by sulphuric acid:

A) It is called oil of vitriol

B) It is manufactured by contact process

C) The purification unit consists of dust removers, scrubbers conc. sulphuric acid and arsenic purifier

D) It acts as a food preservative

Q.14 Ammonia is commercially prepared by Haber's process as shown by the reaction:

$$N_2 + 3H_2 \rightleftharpoons 2NH_3$$

Which of the following is not optimum condition to get maximum yield of ammonia?

A) High pressure (200 – 300 atm)

B) High temperature (500^oC)

C) Continuous withdrawal of ammonia

D) Use of iron catalyst along with promoters MgO, Al_2O_3 and SiO_2

Q.15 Identify the incorrect statement about anhydrides of respective acids:

Options	Acids	Anhydrides
A)	H_2SO_4	SO_3
B)	HNO_3	N_2O_5
C)	H_3PO_4	P_2O_3
D)	$HClO_4$	Cl_2O_7

Q.16 Which of the following is / are uses of SO_2 gas?

A) It acts as food preservative

B) It is used to prepare H_2SO_4

C) Both A and B

D) Neither A nor B

Q.17 All of the following are the optimum conditions in order to get maximum yield of SO_3 by contact process EXCEPT:

A) High pressure (1atm)

B) Catalyst V_2O_5 or Ni

C) Low temperature (400 – 500°C)

D) Continuous withdrawal of SO_3 after intervals

Q.18 Which of the following fertilizers is not useful for paddy rice?

A) Urea C) Ammonium nitrate

B) Ammonia in liquid form D) Ammonium phosphate

Q.19 When sulphuric acid is treated with glucose it acts as?

A) Drying agent C) Dehydrating agent

B) Oxidizing agent D) Reducing agent

Q.20 Sulphuric acid (H_2SO_4) is commercially prepared by contact process. All of the following purification units with their functions are correctly matched EXCEPT:

Options	Purification units	Uses
A)	Dust remover	Dust particles are removed from gases by steam wash
B)	Scrubber	Soluble impurities are removed by water
C)	Conc. H_2SO_4	Acts as drying agent to remove moisture
D)	Arsenic purifier	$Fe(OH)_2$ is used to remove As_2O_3 as impurity

Q.21 All of the following elements are macronutrients EXCEPT:

A) N C) Ca

B) S D) Mn

Q.22 Which of the following is pair of oxides of non-metals are the major cause of acid rain?

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A) CO, NO_2 C) CO_2, SO_2

B) SO_2, NO_2 D) NO_2, O_2

Q.23 Which of the following fertilizers is used for direct application to soil in the liquid state and injected into the soil upto 6 inches?

A) NH_3 C) $CO(NH_2)_2$

B) NH_4NO_3 D) $(NH_4)_2HPO_4$

Q.24 Which one of the following is not the cause of inertness of nitrogen gas?

A) Its smaller size C) Its low dissociation constant

B) Its high bond order D) d-subshell is absent

Q.25 Which of the following is raw material for the preparation of ammonia (NH_3)?

A) Methane gas only C) Both A and B

B) Nitrogen gas only D) Neither A nor B

Q.26 Mark the incorrect statement:

A) The gases in the atmosphere absorb only cosmic rays

B) Oxygen (O_2) gas in the atmosphere is essential for sustaining life on the earth

C) Carbon dioxide (CO_2) gas is required for plant photosynthesis

D) Nitrogen (N_2) gas is used for nitrogen fixing bacteria

Q.27 The harmful substances pollute the atmosphere. They damage which of the following:

I. Damage the environment

II. Human health

III. Quality of life

A) I, II Only C) I, III Only

B) II, III Only D) I, II, III

Q.28 Which of the following is not primary pollutant?

A) SO_2 C) O_3

B) NH_3 D) CO

Q.29 Sulphur dioxide (SO_2) is the most culprit pollutant in the atmosphere. The percentage of SO_2 produced by volcanoes eruption is:

A) 67% C) 63%

B) 65% D) 62%

Q.30 Large quantities of hydrocarbons are emitted by different trees and plants in the atmosphere. Which of the following hydrocarbons is produced by paddy fields?

A) Methane C) Ethene

B) Ethane D) Ethyne

Q.31 The residence time of NO and NO_2 in the atmosphere are _____ and _____ are respectively.

A) 2 and 1 days only C) 4 and 3 days only

B) 3 and 2 days only D) 5 and 4 days only

Q.32 SO_2 and SO_3 have which of the following harmful effects:

I. Are irritating

II. Are suffocating

III. Form sulphate aerosols which cause respiratory troubles

IV. Are major source of acid deposition

A) I, II C) I, II, III

B) II, III, IV D) I, II, III, IV

Q.33 Methane has a mean residence time of about _____ in the atmosphere.

A) 2 – 4 Years C) 3 – 7 Years

B) 3 – 5 Years D) 2 – 6 Years

Q.34 Which of the following is the major source of hydrocarbons emission?

A) Petroleum C) Automobiles

B) Coal D) Wood

Q.35 The pH of unpolluted water should be upto:

A) 5.0 C) 5.4

B) 5.6 D) 5.2

Q.36 The acid deposition involves:

A) Wet acidic deposition (rain, fog and snow) only

B) Dry acid deposition only

C) Both A and B

D) Neither A nor B

Q.37 All of the following statements about ozone (O_3) layer are correct EXCEPT:

A) Its thickness has been decreasing over Antarctica during autumn time since the mid-1970s

B) It ranges from 25 – 28km high in stratosphere

C) It is a blue gas having irritating smell

D) It is an allotropic form of oxygen

Q.38 The stratosphere where the ozone exists is approximately at:

A) 10 – 30km altitudes C) 20 – 50km altitudes

B) 15 – 40km altitudes D) 25 – 60km altitudes

Q.39 Ozone is produced in most of the tropical regions, from where it is transported to polar region. When the concentration of ozone (O_3) exceeds 100 ppm in the polar region, it causes all of the following health problems EXCEPT:

A) It damages eyes

B) It decreases the elasticity of lung tissues

C) It acts as reducing agent and causes fabric dyes to fade

D) It aggravates asthma

Q.40 Ozone is produced in most of the tropical regions by the process of:

A) Oxidation C) Redox reaction

B) Reduction D) Photochemical reaction

Q.41 The amount of ozone in atmosphere is expressed in Dobson units (DU). The normal amount of overhead ozone is about _____ in stratosphere:

A) 330DU C) 350DU

B) 340DU D) 360DU

Q.42 The region in which ozone depletes substantially in every

year during _____ is now termed as ozone hole.

A) Sept - Nov
C) Sept - Oct
B) Oct - Dec
D) Aug – Nov

Q.43 A single chloride free radical can destroy how many ozone molecules:

A) 100
C) 100000
B) 10000
D) 10

Q.44 Mark the incorrect statement about effect of acid rain:

A) It can leach nutrients
B) It can increase pH of the soil
C) It can damage building material
D) It can damage growth of forest

Q.45 Temporary acid rain in some countries is due to release of _____ by volcano eruption:

A) HCl
C) H_2SO_4
B) H_2CO_3
D) HNO_3

Q.46 The ozone layer 25 – 28 km high in the stratosphere surrounds the globe and filters most of the harmful _____ before they reach on the earth:

A) UV rays
C) Gamma rays
B) IR rays
D) Cosmic rays

Q.47 Peeling of ozone layer is due to:

A) CO_2
C) PAN
B) CFCs
D) Coal burning

Q.48 Heavy metals (Pt, Cd, As and Hg) are highly toxic and do not have any safe limits. When ingested through food or water and cause all of the following health problems EXCEPT:

A) Kidney diseases
C) Neutrons disorder
B) Diabetes mellitus
D) High blood pressure

Q.49 Leather tanneries are the big source of chromium

pollution in the environment. Which of the following oxidation state of chromium (Cr) is highly toxic and is known to cause cancer:

A) Cr (II) C) Cr (VI)

B) Cr (III) D) Cr (IV)

Q.50 Chemical and bacterial contents in livestock waste can contaminate surface and ground waters and cause all of the following diseases EXCEPT:

A) Dysentery C) Hepatitis

B) Typhoid D) Malaria

Q.51 Sea water gets polluted by accidental oil spills. Many petroleum products are poisonous and pose serious health problems to humans, animals and aquatic life. Which of the following petroleum products are known to be carcinogenic even at low concentration.

A) Polycyclic aromatics C) Alicyclic

B) Monocyclic aromatics D) Heterocyclic aromatics

Q.52 Soaps and detergents are excessively used in industries and household as cleaning agents. Which of the following is the most dangerous pollutant:

A) Soap only C) Both A and B

B) Detergents only D) Neither A nor B

Q.53 Which of the following methods is used to remove permanent hardness of water?

A) Aeration C) Ion exchange method

B) Coagulation D) Chlorination

Q.54 The materials which are suspended or present in the colloidal form are removed by coagulation. The

coagulant hydroxides from potash alum is precipitated and suspended particles get adsorbed over it and settle at the bottom. Which of the following is that coagulant?

A) KOH C) $Al(OH)_3$

B) $Fe(OH)_3$ D) $Cu(OH)_2$

Q.55 The quality of raw water is improved by aeration. Aeration of water serves all of the following functions EXCEPT:

A) It is used to remove the dissolved gases

B) It oxidizes Fe^{+2} to Fe^{+3}

C) It improves the oxygen level of raw water

D) It reduces organic matter with air

Q.56 Pesticides have been used for the eradication of following diseases EXCEPT:

A) Malaria C) Tuberculosis

B) Sleeping sickness D) Yellow fever

Q.57 Water is considered as polluted water if it contains dissolved oxygen less than:

A) 4ppm C) 6ppm

B) 5ppm D) 8ppm

Q.58 All of the following are harmful effect of chlorination of water EXCEPT:

A) It produces harmful chloramines by the reaction HOCl with dissolved ammonia in water

B) It is frequently used to disinfect water

C) It forms $CHCl_3$ when HOCl reacts with humic acid

D) Risk of liver cancer increases by drinking chlorinated water

Q.59 To avoid the formation of toxic compounds with chlorine which substance is used for disinfection of water:

A) $KMnO_4$ C) Alum

B) Chloroamine D) O_3

Q.60 The term greenhouse effect was first of all used by Nils Gustaf Ekholm in 1901. All of the following gases from a thick cover around the earth and it does not allow infra-red rays emitted by earth to escape EXCEPT:

A) CO_2 C) CH_4

B) O_3 D) CO

Q.61 Green chemistry refers to:

A) Chemistry of plants

B) Development of chemical product and process is less harmful to humans

C) Chemistry of green pigments

D) Chemistry of greenhouse effect

Q.62 Global warming is expected to be greatest in the:

A) Land C) Arctic

B) Oceans D) Antarctic

Q.63 Global warming and climate changes are terms used for the observed century-scale rise in the average temperature of the earths climate system. Global means surface temperature change from 1880 to 2016. An increase in average global temperature results in the following incidence of infectious diseases EXCEPT:

A) Malaria C) Dengue, yellow fever

B) Sleeping sickness D) Asthma

Q.64 The lowest region of the atmosphere extending from the earth's surface to a height of about 6 – 10 km (the lower boundary of the stratosphere) is called:

A) Troposphere C) Mesosphere

B) Stratosphere D) Thermosphere

Q.65 In all of the following reactions concentrated shulphric acid act as a dehydrating agent EXCEPT:

A) $HCOOH(aq) \xrightarrow{conc.H_2SO_4} CO(g) + H_2O(\ell)$

B) $C_2H_5OH \xrightarrow[100^oC]{conc.H_2SO_4} C_2H_4 + H_2O$

C) $C_{12}H_{22}O_{11} \xrightarrow{conc.H_2SO_4} 12C + 11H_2O$

D) Moisture of gases $\xrightarrow{conc.H_2SO_4}$ gases + moisture

Q.66 In which of the following reactions shulphuric acid does not act as an oxidizing agent:

A) $Cu_{(aq)} + 2H_2SO_4(conc.) \longrightarrow CuSO_{4(aq)} + 2H_2O_{(\ell)} + SO_{2(aq)}$

B) $2NaHCO_{3(aq)} + H_2SO_{4(aq)} \longrightarrow Na_2SO_{4(aq)} + 2H_2O_{(\ell)} + CO_{2(g)}$

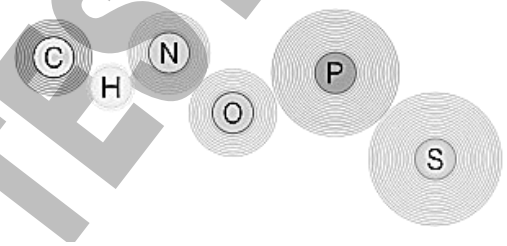
C) $Hg_{(\ell)} + 2H_2SO_4(conc.) \longrightarrow HgSO_{4(aq)} + 2H_2O_{(\ell)} + SO_{2(aq)}$

D) $2Ag_{(aq)} + 2H_2SO_4(conc.) \longrightarrow Ag_2SO_{4(aq)} + 2H_2O_{(\ell)} + SO_{2(aq)}$

ANSWER KEY (Worksheet-10)							
1	C	18	C	35	B	52	B
2	D	19	C	36	C	53	C
3	D	20	D	37	A	54	C
4	A	21	D	38	B	55	D
5	B	22	B	39	C	56	C
6	C	23	A	40	D	57	A
7	B	24	D	41	C	58	D
8	B	25	C	42	A	59	D
9	A	26	A	43	C	60	D
10	A	27	D	44	B	61	B
11	C	28	C	45	A	62	C
12	D	29	A	46	A	63	D
13	D	30	A	47	B	64	A
14	B	31	C	48	B	65	D
15	C	32	D	49	C	66	B
16	C	33	C	50	C		
17	B	34	C	51	A		

STRIKING INFORMATIONS

- **CHON is a mnemonic acronym for the four most common elements in living organisms: carbon, hydrogen, oxygen, and nitrogen.**
- **The acronym CHNOPS, which stands for carbon, hydrogen, nitrogen, oxygen, phosphorus, sulphur, represents the six most important chemical elements whose covalent combinations make up most biological molecules on Earth.**
- **Sulphur is used in the amino acids cysteine and methionine. Phosphorus is an essential element in the formation of phospholipids, a class of lipids that are a major component of all cell membranes, as they can form lipid bilayers, which keep ions, proteins, and other molecules where they are needed for cell function, and prevent them from diffusing into areas where they should not be.**
- **Phosphate groups are also an essential component of the backbone of nucleic acids and are required to form ATP – the main molecule used as energy powering the cell in all living creatures.**
- **Carbonaceous asteroids are rich in CHON elements.**
- **These asteroids are the most common type, and frequently collide with Earth as meteorites.**
- **Such collisions were especially common early in Earth's history, and these impactors may have been crucial in the formation of the planet's oceans.**
- **The simplest compounds to contain all of the CHON elements are fulminic acid and isocyanic acid (the latter of which is much more stable), having one of each atom.**



ANSWERS EXPLAINED

Q.1 **(C)** In contact tower preheated gases at 400-500°C are passed through vertical iron columns packed with the catalyst V_2O_5. Here SO_2 is oxidized to SO_3 as shown in the equation:

$$2SO_2 + O_2 \overset{V_2O_5}{\rightleftharpoons} 2SO_3$$

Q.2 **(D)** SO_2 is not secondary pollutant. **In fact** it is primary pollutant. Primary pollutants are given out from chimneys of industrial units and exhaust of automobiles.

- Other examples of primary pollutants SO_3, (NOx), CO etc.

Q.3 **(D)** **It is extremely soluble in water due to hydrogen bonding.** It can be easily liquefied at room temperature by applying a pressure of about **8 – 10 atmosphere**.

Q.4 (A) **NH_3** is used in **Ostwald's method to prepare nitric acid** but **not** in **Birkeland and Eyde's process**.

Q.5 (B) **Ammonium nitrate (NH_4NO_3)** is the **second most widely** used **fertilizer in Pakistan.** It is a white crystalline solid and is **highly soluble in water.** It is predominantly used in agriculture as a high-nitrogen fertilizer. Its other uses are component of explosive mixtures, in **mining, quarrying,** and in **civil construction**. **90% NH_4NO_3** is used as fertilizer while 10% of it is used for making explosive material.

Q.6 (C) **SO_2 gas has following properties:**

- It is colorless gas with irritating smell.
- It can act an oxidizing as well as reducing agent.
- **As an oxidizing agent:**

$$2H_2S + SO_2 \longrightarrow 3S + 2H_2O$$

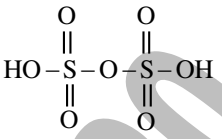
- **As a reducing agent:**

$$Cl_2 + SO_2 + 2H_2O \longrightarrow 2HCl + H_2SO_4$$

Q.7 (B) In fact, **$(NH_4)_2HPO_4$** contains P_2O_5 **16% nitrogen** and **48% P_2O_5**. This product contains about **75% plant nutrients** and is deemed suitable for use either alone or in the mixed form with other fertilizers.

Q.8 (B) **It is such process in which a solid, when heated, vaporizes directly without passing through the liquid phase and these vapors can be condensed to form the solid again. Other examples of such solids are NH_4Cl, I_2, naphthalene, benzoic acid.**

Q.9 (A) **A dense, corrosive liquid consisting of concentrated sulphuric acid containing excess sulphur trioxide in solution. Structure of oleum $H_2S_2O_7$ is**



Q.10 (A) It is incorrect statement. In fact, it must be stable so that it is available for a longer time to the growing plants.

Q.11 (C) **In fact, its salts, sulphates are not always soluble in water. All the alkali metals give sulphate and they are all soluble in water. The solubilities of sulphate of alkaline earth metals, gradually decrease down the group. Because the lattice energy decreases marginally down the group whereas ΔH_{hyd} energy decreases significantly. Because of this reason $BeSO_4$ and $MgSO_4$ are fairly soluble in water. $CaSO_4$ is slightly soluble, while $SrSO_4$ and $BaSO_4$ are almost insoluble.**

Q.12 (D) **It is incorrect statement.** In fact, ionization energy of **nitrogen** is **greater than** those of other elements because of its **smaller size** and greater electronegativity **($I.E_1$ = 1402kJmol^{-1} and electronegativity 3.0).**

Q.13 (D) **H_2SO_4 cannot act as food preservative because it is dehydrating agent, corrosive in nature as well as poisonous in nature. It can denature the food therefore, it cannot be used for this purpose.**

Q.14 (B) **It is incorrect statement. In fact, in order to get maximum yield of NH_3. Optimum conditions are:**

- High pressure (200 – 300atm),

- **Low temperature**: (400^oC), continues withdrawal of ammonia
- Use of catalyst Fe along with promoters **(MgO, Al_2O_3, SiO_2).**

Q.15 (C) **Anhydrides** of H_3PO_4 is **P_2O_5 or P_4O_{10}.**

Q.16 (C) **SO_2** has all of the following properties:

- It acts as food preservative
- It is used to prepare H_2SO_4

Q.17 (B) In **contact process V_2O_5** is used as a catalyst or platinum but **not Ni.**

Q.18 (C) **It is useful for many crops except paddy rice. The microbial bacteria in flooded fields decomposes it to nitrogen gas. So in this way it is not useful for paddy rice because it is converted into free nitrogen which escapes into the atmosphere.**

Q.19 (C) When **conc. H_2SO_4** is treated with glucose, carbon and water are produced. In this case **H_2SO_4** act as dehydrating agent as shown in the reaction.

$$C_6H_{12}O_6 \xrightarrow{\text{Conc. } H_2SO_4} 6C + 6H_2O$$

Q.20 (D) **$Fe(OH)_3$ (Ferric hydroxide)** acts as **arsenic purifier** to remove **As_2O_3** as impurity but **not $Fe(OH)_2$.**

Q.21 (D) **Mn** is micronutrients like **Cu, Cl, B, Zn and Mo, because they are used in smaller amount ranges from 6g to 200g per acre.**

Q.22 (B) **SO_2 and NO_2 are worst pollutant because in atmosphere SO_2 and NO_2 are transformed by reactions with oxygen and water into H_2SO_4 and HNO_3 respectively. These acids get mixed with rain. In this way they become major cause of harmful effect as acid rain.**

Q.23 (A) NH_3 is used for direct application to soil in the liquid state and injected into the soil upto 6 inches.

Q.24 (D) Absence of d-subshell has **no effect** on inertness of nitrogen gas. Nitrogen shows inert behaviour because of high bond order ($N \equiv N$) and **greater bond** energy **($941 kJmol^{-1}$)** and it has also **smaller size.**

Q.25 (C) **<u>Raw Material</u>: Natural gas (methane gas) and, nitrogen gas are raw material for the preparation of ammonia.**

- **Natural gas has 83% CH_4. A mixture of steam and methane is passed over heated nickel at 900^oC to produce CO_2 and H_2**

$$CH_4 + 2H_2O \xrightarrow[900^oC]{Ni} CO_2 + 4H_2$$

- **<u>Nitrogen gas:</u> Nitrogen gas is obtained from the air:**
- **<u>Preparation of ammonia:</u> Ammonia is prepared by Haber's process:**

The Haber process is a reversible reaction:

For the synthesis of **ammonia** by **Haber's process,** nitrogen and hydrogen gases react with each other to form ammonia gas shown in the reaction.

$$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$$

$$\Delta H^{0,f} = -92kJ$$

$$= -46kJmol^{-1}$$

NH_3 is also known as queen of chemicals.

Q.26 (A) In fact, the gases in the atmosphere **not** only absorb most of the cosmic

rays but also the major portion of harmful **electromagnetic radiations coming form the sun.** The absorption of these harmful radiation protects the life of the earth.

Q.27 (D) The gases present in the **atmosphere** are **essential** for **sustaining life on the earth i.e. O_2** is required for **breathing, CO_2** is required for **plant photosynthesis, N_2** is used by **nitrogen fixing bacteria** and **water** vapours are responsible for sustaining various forms of **life** on the **earth.** Atmosphere also maintains the **heat balance of the earth like global warming and green house effect.**

Q.28 (C) The waste products given out from chimneys of industrial units and exhaust of automobiles may contain gases such as **sulphur dioxide (SO_2),** sulphur trioxide (SO_3), nitrogen oxides (NO_x), **carbon monoxide (CO) ammonia (NH_3),** hydrocarbons, compounds of fluorine, and radioactive material. All these waste products are called primary pollutant. But **O_3** is **secondary pollutant** because it is formed by the **photochemical reaction** of **oxygen** in the **polar region.**

Q.29 (A) **Sulphur dioxide (SO_2)** is the most culprit pollutant in the **atmosphere.** The **percentage** of **SO_2** produced by **volcanoes eruption is 67%.**

Q.30 (A) **Hydrocarbon (methane)** is produced from the **paddy fields. Methane is also known as marsh gas.**

Q.31 (C) The residence time of **NO** and **NO_2** in the atmosphere are **4 and 3 days** respectively.

Q.32 (D) **SO_2** and **SO_3** have **harmful effects such irritating, suffocating, form sulphate aerosols which cause respiratory troubles and are major source of acid deposition.**

Q.33 (C) **Methane** has a mean **residence time** of about **3 – 7 years** in the **atmosphere.**

Q.34 (C) **Automobiles** are the major source of hydrocarbons emission.

Q.35 (B) **pH of unpolluted water should be upto 5.6.**

Q.36 (C) **The acid deposition includes both** wet **(rain, fog and snow)** and dry acidic deposition.

Q.37 (A) In fact, its thickness has been decreasing over Antarctica during spring time since the mid-1970s**.** Antarctica, the southernmost continent and site of the South Pole, is a virtually uninhabited, ice-covered landmass. Most cruises (sail about in an area without a precise destination, especially for pleasure) to the continent visit the Antarctic Peninsula, which stretches toward South America.

Q.38 (B) The stratosphere where the ozone exists is approximately at **15 – 40km altitudes.**

Q.39 (C) In fact, ozone (**O_3**) acts as **oxidizing agent.**

Q.40 (D) **Ozone** is produced in most of the tropical regions by the process of **photochemical reaction of oxygen.**

Q.41 (C) The **normal amount** of overhead ozone is about **350DU** in stratosphere.

Q.42 (A) The region in which ozone depletes substantially **in every year during Sept – Nov** is **now** termed as **ozone hole.**

Q.43 (C) A single **chloride free** radical can destroy upto **100,000 ozone molecules.**

Q.44 (B) It is incorrect statement. In fact, **acid rain decreases pH of the soil.**

Q.45 (A) Temporary acid rain in some countries is due to release of **HCl** by volcano eruption.

Q.46 (A) The ozone layer **25 – 28 km** high in the stratosphere surrounds the globe and filters most of the harmful **UV rays** before they reach on the earth.

- So ozone is very useful for human being because it has useful effect to absorb harmful radiation. Harmful effect of UV radiation are as follow:
- It is particularly effective at damaging DNA.
- It is a cause of melanoma and other types of skin cancer.
- Therefore, if there is substantial reduction in the ozone layer, the life on earth would be threatened.
- In 1980's large hole in the ozone layer over Antarctic was discovered which represented a major environmental crisis.

Q.47 (B) Chlorofluorocarbons (CFCs) 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 Cl^{o} free radicals. Chlorofluorocarbons (CFCs) play an effective role in removing O_3 in the stratosphere due to following reactions.

$$CFCl_3 \longrightarrow CFCl_2^{\bullet} + Cl^{\bullet}$$

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

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

Q.48 (B) Diabetes, often referred to by doctors as diabetes mellitus, describes a group of metabolic diseases in which the person has high blood glucose **(blood sugar),** either because insulin production is inadequate, or because the body's cells do not respond properly to insulin, or both. Patients with high blood sugar will typically experience polyuria **(frequent urination),** they will become increasingly thirsty **(polydipsia)** and hungry **(polyphagia).**

Q.49 (C) **Postassium dichromate ($K_2Cr_2O_7$)** is largely used in leather tanneries which **Cr** has oxidation state **+6.** This chemical is very dangerous for human beings is the cause of many diseases.

Q.50 (C) **Hepatitis C** is a disease **caused** by a virus that infects the liver. The virus, called the **Hepatitis C** virus or **HCV** for short, is just one of the **hepatitis** viruses. The other common **hepatitis** viruses are A and B, which differ somewhat from **HCV** in the way they are spread and treated.

Q.51 (A) **Polycyclic aromatics petroleum products are known to be carcinogenic even at low concentration.**

Q.52 (B) The most dangerous pollutant is detergents because it is **non-biodegradable** while soap is not **harmful** because it is **biodegradable.**

Q.53 (C) **Permanent hardness of water** is due to Cl^- and SO_4^{-2} **of** Ca^{+2} and Mg^{+2} **ions.** It is removed by ionic exchange method in which (Analcites) sodium zeolite $NaAl(SiO_3)_2.H_2O$ is used in the column through which hard water is run through. Here Ca^{+2} **and** Mg^{+2} **ions** from hard water are **replaced** by Na^+ **ions**. Which makes its **soft water. By ions exchange method permanent hardness of water is removed.**

Q.54 (C) $Al(OH)_3$ from potash alum acts as a coagulant. It is insoluble in water and forms white gelatinous ppt on which colloidal particles **(sand and clay)** are get adsorbed over it and settle at the bottom in water.

Q.55 (D) In fact, it **oxidizes organic** matter with **air** but **not** reduces organic matter.

Q.56 (C) **Tuberculosis is caused** by bacteria **(Mycobacterium tuberculosis)** that spreads from person to person through microscopic droplets released into the air. This can happen when someone with the untreated, active form of **tuberculosis coughs, speaks, sneezes, spits,** laughs or sings. Although **tuberculosis** is contagious, it's not easy to catch.

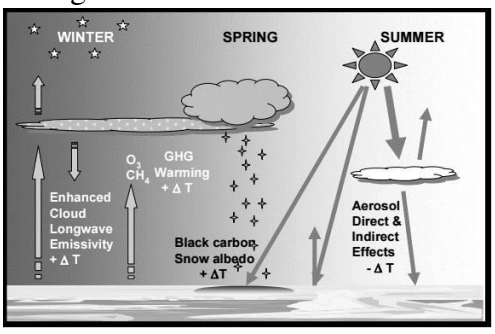
Q.57 (A) Water is considered as polluted water if it contains dissolved oxygen less than **4ppm.** Normal amount of dissolved oxygen should be in the range from **4 – 8 ppm.**

Q.58 (D) The risk of bladder and rectal cancer increases by drinking chlorinated water.

Q.59 (D) To avoid the formation of toxic compounds with **chlorine, ozone** is used for the disinfection of **water.**

Q.60 (D) **Greenhouse gases** is a **mixture** of CO_2, O_3, CH_4, water vapours and **CFCs but does not** contain **CO.**

Q.61 (B) Green chemistry refers to development of chemical products and process is less harmful to humans but not related to chemistry of plants, chemistry of green pigments and chemistry of greenhouse effect.



Q.62 (C) **Arctic temperatures have increased at almost twice the global average rate over the past 100 years (IPCC, 2007). Arctic warming is primarily a manifestation of global warming, such that reducing global-average**

warming will reduce Arctic warming and the rate of melting.

- Reductions in the atmospheric burden of CO_2 are the backbone of any meaningful effort to mitigate climate forcing.
- But even if swift and deep reductions were made, given the long lifetime of CO_2 in the atmosphere, the reductions may not be achieved in time to delay a rapid melting of the Arctic.

- Hence, the goal of constraining the length of the melt season may best be achieved by targeting shorter lived climate forcing agents.
- Addressing these species have the advantage that emission reductions will be felt immediately. These species include methane, tropospheric ozone, and tropospheric aerosols. Calculations indicate that the forcing due to these short-lived pollutants lead to a positive surface temperature response indicating the need to reduce emissions of these species within and outside the Arctic. Additional aerosol species may also lead to surface warming if the aerosol is coincident with thin, low lying clouds.

Q.63 (D) Asthma is a chronic disease of the airways. It cannot be cured, but can be controlled with medication. It can come on suddenly with symptoms of shortness of breath, wheezing, and coughing, and a tight feeling of the chest.

Q.64 (A) The lowest region of the atmosphere, extending from the earth's surface to a height of about 6–15 km (the lower boundary of the stratosphere) is called troposphere.

Troposphere:

- This is the part of atmosphere in which we live. It is approximately 15km above the surface of the earth. Very small amount of ozone is present in it.

- Stratosphere
- This is the layer is from 15km to 50km above the surface of earth. Stratosphere has a thick layer of ozone in it, which absorbs ultraviolet radiations of the sun. Thickness of ozone layer is above 25-28km

Mesosphere:

- This layer is 50km to 80km above the surface of the earth.

Thermosphere

- This layer is 80km above the surface of the earth.

Q.65 (D)

- In this case shulphuric acid act as drying agent. All though moisture is removed by conc. H_2SO_4 to purify SO_2 gas but it is not a chemical reaction
- In first three cases (A, B and C) H_2SO_4 acts as dehydrating agent because water is removed along with a chemical change.

Q.66 (B)

- **This is acid base reaction in this reaction H_2SO_4 does not act as oxidizing agent because oxidation number of sulphur in H_2SO_4 does not change.**
- **In all other three reactions (A, C and D) sulphuric acid act as oxidizing agent while metals (Cu, Hg and Ag) act as reducing agent so these are redox reactions.**

STEP

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