

# **MULTIPLE CHOICE QUESTIONS**

**M.SC. (4<sup>TH</sup> SEMESTER  
CHEMISTRY**

**I<sup>ST</sup> PAPER-ORGANIC SYNTHESIS**

**II<sup>ND</sup> PAPER-ORGANIC SPECTROSCOPY**

**III<sup>RD</sup> PAPER-HETEROCYCLIC COMPOUNDS**

**IV<sup>TH</sup> PAPER-ENVIRONMENTAL CHEMISTRY**

**BY-**

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## Multiple-choice Questions

[ MCQs ]

Class - M.Sc [4th sem]  
Subject - Chemistry  
1st Paper - Organic Synthesis

Attempt all questions and each  
questions carry 02 marks

Q.1. Disconnection concept is  
also known as

ANS. Retrosynthesis concept

Q.2. Meaning of Retero

ANS. Opposite

Q.3. What is full form of TTM

ANS. Target molecule

Q.4. The arrow which is used  
for disconnection concept.

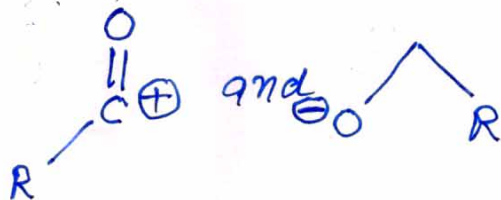
ANS.



Retrosynthetic arrow

Q.5. Structure of Synthons.

ANS.



Q.6. Disconnection approach is a type  
of --

ANS. Organic synthesis

(PTO)

(02)

(Contd. from Page No-01)

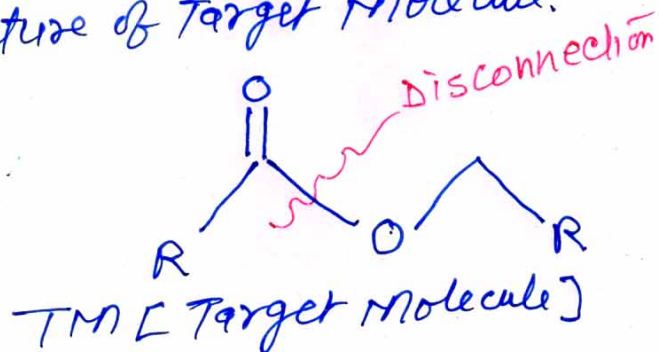
M. SC [4<sup>th</sup> sem]

Chemistry

I<sup>st</sup> - Organic synthesis  
Paper

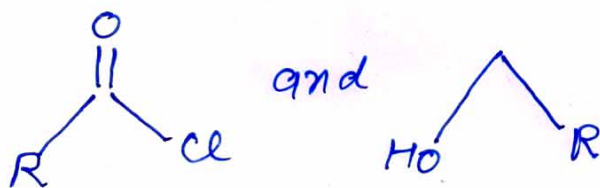
Q7. Structure of Target molecule.

ANS.



Q8. What is synthetic equivalent?

ANS.



Q9. Vitamin D is also known as

ANS.

cholecalciferol

Q10 Vitamin D is also known as.

ANS. 25-Dihydroxycholecalciferol  
[25-OH-D]

Q11 Naturally Vitamin D is.

ANS. Sunshine Vitamin

Q12 Vitamin D, also act as a -

ANS. As a hormone in the human  
or living being

(PTO)

(03)

[Contd. from 02 Page]

M. Sc [4th sem]

Chemistry

Ist Paper - Organic Synthesis

Q13. Forms of Vitamin D is,  
ANS. Vitamin D<sub>2</sub> and Vitamin D<sub>3</sub>

Q14. Vitamin D<sub>2</sub> is obtained from.  
ANS. From fish, egg, milk, cheese  
and fisher liver oil.

Q15. Vitamin D<sub>3</sub> is.  
ANS. It is 25 dihydroxycholecalciferol  
(or) Calcitriol

Q16. Vitamin D is also useful in body.  
ANS. Adequate levels of calcium and  
phosphorus to support metabolic  
functions, & for bone mineral  
alization & neuromuscular transmission.

Q17. Camphor is also known as  
ANS. Camphanone.

Q18. Chemical formula of Camphor  
ANS. C<sub>10</sub>H<sub>16</sub>O

Q19. What is longifoline is?  
ANS. It is oily liquid hydrocarbons  
obtained from pine resin  
[Pinus longifolia]

(PTO)

Q (04)

Contd. from Page No-03

M.Sc [4<sup>th</sup> Sem]

Chemistry

I<sup>st</sup> Paper - Organic Synthesis

Q 20. Longifoline is mostly extracted from.

ANS. From Pinus-roxburghii

Q 21 Longifoline is used as a.

ANS. Used as an tricyclic sesquiterpene.

Q 22. Longifoline is also used in the synthesis of ..

ANS. Also used as a boron derivative as dilongifolyborane, in organic synthesis, as a chiral hydroborating agent.

Q 23. What is the natural source of Reserpine?

ANS. Rauwolfia - Serpentina (m)  
Rauwolfia - Vomitoria

Q 24. Reserpine is a ..

ANS. Alkaloid type

Q 25. Medically Reserpine is used in living beings.

ANS. For the treatment of hypertension, stress, asthma and for dermatological disorders

(PTO)

(05)

(Contd. from page no -04)

M. Sc [4<sup>th</sup> sem]

Chemistry

1<sup>st</sup> paper - Organic Synthesis

Q 26. The chemical formula is

ANS.  $C_{33}H_{40}N_2O_9$

Q 27. Reserpine, chemically contains.

ANS. 5- $OCH_3$  groups [Methoxy groups]

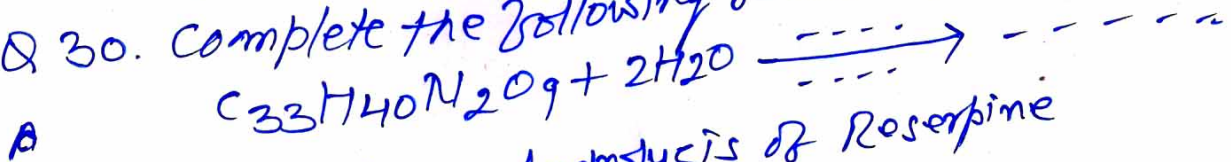
Q 28. Secondary "N" in Reserpine acts as a

ANS. Formation of monoacetyl derivative with  $Ac_2O$

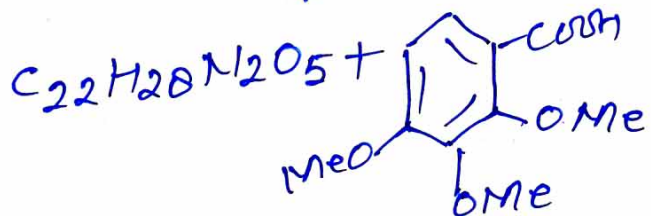
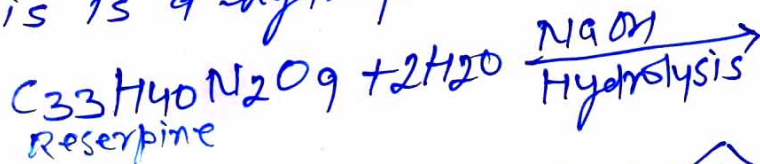
Q 29. Tertiary "N" in Reserpine acts as a

ANS. Formation of Quaternary ammonium salts with  $CH_3I$

Q 30. Complete the following reactions.



ANS. This is a hydrolysis of Reserpine



3,4,5-trimethoxy benzoic acid

(P. To)

06

[Contd. From Page No-05]

M.Sc [4<sup>th</sup> sem]

Chemistry

Ist Paper - Organic synthesis

Q 31. Cortisone is type of.

ANS. Steroidal hormone.

Q 32. Cortisone produced in.

ANS. Adrenaline cortex

Q 33. What are main applications of Cortisone?

ANS. For the treatment of stress response, Immune response, carbohydrate metabolism and also for blood electrolytes levels in the living beings.

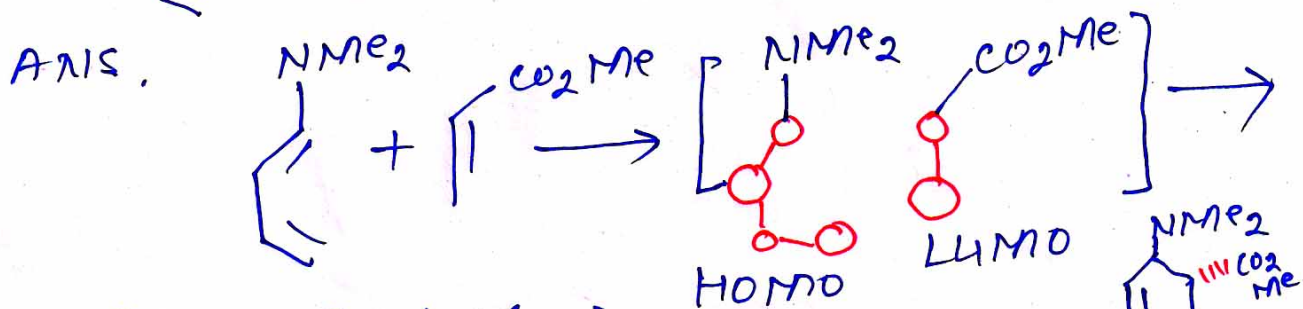
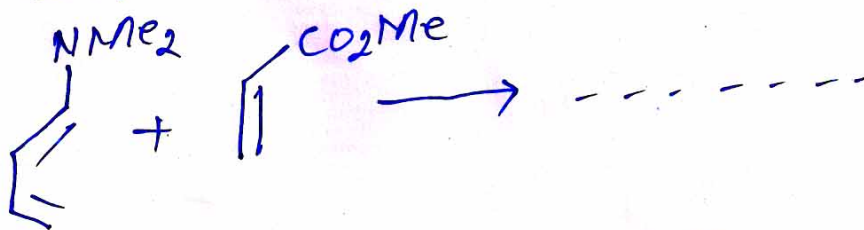
Q 34. Diels-Alder reaction is applicable for.

ANS. For the synthesis of 6-Rings.

Q 35. In the presence of Lewis acid dienophile gives.

ANS. Polarised giving higher regioselectivity and faster reactions.

Q 36. Complete the following reaction.



[Carbon is +ve (or) +ve]

(07)

(Contd. from page No-06)

M.Sc [4<sup>th</sup> sem]

Chemistry

Ist paper - Organic Synthesis

Q 37. What is Micheal addition?

ANS. Nucleophilic addition of carbanion or another nucleophile to an

$\alpha, \beta$ -unsaturated carbonyl compound

Q 38. Which class of Micheal addition?

ANS. Longer class of conjugated additions.

Q 39. When the  $\alpha, \beta$ -unsaturated compound undergoes Micheal addition, is called is?

ANS. Micheal acceptor

Q 40. The nucleophile in Micheal addition is

ANS. Micheal donor.

Q 41. The product in Micheal addition is also known as.

ANS. Micheal adduct.

Q 42. Micheal <sup>addition</sup> is useful method for --

ANS. useful method with formation of C-C bonds

Q 43. What is Robinson annulation?

ANS. Is a chemical reaction used in organic chemistry for ring formation

Q 44. What is the criteria of Robinson annulation

ANS. Method to create a six membered ring by forming three new carbon-carbon bonds.

(PTO)



(Contd. from Page NO - 07)

M.Sc [4th Sem]

Chemistry

1st Paper - Organic Synthesis

Q 45. Which type of Robinson annulation Reaction?

ANS. Robinson annulation is the chemical reaction of  $\alpha$ -hydroxyaryl ketones with aromatic anhydrides to form Flavones (or) Iso Flavones.

Q 46. What is the role of Robinson annulation in the synthesis of cortisone?

ANS. The synthesis of cortisone is completed through the use of the Robinson annulation, as a specific part.

Q 47. Is TMS is a good leaving group?

ANS. TMS [Tetra methyl silane] group can be used as protecting group and leaving group for the synthesis of siloxane based molecules.

Q 48. How can we protect hydroxyl group?

ANS. Hydroxyl group may be protected by formation of an ether, an ester or an acetal.

(PTO)

(09)

(Contd. from Page NO-08)

M.Sc [4th sem]

Chemistry

Ist paper - Organic Synthesis

Q 49. What is a silyl group?

ANS. Contains silicon atom covalently bonded to alkoxy group.

Q 50. Silyl ethers act as a.

ANS. Act as a protecting group for alcohols in organic synthesis.

Q 51. The Role of protecting group.

ANS. Role of multistep organic synthesis.

Q 52. What makes a good protecting group?

ANS. Should be easy to put on, easy to remove in high yielding reactions.

~~Q 53.~~

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## Multiple Choice Questions

[MCQs]

Class - M.Sc [4<sup>th</sup> sem]

Subject - Chemistry

II<sup>nd</sup> Paper - Organic Spectroscopy

Attempt all questions and each question carry 02 marks.

Q 1. UV-Visible Spectroscopy is also known as  
ANS. Absorption (or) Reflectance Spectroscopy

Q 2. Which cuvette is used in UV-Visible Spectroscopy?

ANS. Quartz cuvette.

Q 3. Common name of Quartz glass in UV-Visible Spectroscopy

ANS. Vycor, which is 96% silica.

Q 4. Quartz glass in UV-Visible Spectroscopy is made of

ANS. Silicon dioxide.

Q 5. Which lamp is used in UV-Visible Spectroscopy?

ANS. Deuterium lamp with tungsten halogen lamp.

Q 6. Which detector is used in UV-Visible Spectroscopy?

ANS. Photomultiplier tube

Q 7. The symbol of maximum absorbance in UV-Visible Spectroscopy

ANS.  $\lambda_{max}$

Q 8. Which lamp is used in HPLC?

ANS. Deuterium lamp.

Q 9. What are the two types of light sources in the spectroscopy?

ANS. Incandescence and Luminescence

(PTO)

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## Multiple Choice Questions

[MCQs]

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Q 9. What are the two types of light sources in  
the spectroscopy?

ANS. Incandescence and Luminescence

(PTO)

(02)

(Contd. from Page No - 01)

M.Sc [4th sem]

Chemistry

II<sup>nd</sup> Paper - Organic Spectroscopy

Q.10 Why is UV wavelength is dangerous?  
ANS. UV-C light [100-290 nm] is dangerous.

Q.11. What are the three UV light ranges?

ANS. UV A (or) near [315-400 nm]  
UV B (or) Middle [280-315 nm]  
UV C (or) Far [180-280 nm]

Q.12. Why is Beer's law important?

ANS. To determine the attenuation of radiations [also includes the measurements of concentration of chemical solutions]

Q.13. Does all UV light kill bacteria.

ANS. The UV light is highly effective at killing germs.

Q.14 The full form of RID in HPLC spectroscopy

ANS. Refractive Index detector

Q.15. Why UV-Visible spectroscopy is used?

ANS. Used in analytical chemistry, for quantitative determinations, as for transition metal ions, & conjugated organic compounds.

Q.16. In UV-Visible, a beam with a wavelength range between.

ANS. Between 180 and 1100 nm.

Q.17 What is UV range?

ANS. Wavelength range is 100-400 nm.

Q.18 In UV-Visible what are bands.

ANS. Three bands.

(PTO)

(03)

Contd. from Page no - 02

M. Sc [4th sem]

Chemistry

II<sup>nd</sup> Paper - Organic Chemistry  
[Organic Spectroscopy]

Q.19. Full form of OES.

ANS. Optical emissions spectroscopy

Q.20 Woodward-Fieser rule is applicable to --

ANS. for conjugated dienes and carbonyl compounds.

Q.21 Electromagnetic waves with longest wavelength.

ANS. Microwave.

Q.22. Which electron transition requires maximum energy?

ANS.  $\sigma \rightarrow \sigma^*$

Q.23. Which functional group shows

~~ANS.~~  $\pi \rightarrow \pi^*$  transition

ANS.  $R-\ddot{O}H$

Q.24. Full form of FTIR

ANS. Fourier Transform Infrared Spectrophotometer.

Q.25. Infrared spectrum take place between.

ANS. 

Visible light	IR Spectrum	Micro wave
---------------	-------------	------------

between visible light and microwave.

Q.26. IR spectroscopy is also known as

ANS. Vibrational spectroscopy

Q.27 Wavelength of IR radiation, is

ANS. About 700 nanometer (nm) to 1 millimeter [mm].

(PTO)

(04)

(Contd. From Page No -03)

M.Sc [4<sup>th</sup> sem]

Chemistry

II<sup>nd</sup> Paper - Organic Spectroscopy

Q 28. What are the three types of IR vibrations?

ANS. Three general type of motions, as translations [external], rotations [Internal] and vibrations [Internal].

Q 29. What colour is infrared?

ANS. Infrared light falls just outside the visible spectrum beyond the edge of what we can see as, red colour

Q 30. What lamp is used in IR spectroscopy?

ANS. Light from Quartz-tungsten halogen lamp [QTH] lamp is emitted by a heated filament.

Q 31. What are the applications of IR spectroscopy?

ANS. In mobile phones, Remote systems of TV and also in forensic analysis.

Q 32. Which detector is used in FTIR?

ANS. Pyroelectric detector and mercury cadmium telluride detector is used

Q 33. What is the first mode of vibrations?

ANS. An "acoustic guitar" string as a great example.

Q 34. What is the fingerprint region?

ANS.  $400\text{cm}^{-1}$  and  $1500\text{cm}^{-1}$

(PTO)

(05)

(Contd. from Page No - 04)

M.Sc [4<sup>th</sup> sem]

Chemistry

II<sup>nd</sup> Paper - Organic spectroscopy

Q 35. Which mobile has IR Blaster?

ANS. Best phones with an IR Blaster.

Q 36. How do I know, if my phone has infrared?

ANS. In smart phones, open the camera with IR blaster, then we see that cool flickering light is coming from devices.

Q 37. Infrared radiation or Infrared light is a type of --

ANS. Radiant energy [Invisible radiations]

Q 38. Can I download IR Blaster.

ANS. IR Blaster is a free software.

Q 39. Why KBr is used in FTIR?

ANS. Used as window material, which is transparent between this [range  $4000 - 400 \text{ cm}^{-1}$ ]

Q 40. What is nature of KBr?

ANS. Hygroscopic

Q 41. Why is Infrared useful?

ANS. Useful in electrical heater, TV remotes, optical fibres, & also for thermal imaging cameras.

(PTO)



(06)

(Contd. from Page No - 05)

M. SC [4<sup>th</sup> Sem]

Chemistry

II<sup>nd</sup> Paper - Organic Spectroscopy

Q 42. What is vibronic coupling?

ANS. Amplitude of electronic dipole moment coupling vibrations

Q 43. ESR is a

ANS. Electron spin Resonance spectroscopy

Q 44. ESR is also known as.

ANS. Electron Paramagnetic Resonance Spectroscopy [EPR]

Q 45. Is TMS is good leaving group?

ANS. TMS group can be used as protecting and leaving group for the synthesis of siloxane based molecules.

Q 46. What is full form of TMS?

ANS. Tetramethyl silane

Q 47. Why is TMS is used?

ANS. Because of its high volatility.

Q 48. What is full form of N<sup>15</sup> & N<sup>14</sup>?

ANS. Nuclear spin quantum number

Q 49. In <sup>1</sup>H NMR spectrum consist of 9 - -

ANS. Singlet

Q 50. What does <sup>1</sup>H NMR tells about -

ANS. Proton nucleus magnetic Resonance [Proton NMR], hydrogen -1 NMR (or) <sup>1</sup>H NMR.

(PTO)

(07)  
(Contd. from Page NO - 06)

M.Sc [4th sem]

Chemistry

II<sup>nd</sup> Paper - Organic Spectroscopy

Q. 51. What is n+1 rule?

ANS. It is an empirical rule, used to predict the multiplicity and in conjunction with Pascal's triangle.

Q. 52. What is a nuclear spin?

ANS. Total angular momentum of a nucleus with symbol I.

Q. 53. What is nuclear g factor?

ANS. Also called g value or dimensionless magnetic moment.

Q. 54. The nature of TMS is

ANS. Quite volatile

Q. 54. Is Carbon-13 stable (or) unstable?

ANS. Carbon-12 and carbon-13 are stable.

Q. 55. Which solvent is used in NMR?

ANS.  $C_6H_6$ ,  $CHCl_3$ ,  $CH_3OH$ ,  $DMF$

Q. 56. How many signals are there in  $^{13}C$  NMR?

ANS. 23 different signals

Q. 57. Why is Carbon-12 NMR inactive?

ANS. Carbon-12 atoms do not have a nuclear spin.

Q. 58. Is  $DMF$  acidic or basic?

ANS. Weakly acidic

(PTO)

(08)

(Contd. from page no - 07)

M.Sc [4th sem]

II<sup>nd</sup> paper - Organic spectroscopy

Q 59 What is the chemical shift in NMR ?

ANS. It is Resonant frequency of a nucleus and structure of molecule.

Q 60 Full form of DMSO

ANS. Dimethyl Sulphoxide.

Q 61 Full form of 2D NMR

ANS. 2-Dimension Nuclear magnetic Resonance.

Q 62. What is  $^{19}\text{F}$  NMR ?

ANS. Fluorine is sensitive nucleus which yields sharp signals and has wide chemical shift.

Q 63 What are the main applications of  $^{19}\text{F}$  NMR ?

ANS. metabolism of 5-Fluorouracil in the liver of patients under going chemotherapy.

Q 64. What are the main applications of 2D NMR ?

ANS. 2D NMR provides more information about a molecule than one dimensional NMR.

Q 65 Full form of COSY.

ANS. Correlation spectroscopy.

(PTO)

(09)

[Contd. from Page No -08]

M. Sc [4<sup>th</sup> - sem]

Chemistry

II<sup>nd</sup> paper - Organic spectroscopy

Q 66. Full form of DEPT.

ANS. Distortionless enhancement by Polarization Transfer.

Q 67. What is the application of DEPT NMR?

ANS. Used for the determining the presence of Primary, secondary and Tertiary carbon atoms, and signals from quaternary carbon atoms.

Q 68. Full form of NOESY

ANS. Nuclear Overhauser Effect spectroscopy

Q 69. What is EXSY?

ANS. J-spectroscopy exchange spectroscopy

Q 70. What is APT?

ANS. To assign C-H multiplicities in  $^{13}\text{C}$  NMR spectra, provides the information on all sorts of carbons.

Q 71. ~~The~~ what is the full form of MRI?

ANS. Magnetic Resonance Imaging.

Q 72. Why is CFCs banned?

ANS. It destroys ozone in the atmosphere.

Q 73. What is plasma-oscillations?

ANS. Langmuir waves.

Q 74. What is Larmor equation?

ANS. The Resonance frequency of a magnetic nucleus.

(PTO)

(10)

(Contd. from Page No-09)

M. SC [4<sup>th</sup> sem]

Chemistry

II<sup>nd</sup> paper - Organic Spectroscopy

Q 75. NMR is a concept

ANS. It is a method of physical observation concept

Q 76. Why is NMR is used

ANS. In analytical chemistry for quality control and determining the molecule structure.

Q 77. Excellent example of NMR

ANS. MRI [Magnetic Resonance Imaging] in medical fields

Q 78. Rotating magnetic field is denoted by

ANS. B<sub>1</sub> [generate by passing AC current through a nearby radio frequency [RF] coil.]

Q 79. What is meant by resonance in NMR?

ANS. In nuclear system the Larmor (Resonance) frequency

Q 80. Which is better a CT scan or MRI?

ANS. CT scans use X-rays, while MRI scans use strong magnets and Radio waves

Q 81. What is mass spectrometry?

ANS. Analytical techniques that measures mass to charge ratio of ions.

Q 82. What is the mass spectrometer?

ANS. Produces the charged particles [Ions] from chemical substances

[P70]

(11)

[Contd. from Page No - 10]

M. Sc [4th sem]

Chemistry

II<sup>nd</sup> paper - Organic spectroscopy

Q 83. What is the basic principle of mass spectroscopy?

ANS. To generate ions from either inorganic or organic compounds

Q 84. Full form of AMS in mass spectroscopy

ANS. Accelerator mass spectroscopy

Q 85. Full form of ICP-MS

ANS. Inductively coupled plasma-mass spectroscopy.

Q 86. Full form of IRMS

ANS. Isotopic Ratio of mass spectroscopy

Q 87. Full form of IMS

ANS. Ion mobility spectrometry.

Q 88. How does mass-spectrometer identify the compounds?

ANS. Due to different peaks on mass spectrum.

Q 89. What are four stages in mass spectroscopy?

ANS. Ionisation, Acceleration, Direction and Detector

Q 90. The symbol of mass to charge ratio of ions?

ANS.  $M/Z$

(PTO)

(12)

(Contd. from Page No -11)

M.Sc [4<sup>th</sup> sem]

Chemistry

II<sup>nd</sup> Paper - Organic Spectroscopy

Q 91. What are main applications of Mass Spectroscopy?

ANS. To identify the structure of complex biological molecules, such as carbohydrates, proteins and nucleic acids.

Q 92. What is  $m/z$  in mass spectroscopy?

ANS.  $m$  stands for mass and  $z$  stands for charge number of ions.

Q 93. Mass spectroscopy requires low or high vacuum.

ANS. Requires high vacuum.

Q 94. Mass is usually measured in

ANS. In grams (g) (or) kilograms (kg)

Q 94. What is LC-MS analysis?

ANS. Liquid chromatography - Mass spectroscopy

Q 95. What is GC-MS?

ANS. Gas chromatography - Mass spectroscopy

Q 96. The mass accuracy is.

ANS. Linear ion trap [50 - 200 ppm]

Q 97. What is mass fragmentation in mass spectroscopy?

ANS. The dissociation of energetically unstable molecular ions.

(PTD)

(Contd. from Page No -12)

M. Sc [4<sup>th</sup> sem]

Chemistry  
II<sup>nd</sup> Paper - Organic Spectroscopy

Q 98. In mass spectrometer, how many types of ions formed.

ANS. Few 2<sup>+</sup> ions are formed in mass spectroscopy.

Q 99. RR stands for in mass spectroscopy

ANS. Ring Rule

Q 100. The symbol  $M/z$  unit in mass spectroscopy

ANS. Small peak is  $M+1$  peak.

Q 101. What are the major components of a mass spectrometer?

ANS. An ionic source, a mass analyzer and a detector.

Q 102. According to medical terminology, mass is

ANS. Lump [abnormal growth of cells, cyst also]

Q 103. How the IR mass spectroscopy, used in crime (or) barest traces left by suspects?

ANS. With the help of forensic science

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Professor and Head  
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01

## Multiple Choice Questions

(MCQs)

Class - M. Sc [4<sup>th</sup> sem]

Subject - Chemistry

P. III<sup>n</sup>  
(379) Paper - Heterocyclic Compounds  
Paper -

Attempt all the questions and each  
question carry 02 marks

Q.1 Full form of QTE.

ANS. Quantum tunneling effect.

Q.2. What is the 4 carbon ring called?

ANS. Cycloalkanes

Q.3. Phosphate ion is

ANS. Strong base [In water to form basic sol<sup>n</sup>]

Q.4. What are the aromatic compounds?

ANS. Cyclic, conjugated having  $(4n+2)\pi$  electrons.

Q.5. What is antiaromatic compounds?

ANS. Cyclic, conjugated having  $(4n)\pi$  electrons

Q.6. Antiaromatic compound is stable or unstable.

ANS. more stable

Q.7. What is a 5-membered ring called?

ANS. Furanoses and Pyranoses

Q.8. Thiazole is aromatic or non aromatic

ANS. Aromatic.

(PTO)

(02)

(Contd. from Page No - 01)

M.Sc [4<sup>th</sup> sem]

III<sup>rd</sup> Paper - Heterocyclic compounds

Q 9. What is the characteristics of aromatic compounds?

ANS. A delocalized conjugated  $\pi$  system of alternating single and double bonds

Q 10 In Huckel's rule, the value of  $n$ , for benzene is

ANS. 1

Q 11 What is pyran ring?

ANS. Also known as oxine, is a six membered heterocycles.

Q 12 Application of heterocyclic compounds take place in -

ANS. In pharmaceutical, Agrochemicals as Veterinary products

Q 13. How many kinds of 6-membered rings are in DNA?

ANS. Four [04] types of 6-membered Rings

Q 14 Imidazole is acidic or basic

ANS. More basic

Q 14 What is pyridine in chemistry?

ANS. Basic heterocycles organic compound

Q 15. Is pyrylium ion is aromatic or not?

ANS. Aromatic

Q 16. What is a 3-carbon rings called?

ANS. cyclopropane

(PTD)

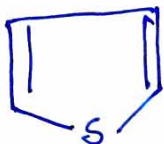
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M.Sc [4th sem]

III<sup>rd</sup> Paper - Heterocyclic compounds

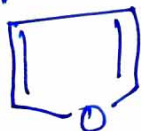
Q. 17. structure of Thiophen.

ANS.



Q. 18. structure of Furan.

ANS



Q. 19 Which bacteria are indole positive?

ANS. Aeromonas hydrophila (Indole from tryptophan)

Q. 20 what is chemical formula of indole?

ANS. C<sub>8</sub>H<sub>7</sub>N, bicyclic structure

Q. 21 Name the arrow.



ANS. Fish-hook type arrow

Q. 22 Name the arrow.



ANS. Resonance.

Q. 23. Medically, benzo furan is used as a

ANS. As an bioactive antioxidants

(04)

(Contd. from Page No - 03)

M.Sc [4<sup>th</sup> sem]

Chemistry

III<sup>rd</sup> Paper - Heterocyclic Compounds

Q 24. Pyramidal Inversion is

ANS. Is a fluxional process in compound with a pyramidal molecule, as  $\text{NH}_3$

Q 25. What is amine inversion?

ANS. Basically Quantum tunneling effect.

Q 26. What is the atomic Inversion?

ANS. It is a spatial arrangements of atoms or groups of atoms in a dissymmetric molecules

Q 27. The another name of Nitrogen Inversion

ANS. Umbrella Inversion, is a fluxional process in Nitrogen and Amines.

Q 28. Is  $\text{NH}_3$  is chiral?

ANS. Chiral, because single bonded N is pyramidal in shape with non-bonding electron pair.

Q 29. What are Non-aromatic compounds?

ANS. Small Ring heterocycles, alkaloids, Lactams hypertensive molecules.

Q 30. How many purines exists?

ANS. 04

Q 31. How many pyrimidines are?

ANS. 04

(PTO)

(05)

(Contd. from Page No -04)

M.Sc [4th sem]

Chemistry

III<sup>rd</sup> paper - Heterocyclic compounds

Q 32. Why are 4 membered rings unstable?

ANS. 3 and 4 membered rings have high energy bond angle that are strained so unstable

Q 33. Which heterocycle is most stabilized?

ANS. Thiophene, is most resonance stabilized 5-membered ring

Q 34. Is pyridine activating or deactivating?

ANS. Pyridine act as a electron-withdrawing and therefore deactivating substituent.

Q 35. Pyrrrole and Furan, which is more reactive?

ANS. Pyrrrole is more reactive than Furan.

Q 36. What is the 5 carbon ring called?

ANS. Cyclopentane

Q 37. Which is a six membered heterocyclic aromatic ring?

ANS. Pyridine with one nitrogen atom

Q 38. Which is the most stable cycloalkane?

ANS. Cyclohexane

(PTO)

(06)

(Contd. from Page No -05)

M.Sc [4th sem]

III<sup>rd</sup> paper - Heterocyclic compounds

Q 39. The full form of EWG.

ANS

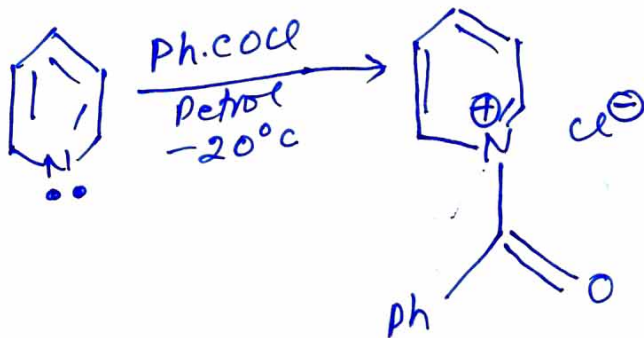
Electron withdrawing group

Q 40. The full form of EDG.

ANS.

Electron donating group

Q 41. Name the reaction



ANS. Acylation at nitrogen

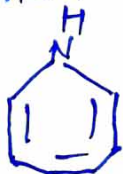
Q 42. Seven membered heterocycle with Nitrogen, is

ANS. saturated Azepane and unsaturated Azepine

Q 43. Azepine is a

ANS. unsaturated 7-membered heterocyclic compound with six carbon atoms, one Nitrogen atom and three double bonds

Q 44. Name the structure



ANS. Azepine

(PTO)

(Contd. from Page NO - 06)

M.Sc [4th sem]

Chemistry

III<sup>rd</sup> Paper - Heterocyclic Compounds

Q 45. Chemical formula of Thiopine.

ANS.  $C_4H_6S$

Q 46. Medically benzothiothione is used in ~~some~~ production of drugs; as...

ANS. Raloxifene, Zileuton and Sertaconazole

Q 47. Medically benzofuran used in

ANS. Benzofuran, used in antiviral, antifungal, antidepressants, anticancer drugs,

Q 48. Benzofuran is also used in

ANS. For ... pathological syndromes of the cardio-vascular disorders

Q 49. Structure of Pyridine.



Q 50. What is pyridine used for?

ANS As a solvent.

(Contd. from Page No - 08)

M.Sc [4th Sem]

Chemistry

III<sup>rd</sup> Paper - Heterocyclic Chemistry

Q 51 Why heterocyclic compounds are essential for life?

ANS. These are building blocks for the metabolism of all living cells.

Q 52. The chemical formula of coumarin

ANS.  $C_9H_6O$

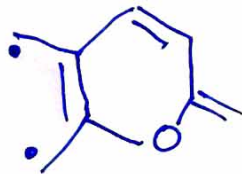
Q 53. Medically coumarins is used for.

ANS. For the treatment of chronic infections.

Q 54 Naturally, coumarin is extracted from.

ANS. Toddalia asiatica, used in Malania

Q 55. The structure of coumarin.

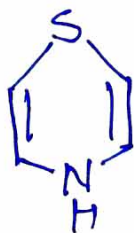


Q 56. Chemical formula of Thiazine.

ANS.  $C_4H_5NS$

Q 57. Structure of 1,4-Thiazine.

ANS.



(PTO)



(59)

(Contd. from Page No - 07)

M.Sc [4<sup>th</sup> sem]

III<sup>rd</sup> Paper - Heterocyclic compounds

Q 58 The another name of Thiiazine is

ANS. Parathiazine

Q 59. chemical formula of Diazepine.

ANS.  $C_7H_6N_2$

Q 60. The chemical formula of Chromones.

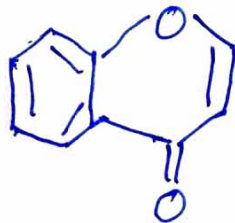
ANS.  $C_9H_6O_2$

Q 61 Chromone is also known as

ANS. 1,4-benzopyrone

Q 62. What is the structure of chromone?

ANS.



Q 63. chromones are also known as

ANS. Phenylpropanoids.

Q 64. Chromone is an isomer of

ANS. coumarin.

(PTO)

(10)

Contd. from Page No - 00

M. Sc [4<sup>th</sup> sem]

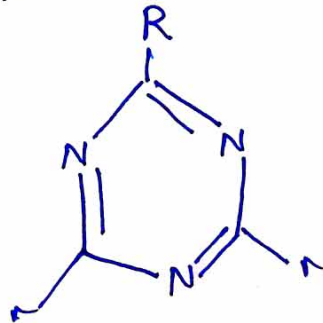
III<sup>rd</sup> Paper - Heterocyclic compounds

Q 65. The chemical formula of Triazine

ANS.  $C_3H_3N_3$

Q 66. The structure of Triazine

ANS.



1,3,5-Triazine

Q 67. What is diazine

ANS. Six-membered aromatic heterocyclic compound.

Q 68. The molecular formula of diazine is

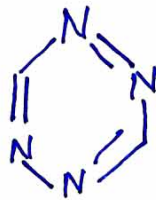
ANS.  $C_4H_4N_2$

Q 69. Tetrazine is

ANS. six-membered aromatic compound

Q 70. What is the structure of tetrazine

ANS.



1,2,4,5-tetrazine

(P.T.O)

10 11

(Contd. from Page No-09)

M.Sc [4<sup>th</sup> sem]

Chemistry

III<sup>rd</sup> Paper - Heterocyclic compounds

Q 71. Molecular formula of Tetrazine

ANS  $C_2H_2N_4$

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## Multiple choice Questions

[MCQs]

Class - M.Sc [4th sem]

Subject - Chemistry

4th Paper -

IVth

Environmental Chemistry

Attempt all questions and each question carry 02 marks.

Q1. What is hydrosphere?

Ans. All the components, such as water in oceans, rivers and ponds.

Q2. What is lithosphere?

Ans. It includes solid components, such as rocky substances of continents.

Q3. What is atmosphere?

Ans. Gaseous mantle, which envelops hydrosphere and lithosphere, it supplies  $O_2$ ,  $N_2$  and  $CO_2$ .

Q4. How many types of Nutrient cycle?

Ans. Three types, as  $O_2$ ,  $CO_2$ ,  $N_2$  cycles.

Q5. The percentage of  $N_2$  in the atmosphere.

Ans. 78.03%

(P.T.O)

(02)

(Contd. from Page NO - 01)

M.Sc [4<sup>th</sup> Sem]

Chemistry

4<sup>th</sup> Paper - Environmental Chemistry  
[IV<sup>th</sup>]

Q.6. What is the Percentage of  $O_2$  in the atmosphere?

ANS. 20.99%.

Q.7. What is the Percentage of Argon and Carbon dioxide in the atmosphere?

ANS. Argon = 0.94%,  $CO_2$  = 0.03%.

Q.8. What are herbivores?

ANS. The individuals feed on living plants.

Q.9. What are carnivores?

ANS. Organisms which feed animals.

Q.10. What is saprovores?

ANS. Such organisms take dead plants, animals and excreta as their foods.

Q.11. What is omnivores?

ANS. They feed on both plants and animals.

Q.12. What is ecological niche?

ANS. As the ultimate distribution unit occupied by one species or sub species

Q.13. What is lentic [lenis, calm] habitat?

ANS. It is characterised by standing water  
Leg., Pond, lake, Swamp

Q.14. What is lotic [Lotus, washed] Habitat?

ANS. Having running water, eg, spring, stream or river.

(P.T.O)

(03)

(Contd. from Page No -02)

M.Sc [4th Sem]

Chemistry

4<sup>th</sup> Paper - Environmental Chemistry

VI

Q15. What is habitat ecology?  
ANS. It includes fresh water ecology, marine, desert and estuarine

Q16. What is conservation ecology?  
ANS. It is a branch of applied ecology related to natural resources

Q17. What is production ecology?  
ANS. This a branch concern with the gross and net production of different ecosystem.

Q18. What is Abiotic components?  
ANS. Non-living elements of the ecosystem.

Q19. What is biotic components?  
ANS. Living elements of the ecosystem.

Q20. What is Paleo ecology?  
ANS. Study of Past ecosystem.

Q21. Chipko movement is started in which state.  
ANS. In Uttarakhand, to protect the trees

Q22. Who was the leader of chipko  
ANS. Gaura Devi

Q23. Raja ji National Park is situated in.  
ANS. In Uttarakhand

Q24. Nanda Devi Biosphere Reserve situated in which state  
ANS. In Uttarakhand, Chamoli.

(PTO)

(04)

(Contd. from Page No -03)

M. SC [4<sup>th</sup> Sem]

Chemistry

4<sup>th</sup> paper - Environmental Chemistry  
IV

Q25. Tiger Reserve situated in which state.  
ANS. In Uttarakhand

Q26. What is Neuston in the ecosystem?  
ANS. Refers to the faunal group associated with a body of water

Q27. What is supraneuston?  
ANS. These organisms remain associated with the upper surface of water [eg, aquatic birds, spiders etc]

Q28. What is Inbraneuston?  
ANS. Inbraneuston, refers to the organisms coming in contact with submerged surface of water [eg. Mosquito larvae, wriggles etc]

Q29. What is plankton?  
ANS. These includes group of animals or plants which float or swim at various depths

Q30. What is neuston or Nekton?  
ANS. These are large active swimmers swimming independtly.

Q31. What is benthon?  
ANS. They include bottom-dwelling organisms

Q32. What are Periphyton?  
ANS. They remain clinged to submerged vegetations

(PTO)

(05)

(Contd. from Page No -04)

M.Sc [4<sup>th</sup> sem]

Chemistry

4<sup>th</sup> Paper

IV

Environmental Chemistry

Q 33. What is sub-littoral zone?

ANS. It lies just above the edge of standing water in fresh water pools.

Q 34. What is Littoral zone?

ANS. It is a shallow water region near the coast and possess rooted plants.

Q 35. What is Limnetic zone?

ANS. This region is the open water zone reaching upto depth of effective light.

Q 36. What is profundal zone?

ANS. It includes deep areas and bottom of fresh water habitat where effective light penetration is negligible.

Q 37. What are producers?

ANS. Littoral zone possesses two kinds of producers, that is benthic [rooted] plants

Q 38. What are consumers?

ANS. These include different forms of animals.

Q 39. What are decomposers?

ANS. They are not so common in the littoral zone and are dominant in the profundal zone.

(PTO)



(06)

(Contd. from page No-05)

M.Sc [4<sup>th</sup> Sem]

Chemistry

4<sup>th</sup> Paper - Environmental Chemistry

Q. 40. What is benthic forms?

ANS. Includes bloodworms (Chironomid larvae).

Q 41. What is planktonic form?

ANS. Which includes phantom larvae or Chaoborus.

Q 42. What is dimictic?

ANS. This includes two seasonal periods of free circulation [eg, autumn overturn]

Q 43. What is polymictic?

ANS. In it, lakes exhibit continuous circulation of water with short stagnant ~~not~~ periods.

Q 44. What is oligo and meromictic?

ANS. In the former, slow circulation takes place as, water is thermally stable, while in latter permanent stratification occurs.

Q 45. What is oligotrophic lakes?

ANS. Typically, they are very deep and poor in phosphorus, nitrogen and calcium.

Q 46. What is Eutrophic lakes?

ANS. These are relatively shallow lakes and are typically rich in nutrients unlike the oligotrophic lakes

(PTO)

(07)

(Contd. from Page No - 06)

M.Sc [4th Sem]

Chemistry

4th paper - Environmental Chemistry  
(VI)

Q 47. What is dystrophic lakes?

ANS. These are also called bog lakes, possess high concentration of humic acid large complex molecules, formed by chemical and biological humification of plants and animals.

Q 48. What is desert salt lakes?

ANS. Occurs in arid climates where evaporation exceeds precipitation.

Q 49. What is volcanic lakes?

ANS. May be acid or alkaline in nature and developed from volcanoes.

Q 50. What is polar lakes?

ANS. Have surface temperature between  $4^{\circ}\text{C}$ , as found in polar region.

Q 51. What is meromictic and holomictic lakes?

ANS. Stratified lakes may include either partly mixed surface and bottom waters.

Q 52. What is Impoundments?

ANS. These include artificial lakes possessing fluctuating water levels and high turbidity.

(PTO)

(08)

(Contd. from Page No-07)

M.Sc [4<sup>th</sup> sem]

Chemistry

4<sup>th</sup> Paper - Environmental Chemistry  
IV<sup>th</sup>

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Q.53. What is Lotic ?

ANS. Running water stream.

Q.54. What is rapid or Riffle zone ?

ANS. Are the shallow water areas over irregular substrate of rocks etc.

Q.55. What is positive rheotaxis ?

ANS. Rheo, current, taxis, arrangement, lotic animals almost orient themselves upstream.

Q.56. What is thigmotaxis ?

ANS. [thigmo, touch, contact] many stream animals have an inherent behaviour

Q.57. What is neritic zone ?

ANS. Usually, continental shelf extends along the shallow shore region

Q.58. What is benthos ?

ANS. These are bottom-dwelling planktons which are mostly sessile and inactive forms

Q.59. What is microbiota ?

ANS. It includes small organisms, such as bacteria, fungi, blue green algae and Protozoans

(P.T.O)

(09)

(Contd. from Page No - 08)

M.Sc [4th Sem]

Chemistry

4th Paper - Environmental Chemistry

Q 60 What is mesobiota?

ANS. These are middle-sized creatures having body size within the range (as 200  $\mu$  to 1 cm)

Q 61 What is Estuarine ecology?

ANS. Semi-enclosed coastal body of water

Q 62. Environment department of India was established in.

ANS. In 1980

Q 63 World environment day is on.

ANS. 5th June

Q 64 Man resource is maximum affected by

ANS. climate

Q 65 Biosphere is concentrated mainly on the surface of

ANS. Earth

Q 66 Man biologically called

ANS. Homo ~~spa~~ sapiens.

Q 67. The credit for creating awareness goes to the conference on "Human Environment"

held at Stockholm in

ANS. In 1972

Q 68 Earth Summit was held in Rio-de-Janeiro in.

ANS. In 1992

(PTO)

(10)

(Contd. from Page No - 09)

M. SC [4th Sem]

Chemistry

4th Paper - Environmental Chemistry

- Q 69. Autotrophic organisms are largely.
- ANS. Green plants
- Q 70. Inorganic compound is.
- ANS.  $\text{CO}_2$
- Q 71. Decomposers are also called
- ANS. Micro consumers
- Q 72. Producers in a pond are of.
- ANS. Two types
- Q 73. Full form of CNG
- ANS. Compressed Natural Gas
- Q 74. In India, gold is found maximum in
- ANS. In Karnataka state
- Q 75. For Green Revolution N.A. Borlaug
- received Nobel Prize for
- ANS. For agriculture
- Q 76. CNG is preferred over LPG because
- it is -
- ANS. Less pollution causing
- Q 77. World forest day is on
- ANS. 21st March
- Q 78. The main cause of soil erosion in
- India, is
- ANS. Due to flood.

(PTO)

(11)

(Contd. from Page No - 10)

M.Sc [4<sup>th</sup> sem]

Chemistry

4<sup>th</sup> Paper - Environmental Chemistry

Q 79. The first controlled nuclear fission demonstrated in

ANS. 1942

Q 80. Cold desert in India is found in

ANS. Manipur

Q 81. "Mocha" word is related to

ANS. For coffee

Q 82. The biological diversity across the world have been divided into --

ANS. 8 biological realms.

Q 83. The Biodiversity of a region is a valuable

ANS. Natural Resources

Q 84. The Wild life [Protection] Act, enacted by the central Government in

ANS. 1972

Q 85. Largest size bird is

ANS. Ostrich

Q 86. The main threat of biodiversity in India is

ANS. Habitat loss

Q 87. A National bird of India, is

ANS. Peacock.

(P.T.O)

Contd. from Page no 11

M.Sc [4th sem]

Chemistry

4th paper - Environmental Chemistry

Q. 88. The fatal gas MIC killed over 2500 peoples in Bhopal, in

ANS. 1984

Q. 89 which is one of the six major pollutants?

ANS. CO

Q. 90. Suspended Particulates are smaller than

ANS. 10 microns

Q. 91 In context of air pollution, only two oxides of Nitrogen, viz (NO) and --

ANS. NO<sub>2</sub>

Q. 92. The chief ingredients of photochemical smog are the

ANS. Mixed hydrocarbons.

Q. 93. one of the most toxic substances currently in industrial use is

ANS. Beryllium

Q. 94. What is global warming?

ANS. Is the temperature of Earth's surface, oceans and atmosphere going up over ten years.

Q. 95. Full form of GHG

ANS. Green house gases

Q. 96. What are the 5 main greenhouse gases?

ANS. CO, CH<sub>4</sub>, N<sub>2</sub>O, O<sub>3</sub>, CFCs, HCFCs, HFCs, PFCs and NF<sub>3</sub>

(PTO)

(13)

(Contd. from Page No - 12)

M.Sc [4th Sem]

Chemistry

4th Paper - Environmental Chemistry

Q 97. What is the number 1 greenhouse gas?

ANS. Water-vapours

Q 98. Which greenhouse gas causes the most warming?

ANS. Carbon dioxide

Q 99. What is full form of VOCs?

ANS. Volatile organic compounds

Q 100. Full form of DO.

ANS. Dissolved oxygen

Q 101. Full form of COD.

ANS. Chemical oxygen demand

Q 102. Full form of BOD.

ANS. Biological oxygen demand.

Q 103. What is dissolved oxygen?

ANS. DO is one of the most important indicators of water quality.

Q 104. What is the normal dissolved oxygen?

ANS. DO concentrations should be above 6.5-8 mg/L and about 80-120%.

(P.T.O)



(14)

Contd. from Page No 13

M.Sc [4<sup>th</sup> sem]

Chemistry

4<sup>th</sup> Paper - Environmental Chemistry

Q. 105. Does pH affect dissolved oxygen?  
ANS. DO levels decreases to increasing levels of pH.

Q. 106. What is COD?

ANS. The chemical oxygen demand is a measurement of water and waste water quality.

Q. 107. What is COD Test?

ANS. Often used to monitor water treatment plant efficiency.

Q. 108. What is Biological oxygen demand?

ANS. Represents the amount of oxygen consumed by bacteria and other micro-organisms, while they decompose organic matter under aerobic ( $O_2$ ) conditions.

Q. 109. What is photochemical effect?

ANS. The chemical reactions caused by absorption of light or ultraviolet light (wavelength from 100-400 nm), visible light (400-750 nm) or infra-red radiations (750-2500 nm).

Q. 110. Is ~~Rain~~ Rainbow a chemical reaction?

ANS. A rainbow is not a chemical reaction, but is an optical illusion due to sunlight through water droplets in the atmosphere.

(1PTO)

(Contd. from Page 10-14)

M.Sc [4<sup>th</sup> Sem]

Chemistry

4<sup>th</sup> paper - Environmental Chemistry

Q 111. How is the acid-rain takes place?  
 Ans. Chemical reactions caused by the excess amount of sulphur dioxide and nitrogen oxide are released into the air.

Q 112. What is the colour of acid rain?  
 Ans. When you add acid, bromothymol blue turns yellow, when you add base [like sodium sulphite] it turns blue, Green means neutral (like water)

Q 113. The unpolluted rain has pH values -  
 Ans. pH value between 5 and 6.

Q 114. What is photochemical smog?  
 Ans. Is a mixture of pollutants that are formed when nitrogen oxides and VOCs (volatile organic compounds) react to sunlight creating a brown haze above cities (or) metropolitan cities.

Q 115. Basically the photochemical smog is.  
 Ans. A type of air pollution due to the reaction of solar radiation with airborne pollutants.

(P.T.O)

(16)

(Contd. from Page No - 15)

M.Sc [4th Sem]

Chemistry

4th Paper - Environmental Chemistry

Q 116. What is Particulate matters ?

ANS. Also known as Particle Pollution (or) PM, is a complex mixture of extremely small particles and liquid droplets including acids [such as nitrates and sulphates] organic chemicals, metals and soil or dust particles.

Q 117. What is Smog ?

ANS. Is formed by a chemical reaction of carbon monoxide, Nitrogen oxides, Volatile organic compounds and heat from sunlight.

Q 118. Smog is

ANS. Mixture of smoke + fog

Q 119. What is smog in chemistry ?

ANS. The light, oxygen, Volatile organic compounds and Nitrogen oxides in the troposphere produce ozone

Q 120. What is haze ?

ANS. A slight obscuration of the lower atmosphere, typically caused by the suspended particles [SPS].

(PTO)

(17)

Contd. from Page NO - 16

M.Sc [4<sup>th</sup> sem]

Chemistry

4<sup>th</sup> Paper - Environmental Chemistry  
IV<sup>th</sup>

Q 121. How does haze affect the environment?  
ANS. Haze is one of the most basic forms of  
part air pollution and degrades visibility,  
[Also known as haze pollution]

Q 122. Haze also contains?  
ANS. Dust particles, smoke particles, also  
includes air pollutants such as  
sulphur dioxide, Nitrogen dioxide, ozone,  
Carbon monoxide and fine particulate  
matters.

Q 123. What is pesticides?  
ANS. It contaminate soil, water, turfs and other  
vegetations, in addition to killing insects (or)  
weeds, it is highly toxic for nature.

124. What are common types of pesticides?  
ANS. Insecticides, Herbicides, Rodenticides,  
Fungicides, Larvaceides, Bactericides

125. World blood donors day & ANS 14 June

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