

CENTRAL COUNCIL FOR RESEARCH IN SIDDHA
RESEARCH ASSISTANT (CHEMISTRY)

Date: 26.3.2017

1. Oxidation states of A, B and C are +2, +5 and -2 respectively. Possible formula of the compound is
 - a) $A_2(BC_2)_2$
 - b) $A_3(BC_4)_2$
 - c) $A_2(BC_3)_2$
 - d) $A_3(B_2C)_2$
2. Which of the following does not undergo Friedel-Craft's reaction ?
 - a) Pyrrole
 - b) Furan
 - c) Thiophene
 - d) Pyridine
3. In the manufacture of cast iron from haematite ore, the slag formed is
 - a) Silica
 - b) $FeSiO_3$
 - c) $CaSiO_3$
 - d) $MgSiO_3$
4. 1-Naphthol on reduction with Na/liq NH_3 gives:
 - a) 5,8-dihydro-1-naphthol
 - b) 5,6-dihydro-1-naphthol
 - c) 7,8-dihydro-1-naphthol
 - d) 5,6,7,8-tetrahydro-1-naphthol
5. Find out the incorrect statement about DPPH
 - a) It is a free radical.
 - b) It's 'g' value is 2.0039.
 - c) It gives three sharp peaks with relative intensities 1: 3 : 1
 - d) It is used as standard in ESR.
6. A pmr signal comes at 80 cps down field with reference to TMS in a spectrometer using 40 Mcps. The chemical shift is
 - a) 4.00 ppm
 - b) 0.50 ppm
 - c) 2.00 ppm
 - d) 0.25 ppm

CENTRAL COUNCIL FOR RESEARCH IN SIDDHA
RESEARCH ASSISTANT (CHEMISTRY)

Date: 26.3.2017

7. In the IR spectrum of p-nitrophenylacetate, the carbonyl absorption band appears at
 - a) 1670 cm^{-1}
 - b) 1700 cm^{-1}
 - c) 1730 cm^{-1}
 - d) 1760 cm^{-1}
8. Number of isoprene units present in lupeol is
 - a) 2
 - b) 4
 - c) 6
 - d) 8
9. Toxicity of cadmium and mercury in the body is being reversed by proteins using the amino acid residue
 - a) Glycine
 - b) Leucine
 - c) Lysine
 - d) Cysteine
10. Calculate the pH of a 0.01 M solution of CH_3COOH with 12.5 % degree of dissociation is
 - a) 2.0
 - b) 1.0
 - c) 2.9
 - d) 0.25
11. The quaternary structure of human haemoglobin is best described as a
 - a) Dimer of two myoglobin units
 - b) Tetramer of identical subunits
 - c) Tetramer of four different subunits
 - d) Tetramer of two different subunits
12. ^1H NMR spectrum of [18]-annulene shows
 - a) Only one peak at δ 7.2 (18H)
 - b) Only one peak at δ 5.0 (18H)
 - c) Two peaks at δ 9.0 (12H) and δ -3.0 (6H)
 - d) Two peaks at δ 9.0 (6H) and δ -3.0 (12H)

CENTRAL COUNCIL FOR RESEARCH IN SIDDHA
RESEARCH ASSISTANT (CHEMISTRY)

Date: 26.3.2017

13. The pH of a buffer solution containing 4×10^{-3} and 0.4 moles of acetic acid ($pK_a = 4.76$) and sodium acetate respectively will be
- 6.76
 - 4.76
 - 2.76
 - 0.76
14. Heroin gets rapidly degenerated to
- 4-monoacetyl morphine
 - 6-monoacetyl morphine
 - Diacetyl morphine
 - 2-monoacetyl morphine
15. BF_3 is more stable than the separated B and F atoms because
- boron is more electronegative than fluorine
 - molecular orbitals are always more stable than atomic orbitals
 - the bonding electron pairs are attracted to, and stabilized by two nuclei as opposed to one
 - the Pauli exclusion principle requires this
16. When cyclohexanone oxime is treated with H_2SO_4 , the ring expansion taking place is due to
- Curtius reaction
 - Beckmann rearrangement
 - Favorskii rearrangement
 - Claisen rearrangement
17. Methylethylamine cannot be resolved into enantiomers because
- it is planar
 - it undergoes rapid inversion
 - it has plane of symmetry
 - a trivalent atom cannot be a centre of chirality

CENTRAL COUNCIL FOR RESEARCH IN SIDDHA
RESEARCH ASSISTANT (CHEMISTRY)

Date: 26.3.2017

18. Cope rearrangement is
- a) [2,3]sigma tropic rearrangement
 - b) [3,2] sigma tropic rearrangement
 - c) [3,3]sigma tropic rearrangement
 - d) [1,3] sigma tropic rearrangement
19. Which of the following acts as a protective colloid?
- a) Gelatin
 - b) Silica gel
 - c) Oil-in-Water emulsion
 - d) All the above
20. Milk is an emulsion of fat dispersed in water. It is stabilized by
- a) Casein- a lyophilic colloidal sol
 - b) Casein-a lyophobic colloidal sol
 - c) lactose-a lyophilic colloidal sol
 - d) Lactose- a lyophobic colloidal sol
21. Match the methods of molecular weight determination of polymers and its related equation:
- | | |
|-----------------------------------|--------------------------|
| (A) Viscosity method | (i) Svedberg Equation |
| (B) Light scattering method | (ii) Zimm equation |
| (C) Sedimentation velocity method | (iii)Staudinger Equation |
- | | | |
|----------|-------|-------|
| (A) | (B) | (C) |
| a) (iii) | (ii) | (i) |
| b) (ii) | (iii) | (i) |
| c) (i) | (ii) | (iii) |
| d) (iii) | (i) | (ii) |
22. Concentrated nitric acid oxidises cane sugar into:
- a) CO₂ and H₂O
 - b) CO and H₂O
 - c) oxalic acid and H₂O
 - d) CO, CO₂ and H₂O

CENTRAL COUNCIL FOR RESEARCH IN SIDDHA
RESEARCH ASSISTANT (CHEMISTRY)

Date: 26.3.2017

23. Fundamental stretching vibration for $^1\text{H}^{35}\text{Cl}$ is observed at 2886 cm^{-1} . The value of first and second overtones are at:
- 2886 and 5772 cm^{-1}
 - 5772 and 8658 cm^{-1}
 - 2886 and 8658 cm^{-1}
 - 1443 and 2886 cm^{-1}
24. Cyclohexanol on oxidation with $\text{K}_2\text{Cr}_2\text{O}_7/\text{acid}$ at $>60^\circ\text{C}$ yields:
- Cyclohexanone
 - Hexanoic acid
 - Adipic acid
 - Hexanaldehyde
25. Find out the incorrect statement(s)
- K_2IrCl_6 could not be predicted by ESR spectrum
 - Zinc (II) complexes could be identified by ESR spectrum.
 - Odd electron species NO_2 , NO can be identified by ESR spectrum
 - ESR spectrum can be used to estimate Mn^{2+}
- ii) and (iii)
 - (iii) and (iv)
 - (i) and (iv)
 - (i) and (ii)
26. Name the rearrangement that involves acid catalyzed dehydration of 1,2 – diols
- Hoffmann
 - Pinacol-pinacolone
 - Curtius
 - Baeyer-Villiger
27. The number of metal-metal bonds in $\text{Ir}_4(\text{CO})_{12}$ is
- 4
 - 6
 - 10
 - 12

CENTRAL COUNCIL FOR RESEARCH IN SIDDHA
RESEARCH ASSISTANT (CHEMISTRY)

Date: 26.3.2017

28. Crystal field stabilization energy of transition metal complexes can be determined by
- UV-Vis spectroscopy
 - IR spectroscopy
 - Microwave spectroscopy
 - NMR spectroscopy
29. Addition of excess aqueous ammonia to copper (II) sulphate attributes to
- Labile complexes
 - Inert complexes
 - Both
 - None of the above
30. Reversed-phase HPLC of a multi-component sample usually uses
- Elution with a polar solvent
 - Gradient elution from a less polar to a more polar solvent
 - Elution with a non-polar solvent
 - Gradient elution from a more polar to less polar solvent
31. Appropriate reasons for the deviation from the Beer's law among the following are
- Monochromaticity of light
 - Association of analyte
 - Very high concentration of analyte
 - Dissociation of analyte
- A, B and D
 - B, C and D
 - A, C and D
 - A, B and C
32. In ^{13}C NMR, the DEPT method is better known as
- Distortion-more enhancement by polarization transfer
 - Decorated-less enhancement by depolarization time
 - Distortion-more reduction by polarization time
 - Distortion-less enhancement by polarization transfer

CENTRAL COUNCIL FOR RESEARCH IN SIDDHA
RESEARCH ASSISTANT (CHEMISTRY)

Date: 26.3.2017

33. In the mass spectrum of ethyl benzene some of the prominent peaks appear at $m/Z=106,91$ and 65 . Which of the species given below is not responsible for these peaks
- Ethyl benzene
 - Ethene
 - Tropylium ion
 - $C_5H_5^+$
34. Vitamin A_2 is also called as
- 3,4-Dehydroretinol
 - 4,5-Dehydroretinol
 - 5,6-Dehydroretinol
 - 1,2-Dehydroretinol
35. In the proton decoupled ^{13}C and ^{31}P NMR spectra of $(CH_3)_3P=O$, the number of lines observed, respectively, are
- Two and one
 - One and two
 - Three and one
 - Two and two
36. Copper and iron are present at the active site of _____ enzyme
- Liver alcohol dehydrogenase
 - Cytochrome C Oxidase
 - Hemocyanin
 - Myoglobin
37. Lindane is a
- Carbonate
 - Organochlorine pesticide
 - Organo phosphorus pesticide
 - Fungicide
38. The two important relaxation processes that are encountered in NMR spectroscopy are
- Spin lattice- Longitudinal
 - Spin-Spin and transverse
 - Spin-lattice and spin-spin
 - Longitudinal and parallel

CENTRAL COUNCIL FOR RESEARCH IN SIDDHA
RESEARCH ASSISTANT (CHEMISTRY)

Date: 26.3.2017

39. The most widely used flame in atomic absorption is
- Air-coal gas
 - Air-propane
 - Air-acetylene
 - Oxyacetylene
40. Bleeding is stopped by the application of Ferric chloride. This is because
- the blood starts flowing in opposite direction
 - the blood reacts and forms a solid, which seals the blood vessel
 - the blood is coagulated and thus the blood vessel is sealed
 - The ferric chloride seals the blood vessel
41. The vibrational rotational spectrum is observed in
- Near IR region
 - Microwave region
 - Visible region
 - Radiofrequency region
42. Which one of the following groups is present in testosterone hormone
- Alcoholic
 - Ketonic
 - Aldehydic
 - Carboxylic
43. Which is not the correct statement for a catalyst?
- It does not alter
 - The surface of a catalyst adsorbs reactants
 - Catalyst may form intermediates with the reactants
 - Action of enzyme catalyst is always specific
44. The ^{13}C NMR chemical shifts of methylamine and methanol are δ 26.9 and 48.0 δ respectively. It reveals that
- There is no shielding effect.
 - Carbon that is bonded to nitrogen is more shielded than those bonded to oxygen.
 - Carbon that is bonded to nitrogen is less shielded than those bonded to oxygen.
 - Shielding effect does not influence the chemical shift values.

CENTRAL COUNCIL FOR RESEARCH IN SIDDHA
RESEARCH ASSISTANT (CHEMISTRY)

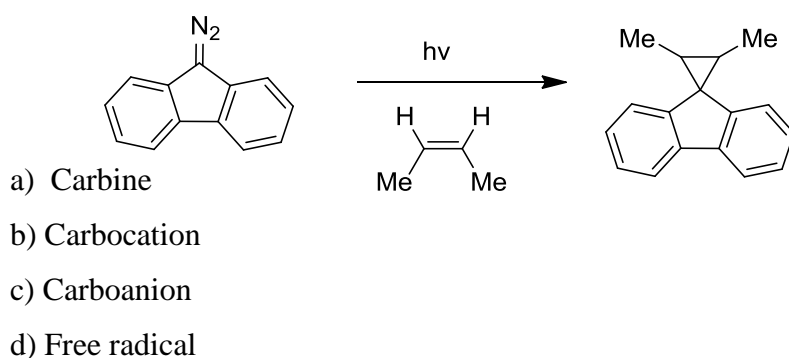
Date: 26.3.2017

45. The intermediate in Wittig reaction is
- Diene
 - Carbene
 - Nitrene
 - Oxaphosphetane
46. Find out the correct statement(s) regarding Raman spectra
- CCl_4 and CBr_4 do not produce any new line in Raman spectra on mixing.
 - SnClBr_3 and SnCl_2Br_2 are formed when SnCl_4 and SnBr_4 are reacted.
 - CClBr_3 and CCl_2Br_2 are formed when CCl_4 and CBr_4 are reacted.
 - Tin-halogen bonds are not as labile as carbon halogen bonds.
- (ii) and (iv)
 - (ii) and (iii)
 - (i) and (iii)
 - (i) and (ii)
47. E2 reactions take place
- when the two groups and the two carbon atoms (to which the groups are attached) all lie in one plane
 - when the two groups to be eliminated are trans
- (i) is true (ii) is false
 - Both (i) and (ii) are false
 - Both (i) and (ii) are true
 - (i) is false (ii) is true
48. In transition metal complexes containing d-shells less than half filled, the 'g' value is
- equal to 2.0023
 - less than 2.0023
 - more than 2.0023
 - equal to 2.0039
49. The ionic strength of the solution of electrolytes 0.01 m H_2SO_4 , 0.01 m CuSO_4 and 0.01 m NaCl are respectively
- 0.03, 0.02 and 0.01m
 - 0.06, 0.04 and 0.02 m
 - 0.06, 0.02 and 0.02m
 - 0.03, 0.04 and 0.01m

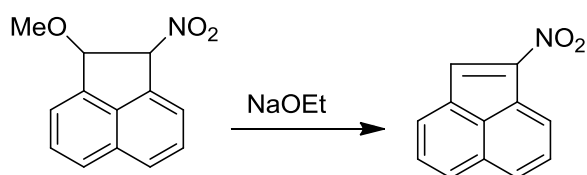
CENTRAL COUNCIL FOR RESEARCH IN SIDDHA
RESEARCH ASSISTANT (CHEMISTRY)

Date: 26.3.2017

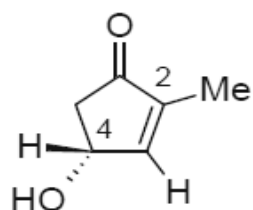
50. Find out the correct order of disc material, heat monitoring equipment and standard used in DSC
- a) Indium, thermostat, Cu/Ni alloy
 - b) Cu/Ni alloy, Indium, thermostat
 - b) Indium, thermocouple, Cu/Ni alloy
 - d) Cu/Ni alloy, thermocouple, Indium
51. In 2-bromocyclohexanone, the axial form predominates the equatorial form because the equatorial dipolar repulsion
- a) is larger than 1,3 interactions
 - b) is lesser than 1,3 interactions
 - c) does not influence 1,3 interactions
 - d) is equal to 1,3 interactions
52. Photochemical cleavage of 2-Pentanone gives rise to
- a) Pentane
 - b) Acetone
 - c) Butanone
 - d) Isopropyl alcohol
53. Which type of injector is most commonly used for capillary GC chromatography?
- a) Purge and trap
 - b) Splitless injector
 - c) Split injector
 - d) Loop injector
54. The intermediate involved in the reaction given below is



55. The reaction given below is an example of



- a) E₁cb-elimination
b) E₁- elimination
c) *syn*- elimination
d) E₂- elimination
56. The stereochemical descriptors for the chiral centre and olefin in the compound given below are



- a) 4R, 2Z
b) 4S, 2Z
c) 4R, 2E
d) 4S, 2E
57. Glycogen is present in all body tissues except in
- a) Liver
b) Brain
c) Kidney
d) Stomach
58. In Mass spectroscopy, the rule sometimes used to verify a molecular ion peak is
- a) Lewis-Randell rule
b) Nitrogen rule
c) Thumb rule
d) Oxygen rule

CENTRAL COUNCIL FOR RESEARCH IN SIDDHA
RESEARCH ASSISTANT (CHEMISTRY)

Date: 26.3.2017

59. The oxidation state of molybdenum in $[(\eta^7\text{-tropylium})\text{Mo}(\text{CO})_3]^+$ is
- +2
 - +1
 - 0
 - 1
60. The number of lines in the ESR spectrum of CD_3 is (the spin of D is 1)
- 1
 - 3
 - 4
 - 7
61. The triple point of water is at
- 273.16 K
 - 273.16 K and 760 Torr
 - 273.16 K and 4.58 Torr
 - 760 Torr
62. The electrical resistivity of a semiconductor
- Increases with temperature
 - Decreases with temperature
 - Increases at low temperature and then decreases at high temperature
 - Does not change with temperature
63. Which one of the following statements for hemoglobin is NOT correct?
- The binding with O_2 is weaker in comparison with myoglobin
 - Iron is 5-coordinated
 - Iron is coplanar with the porphyrin ring in the absence of oxygen
 - The oxidation state of iron is +2
64. The measurement of the intensity of the scattered light as a function of the concentration of dispersed phase constitute the basis of
- Turbidimetric analysis
 - Potentiometric analysis
 - Raman scattering
 - Nephelometric analysis

CENTRAL COUNCIL FOR RESEARCH IN SIDDHA
RESEARCH ASSISTANT (CHEMISTRY)

Date: 26.3.2017

65. Silica gel used in chromatographic technique is
- Acidic in nature
 - Basic in nature
 - Neutral in nature
 - Amphoteric in nature
66. The electrolyte which will not obey Debye-Huckel-Onsagar equation for equivalent
- HCl
 - AgNO₃
 - CH₃COOH
 - NaCl
67. Coupling between the protons of the same carbon is called
- Vicinal coupling
 - Geminal coupling
 - Allylic coupling
 - Long range coupling
68. CrO₃ is bright orange in colour due to
- d-d transition
 - CT transitions
 - Both (a) and (b)
 - None of the above
69. Vibrational transitions are always accompanied by
- Vibrational transitions
 - Rotational transitions
 - Electronic transitions
 - None of the above
70. The frequency of UV radiations is greater than
- Microwaves
 - IR radiations
 - Both (a) and (b)
 - None of the above

CENTRAL COUNCIL FOR RESEARCH IN SIDDHA
RESEARCH ASSISTANT (CHEMISTRY)

Date: 26.3.2017

Answers

1.	B
2.	D
3.	C
4.	A
5.	C
6.	C
7.	D
8.	C
9.	D
10.	C
11.	D
12.	C
13.	B
14.	B
15.	C
16.	C
17.	B
18.	C
19.	A
20.	A
21.	A
22.	C
23.	B
24.	C
25.	D
26.	B
27.	B
28.	A
29.	A
30.	D
31.	B
32.	D
33.	D
34.	A
35.	C

36.	B
37.	B
38.	C
39.	C
40.	D
41.	A
42.	A
43.	A
44.	B
45.	D
46.	D
47.	C
48.	B
49.	D
50.	D
51.	A
52.	B
53.	C
54.	A
55.	A
56.	A
57.	D
58.	B
59.	C
60.	D
61.	C
62.	B
63.	C
64.	D
65.	A
66.	C
67.	B
68.	B
69.	B
70.	C