

Seat No.

Total No. of Pages : 23

P.G. Entrance Examination, 2024**M. Sc. Chemistry (Inorganic/Organic/Physical/Analytical/Industrial/Applied)****CHEMISTRY****Subject Code : 58713**

Day and Date : Thursday, 16-05-2024**Total Marks : 100****Time : 10:30 am to 12:00 pm**

Instructions :

- 1) All questions are compulsory.
 - 2) Each question carries 1 mark.
 - 3) Answers should be marked in the given OMR answer sheet by darkening the appropriate option.
 - 4) Follow the instructions given on OMR sheet.
 - 5) Rough work shall be done on the sheet provided at the end of question paper.
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- 1) Super conductors show effect.
 - a) resonance
 - b) Raman
 - c) trans
 - d) Meissner

- 2) A decrease in the value of Gibb's free energy at constant pressure and temperature is a measure of maximum reversible work done by the system
 - a) mechanical
 - b) non-mechanical
 - c) total
 - d) free

- 9) When is a separation step not required in a manufacturing process?
- a) when there is a decomposition reaction
 - b) when there is a complete conversion
 - c) when the byproducts are in the form of gases
 - d) when the reaction is reversible
- 10) Brine is a saturated solution of.....
- a) NaCl
 - b) NaOH
 - c) KCL
 - d) CsCl
- 11) A reaction sequence in which an intermediate of reduced coordination number is formed by the departure of the leaving group is called:
- a) an associative mechanism
 - b) a dissociative mechanism
 - c) an interchange mechanism
 - d) None of these
- 12) Ligands are considered as
- a) charged species
 - b) point groups
 - d) charged group
 - c) point charges
- 13) Which of the following classes of ligands has the strongest trans effect?
- a) π donor groups
 - b) π acceptor groups
 - c) σ donor groups
 - d) σ acceptor groups

- 18) technique is used in water purification technology.
- a) high-performance liquid chromatography
 - b) size exclusion chromatography
 - c) ion exchange chromatography
 - d) affinity chromatography
- 19) Compounds with low Rf value can be effectively separated by paper chromatography.
- a) ascending
 - b) descending
 - c) radial/circular
 - d) none of these
- 20) CFSE for d6 octahedral complex in weak field is Dq.
- a) +4
 - b) -6
 - c) -4
 - d) -12
- 21) Cation exchanger possesses charged groups and anion exchanger possesses..... charged groups
- a) positive; negative
 - b) negative; positive
 - c) positive, neutral
 - d) negative, negative

- 22) Which of the following detectors have high sensitivity to all organic compounds?
- a) sulphur chemiluminescence detector
 - b) thermionic emission detector
 - c) flame ionization detector
 - d) argon ionisation detector
- 23) Which sentence is false about gravimetric analysis?
- a) it is used for inorganic ions
 - b) it is used to assay volatile organic compounds
 - c) it is used to assay barium sulphate
 - d) it is used to assay of aluminum
- 24) Gravimetric analysis in which weight change as a function of temperature/ time is measured is
- a) electrogravimetry
 - b) thermogravimetry
 - c) volatilisation gravimetry
 - d) precipitation gravimetry
- 25) When the foreign ions get trapped in the growing crystal, it is called
- a) inclusion
 - b) mechanical Entrapment
 - c) surface adsorption
 - d) occlusion

- 26) What is the role of oxine in aluminum assay?
- a) surfactants
 - b) colloidal
 - c) precipitating agent
 - d) emulsifier agent.
- 27) In which step, ions or elements are aggregated in gravimetric analysis?
- a) supersaturation
 - b) nucleation
 - c) particle growth
 - d) none of the above
- 28) Ostwald ripening is
- a) re-precipitation
 - b) dissolved small precipitate
 - c) produced a larger precipitate
 - d) all of the above
- 29) The spectra caused in the infrared region by the transition in vibrational levels in different modes of vibrations are called
- a) rotational spectra
 - b) electronic spectra
 - c) vibrational spectra
 - d) none of these

- 30) Which relationship is true regarding molecular energy levels?
- $E(\text{vibrational}) > E(\text{electronic}) > E(\text{rotational})$
 - $E(\text{rotational}) > E(\text{vibrational}) > E(\text{electronic})$
 - $E(\text{electronic}) > E(\text{rotational}) > E(\text{vibrational})$
 - $E(\text{electronic}) > E(\text{vibrational}) > E(\text{rotational})$
- 31) For copper sulphate solution transmitted colour is bluish, while λ_{max} will appear in range..... of.....
- 400-435 nm
 - 480-490 nm
 - 610-750 nm
 - 490-500 nm
- 32) A device for measuring a response of photocell is called
- voltmeter
 - conductometer
 - galvanometer
 - (d) all of theses.
- 33) In f-block elements the successive addition of electrons in
- (n-2)
 - (n-3)
 - (n-1)
 - (n-4)
- 34) are the anomalous oxidation states of lanthanides.
- +1, +3
 - +2, +4
 - +3, +3
 - +2, +3

- 40) Which of the following are the reactions in which molecules absorbing light do not themselves react but induce other molecules to react?
- a) photosensitized reactions
 - b) free radical reactions
 - c) chain reactions
 - d) reversible reactions
- 41) D-Glucose does not react with reagents.
- a) Fehling's.
 - b) Tollen's
 - c) Schiff's
 - d) None of these
- 42) The condensation reaction of activated methylene compound and aldehyde or ketone is called reaction
- a) Michael
 - b) Knoevenagel
 - c) Wittig
 - d) Dickmann condensation
- 43) Rearrangement involving a change in carbon skeleton through carbocation intermediate is called as.....
- a) Wagner-Meerwein
 - b) Knoevenagel
 - c) Diels-Alder
 - d) Wittig

- 44) Synthetic equivalent for alkyl anion is
- Grignards reagent
 - alkyl halide
 - Tollen's reagent
 - alkane
- 45) The addition of halogen to triple bond hydrocarbons produces
- dihaloalkane
 - tetrahaloalkane
 - alcohol
 - aldehyde
- 46) Alkenes form 1:2 diols on reaction with.....
- dilute H_2SO_4
 - BH_3 and H_2O_2
 - cold aqueous KMnO_4 solution
 - dilute alkali
- 47) Isoprene may turn into rubber on.....
- | | |
|-----------------------------------|--------------------|
| a) heating at 280°C | b) on distillation |
| c) polymerization | d) none of these |

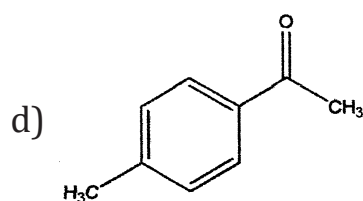
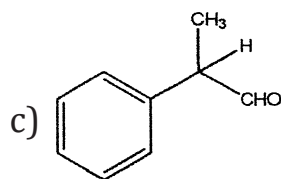
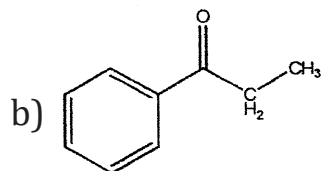
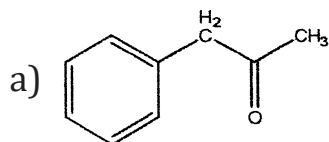
- 48) What is an alkaloid?
- a) a type of hydrocarbons
 - b) a type of isoprene unit containing molecules
 - c) nitrogen-containing natural products
 - d) oxygen-containing natural products
- 49) Decolorization of cane juice is done using
- a) activated carbon
 - b) ion exchange resin
 - c) sulphitation process
 - d) all of these
- 50) The density scale used to measure sugar concentration is
- a) trix
 - b) brix
 - c) pan
 - d) calendria
- 51) An antipyretic is a drug used to.....
- a) control sleep
 - b) induce sleep
 - c) lower body temperature
 - d) elevate body temperature

- 52) The polymers are grouped based on their
- a) origin
 - b) structure
 - c) property
 - d) all of these
- 53) The CPs are used in
- a) storage batteries
 - b) gas sensors
 - c) PCBs
 - d) all of these
- 54) The concept of matter wave was suggested by
- a) de Broglie
 - b) Schrodinger
 - c) Laplace
 - d) Heisenberg
- 55) In a rigid rotator distance between two particles is.....
- a) infinite
 - b) zero
 - c) variable
 - d) constant
- 56) Flame photometry is concerned with the measurement of the intensity of light..... when a metal is introduced into the flame.
- a) absorbed
 - b) emitted
 - c) both a and b
 - d) none of these
- 57) The Nernst distribution law equation $C_1/C_2=KD$ applies when:
- a) the molecular state of the solute is the same in both the solvents
 - b) the molecular state of the solute is different in both the solute
 - c) the molecular state of the solute may be the same or different in both the solute
 - d) none of the above

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- 68) Deduce the structure of the organic compound from the following spectroscopic data MF: $C_9H_{10}O$ Mass: 134, 91, 43 IR: 1715 cm^{-1}

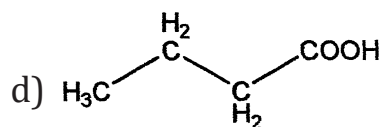
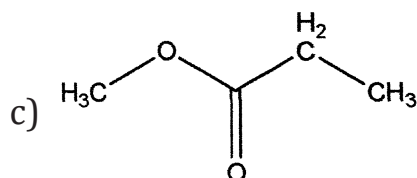
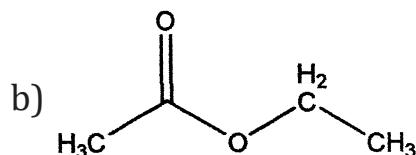
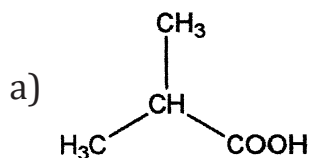
NMR: δ 2.1 (3H, s); 3.7 (2H, s); 7.1-7.4 (5H, m)



- 69) Deduce the structure of the organic compound from the following spectroscopic data.

MF: $C_4H_8O_2$ Mass: 88, 43 IR: 1735 cm^{-1}

NMR: δ 1.3 (3H, t); 2 (3H, s); 4.2 (2H, q)



70) Deduce the structure of the compound from the following spectral data.

M.F. : C_8H_8O UV - λ max 292 nm IR-1710 cm^{-1}

PMR- δ 7.27 (s, 5H), 2.80 (s, 2H); 9.88 (s, 1H)

- a) $C_6H_5-CO-CH_3$ b) $C_6H_5-CH_2-CHO$
c) $C_6H_5-CH_2-CH_2-OH$ d) $C_6H_5-CHOH-CH_3$

71) What is the purpose of the use of a standard solution in titrimetric analysis?

- a) to react with the analyte and form a product
b) to determine the concentration of the analyte
c) to calibrate the titration apparatus
d) to increase the sensitivity of the titration reaction.

72) Which of the following factors can affect the accuracy of titrimetric analysis?

- a) temperature
b) pH
c) concentration of the titrant solution
d) all of the above

73) Which of the following chelating agents is commonly used in the preservation of food"

- a) ethylene diamine tetraacetic acid.
b) dimercaprol
c) deferoxamine
d) penicillamine

- 84) Emission of an alpha particle from a nucleus of an atom leads to a
- a) decrease of 2 units in the charge of the atom
 - b) decrease of 2 units in the mass of the atom
 - c) increase of 2 units in the mass of the atom
 - d) increase of 4 units in the mass of the atom
- 85) ${}_{92}\text{U}^{235}$ nucleus absorbs a neutron and disintegrates in ${}_{54}\text{Xe}^{139}$, ${}_{38}\text{Sr}^{94}$ and 'z' so, what will be product 'z'?
- a) 2 neutrons
 - b) α -particle
 - c) 3 neutrons.
 - d) β -particle
- 86) What is the interplanar distance if an X-ray of wavelength 2.64 nm gave a first-order reflection from the crystal plane at an angle of 11.2°
- a) 6,80 m
 - b) 6.82 nm
 - d) 680 m
 - c) 680 nm
- 87) The ratio $d_{100} : d_{110} : d_{111} = 1 : 1/\sqrt{2} : 2/\sqrt{3}$, then the crystal belongs to lattice.
- a) face-centered cubic
 - b) body-centered cubic
 - c) simple cubic
 - d) edge-centered cubic

- 88) (111) plane contains
- a) only Na⁺ ions
 - b) only Cl⁻ ions
 - c) equal number of Na⁺ and Cl⁻ ions
 - d) either all Na⁺ ions or all Cl⁻ ions
- 89) To obtain the diffraction pattern by using an X-ray diffractometer a plot of is plotted.
- a) intensity vs. 2θ degree
 - b) 2θ degree vs. Intensity
 - c) Intensity vs. θ degree
 - d) θ degree vs. Intensity
- 90) Number of Na⁺ ions in a unit cell of NaCl is at the centre of faces which are shared by two cubes.
- a) 1
 - b) 6
 - c) 12
 - d) 4
- 91) Phenol on nitration gives a mixture of o-nitrophenol and p-nitrophenol. This is an example of type of reaction
- a) opposing
 - b) competing
 - c) chain
 - d) consecutive

Rough Work