



PUNJAB TECHNICAL UNIVERSITY JALANDHAR

Max. Marks: 90

Time: 90 Mins.

Entrance Test for Enrollment in Ph.D. Programme

Important Instructions

- Fill all the information in various columns, in capital letters, with blue/black ball point pen.
- Use of calculators is not allowed. Use Blue/Black ball point pen for attempting the questions.
- All questions are compulsory. No negative marking for wrong answers.
- To attempt a question, make a tick mark (✓) at the right option/answer.
- Each question has only one right answer.
- Questions attempted with two or more options/answers will not be evaluated.

Stream (Engg./Arch./Pharm./Mgmt./App.Sci./Life Sci.)

Applied Science

Discipline

Chemistry

Name

Father's Name

Roll No.

Date: **15-01-2011**

Signature of Candidate

Signature of Invigilator

Q. 1 Which of the following is not tetrahedral

- (a) methyl anion
- (b) methyl cation
- (c) trimethyl amine
- (d) dimethyl ether

Q. 2 Which of the following is expected to have lowest boiling point

- (a) n-heptane
- (b) 2-methyl hexane
- (c) 2-methyl heptane
- (d) 3,3-dimethyl pentane

Q. 3 Which of the following is the most stable free radical

- (a) methyl
- (b) vinyl
- (c) allyl
- (d) benzyl

Q. 4 Which of the following objects are not chiral

- (a) pair of gloves
- (b) pair of shoes
- (c) pair of socks
- (d) pair of scissors

Q. 5 Which of the following has highest boiling point

- (a) n-propyl alcohol
- (b) n-pentyl alcohol
- (c) n-hexyl alcohol
- (d) n-octyl alcohol

Q. 6 Which of the following alcohol shows highest reactivity towards gaseous HBr

- (a) 1-pentanol
- (b) 2-pentanol
- (c) 2-methyl-2-pentanol
- (d) 1-hexanol

Q. 7 In which of the following cis-3-hexene does not differ from trans-3-hexene

- (a) infrared spectrum
- (b) dipole moment
- (c) product of hydrogenation
- (d) rate of hydrogenation

Q. 8 Which of the following represent the most stable alkene

- (a) $R_2C = CR_2$
- (b) $R_2C = CHR$
- (c) $R_2C = CH_2$
- (d) $RCH = CH_2$

Q. 9 Which alkene on ozonolysis would yield butanal and methanal

- (a) 1-pentene
- (b) 1-hexene
- (c) 2-pentene
- (d) 2-hexene

- Q. 10 Which of the following is the most stable cation
(a) isopropyl
(b) tert-butyl
(c) ethyl
(d) methyl
- Q. 11 Which of the following has the strongest acidic character
(a) ethanol
(b) acetylene
(c) ammonia
(d) ethane
- Q. 12 A compound having formula $C_3H_5Cl_3$ shows two different singlets in its NMR spectrum. This compound can be
(a) $CCl_3CH_2CH_3$
(b) $CH_2ClCHClCH_2Cl$
(c) $CHCl_2CH_2CH_2Cl$
(d) $CH_2ClCCl_2CH_3$
- Q. 13 Which of the following group activates the benzene ring for electrophilic aromatic substitution
(a) NO_2
(b) OH
(c) COOH
(d) CN
- Q. 14 The major product obtained on the bromination of nitro benzene is
(a) ortho isomer
(b) meta isomer
(c) para isomer
(d) all the above
- Q. 15 Vinyl chloride will show how many signals in its NMR spectrum
(a) 1 signal
(b) 2 signals
(c) 3 signals
(d) 4 signals
- Q. 16 Which of the following will show only one signal in its 1H NMR spectrum
(a) 2-propanone
(b) 2-butanone
(c) 2-pentanone
(d) 2-hexanone
- Q. 17 Benzene will show how many signals in its NMR spectrum
(a) 6 signals
(b) 3 signals
(c) 2 signals
(d) 1 signal
- Q. 18 Which of the following will show the signal at highest value of λ_{max} in its U.V. spectrum
(a) an alkane
(b) a monoene
(c) a diene
(d) a triene
- Q. 19 Which of the following can not show Infrared spectrum
(a) hydrogen
(b) hydrogen chloride
(c) carbon monoxide
(d) carbon dioxide
- Q. 20 Which of the following can show iodoform test
(a) propane
(b) propene
(c) propanone
(d) propanal
- Q. 21 Which of the following is the strongest acid
(a) acetic acid
(b) chloro acetic acid
(c) dichloroacetic acid
(d) trichloroacetic acid
- Q. 22 Which of the following contains isoprene units
(a) Nylon-66
(b) Bakelite
(c) Teflon
(d) Natural rubber
- Q. 23 Smoke is an example of
(a) gas dispersed in liquid
(b) gas dispersed in solid
(c) solid dispersed in gas
(d) solid dispersed in solid
- Q. 24 In which of the following Tyndall effect is not observed
(a) suspension
(b) emulsion
(c) sugar solution
(d) gold sol

- Q. 25 The monomeric unit of starch is
- (a) glucose
 - (b) sucrose
 - (c) mannose
 - (d) none of these
- Q. 26 In nucleic acids the nucleotides are linked with one another through
- (a) hydrogen bond
 - (b) peptide bond
 - (c) glycoside linkage
 - (d) phosphate group
- Q. 27 Night blindness is caused due to the deficiency of
- (a) vitamin A
 - (b) vitamin B
 - (c) vitamin C
 - (d) vitamin D
- Q. 28 Which of the following contains cobalt
- (a) chlorophyll
 - (b) haemoglobin
 - (c) vitamin B₁₂
 - (d) vitamin C
- Q. 29 Aspirin is called
- (a) pyretic
 - (b) antipyretic
 - (c) antibiotic
 - (d) antiseptic
- Q. 30 Pheromones are chemicals
- (a) formed by fermentation of fungi
 - (b) secreted by endocrine glands of man
 - (c) secreted outside the body by insects
 - (d) plant growth hormones
- Q. 31 Which of the following is the strongest Lewis acid
- (a) BF₃
 - (b) BCl₃
 - (c) BBr₃
 - (d) AlF₃
- Q. 32 Which one shows the most pronounced inert pair effect
- (a) C
 - (b) Si
 - (c) Sn
 - (d) Pb
- Q. 33 In which of the following N has the lowest oxidation number
- (a) NH₃
 - (b) N₃H
 - (c) N₂H₄
 - (d) N₂H₂
- Q. 34 The structure of SF₄ is
- (a) tetrahedral
 - (b) square planar
 - (c) trigonal pyramidal
 - (d) octahedral
- Q. 35 The pale yellow coloured gas is
- (a) fluorine
 - (b) chlorine
 - (c) bromine
 - (d) iodine
- Q. 36 Alloy of copper and tin is called
- (a) brass
 - (b) bronze
 - (c) steel
 - (d) none of these
- Q. 37 Oxidation number of Fe in K₃[Fe(C₂O₄)₃] is
- (a) 0
 - (b) 1
 - (c) 2
 - (d) 3
- Q. 38 The types of bonds present in CuSO₄.5H₂O is
- (a) ionic
 - (b) covalent
 - (c) coordinate
 - (d) ionic, covalent, coordinate
- Q. 39 Corundum is
- (a) SiO₂
 - (b) Al₂O₃
 - (c) CaF₂
 - (d) Cr₂O₃
- Q. 40 Coal containing maximum percentage of carbon is
- (a) lignite
 - (b) anthracite
 - (c) bituminous
 - (d) peat

- Q. 41 Nitric acid may be kept in a bottle of
- (a) Ag
 - (b) Sn
 - (c) Pb
 - (d) Al
- Q. 42 Which of the following has the lowest boiling point
- (a) H₂O
 - (b) H₂S
 - (c) H₂Se
 - (d) H₂Te
- Q. 43 Which of the following is the most strongest reducing agent
- (a) HI
 - (b) HBr
 - (c) HCl
 - (d) HF
- Q. 44 Percentage of gold in 14 carat gold is
- (a) 80
 - (b) 58
 - (c) 40
 - (d) 14
- Q. 45 Effective atomic number of Cr in Cr(NH₃)₆Cl₃ is
- (a) 32
 - (b) 33
 - (c) 34
 - (d) 35
- Q. 46 Which of the following has minimum internuclear distance
- (a) O₂
 - (b) O₂⁺
 - (c) O₂⁻
 - (d) O₂⁻²
- Q. 47 Which of the following is not an ionic halide
- (a) InF₃
 - (b) GaF₃
 - (c) BF₃
 - (d) GaF₃
- Q. 48 Which poisonous gas is present in the exhaust of a car
- (a) methane
 - (b) ethane
 - (c) carbon mono-oxide
 - (d) acetylene
- Q. 49 Which contains the maximum amount of lead
- (a) soft glass
 - (b) hard glass
 - (c) pyrex glass
 - (d) flint glass
- Q. 50 The largest bond angle is in
- (a) NH₃
 - (b) AsH₃
 - (c) SbH₃
 - (d) PH₃
- Q. 51 Phosphide ion has electronic structure similar to
- (a) nitride ion
 - (b) sodium ion
 - (c) chloride ion
 - (d) fluoride ion
- Q. 52 SO₂ does not act as a
- (a) reducing agent
 - (b) oxidizing agent
 - (c) bleaching agent
 - (d) Lewis base
- Q. 53 Which of the following compounds have bond angle nearly 90°
- (a) NH₃
 - (b) H₂S
 - (c) H₂O
 - (d) CH₄
- Q. 54 A substance that sublimes easily
- (a) F₂
 - (b) Cl₂
 - (c) Br₂
 - (d) I₂
- Q. 55 Which of the following can react with F₂
- (a) NaF
 - (b) CaF₂
 - (c) SF₆
 - (d) IF₅
- Q. 56 Cinnabar is an ore of
- (a) Hg
 - (b) Zn
 - (c) Cd
 - (d) Ag

- Q. 57 Stainless steel contains iron and which of the following metal
- (a) Cu
 - (b) Cr
 - (c) Al
 - (d) Zn
- Q. 58 Fe^{+3} is isoelectronic with
- (a) Ni^{+2}
 - (b) Cr^{+3}
 - (c) Mn^{+2}
 - (d) Co^{+3}
- Q. 59 Which of the following belongs to d-block of the periodic table
- (a) As
 - (b) Pb
 - (c) Ra
 - (d) Pt
- Q. 60 Which of the following is not a constituent of German silver
- (a) Ag
 - (b) Zn
 - (c) Ni
 - (d) Cu
- Q. 61 The hybridization of Xe in XeF_2 is
- (a) sp
 - (b) sp^2
 - (c) sp^3
 - (d) sp^3d
- Q. 62 All ligands are
- (a) Lewis acid
 - (b) Lewis base
 - (c) amphoteric
 - (d) neutral
- Q. 63 A process is spontaneous at all temperatures if
- (a) $\Delta H > 0, \Delta S > 0$
 - (b) $\Delta H > 0, \Delta S < 0$
 - (c) $\Delta H = 0, \Delta S < 0$
 - (d) $\Delta H < 0, \Delta S > 0$
- Q. 64 Which of the following is correct
- (a) $1 \text{ erg} > 1 \text{ J} > 1 \text{ cal}$
 - (b) $1 \text{ erg} > 1 \text{ cal} > 1 \text{ J}$
 - (c) $1 \text{ cal} > 1 \text{ J} > 1 \text{ erg}$
 - (d) $1 \text{ J} > 1 \text{ cal} > 1 \text{ erg}$
- Q. 65 Warming ammonium chloride with sodium hydroxide in a test tube is an example of
- (a) closed system
 - (b) isolated system
 - (c) open system
 - (d) none of these
- Q. 66 Which of the following represents a set of extensive properties only
- (a) volume, temperature, mass
 - (b) energy, viscosity, mass
 - (c) enthalpy, energy, temperature
 - (d) mass, energy, enthalpy
- Q. 67 As compared to initial temperature, the final temperature during an adiabatic expansion is
- (a) less
 - (b) more
 - (c) equal
 - (d) none of these
- Q. 68 When a solid melts, there is
- (a) increase in enthalpy
 - (b) decrease in entropy
 - (c) no change in entropy
 - (d) decrease in enthalpy
- Q. 69 According to which law of thermodynamics, the entropy of a perfectly crystalline substance at 0°C is zero
- (a) first
 - (b) second
 - (c) third
 - (d) zeroth
- Q. 70 The rate constant of a reaction depends on
- (a) nature of reactant
 - (b) temperature
 - (c) pressure
 - (d) concentration of reactant
- Q. 71 The role of a catalyst in a chemical reaction is to change
- (a) heat of reaction
 - (b) nature of products
 - (c) activation energy
 - (d) equilibrium constant

- Q. 72 In a zero order reaction
- (a) reactants do not react
 - (b) rate is not affected by time
 - (c) rate increases with time
 - (d) rate decreases with time
- Q. 73 The rate at which a substance react is proportional to its
- (a) molecular weight
 - (b) equivalent weight
 - (c) number of moles
 - (d) number of moles per litre
- Q. 74 The minimum amount of energy required by a molecule at the time of collision in order to produce the effective collision is called
- (a) internal energy
 - (b) threshold energy
 - (c) activation energy
 - (d) potential energy
- Q. 75 Equilibrium constant depends on
- (a) temperature
 - (b) presence of catalyst
 - (c) presence of inert materials
 - (d) quantities of substances involved
- Q. 76 For a reversible reaction, if the volume of the container is doubled, equilibrium constant will be
- (a) doubled
 - (b) halved
 - (c) one fourth
 - (d) same
- Q. 77 What is the direction of a reversible reaction when one of the products of the reaction is removed
- (a) forward reaction
 - (b) backward reaction
 - (c) reaction stops
 - (d) unpredictable
- Q. 78 Cl^- is a conjugate base of
- (a) HCl
 - (b) HOCl
 - (c) HClO_3
 - (d) HClO_4
- Q. 79 On addition of sodium acetate to acetic acid, the degree of ionization of acetic acid
- (a) decreases
 - (b) increases
 - (c) does not change
 - (d) can not be predicted
- Q. 80 The conjugate acid of NH_2^- is
- (a) NH_4^+
 - (b) NH_3
 - (c) NH_2OH
 - (d) N_2H_4
- Q. 81 The pH value of a 10^{-8} M HCl solution is
- (a) 8
 - (b) 10
 - (c) 6.9
 - (d) 1
- Q. 82 Which of the following is not a colligative property
- (a) depression in freezing point
 - (b) elevation in boiling point
 - (c) refractive index
 - (d) osmotic pressure
- Q. 83 For an ideal binary solution, which of the following is correct
- (a) $\Delta H = 0$
 - (b) $\Delta V = 0$
 - (c) Raoult's law is obeyed
 - (d) all of these
- Q. 84 In dilute solutions, the depression in freezing point is proportional to
- (a) molality
 - (b) normality
 - (c) molarity
 - (d) mole fraction
- Q. 85 Which one is likely to be most unstable
- (a) ${}_{30}\text{Zn}^{63}$
 - (b) ${}_{30}\text{Zn}^{67}$
 - (c) ${}_{30}\text{Zn}^{71}$
 - (d) ${}_{30}\text{Zn}^{64}$
- Q. 86 The nucleides ${}_{18}\text{Ar}^{40}$ and ${}_{19}\text{K}^{41}$ are
- (a) isotopes
 - (b) isobars
 - (c) isotones
 - (d) none of these

Q. 87 The fresh precipitate can be passed in colloidal state by

- (a) coagulation
- (b) peptisation
- (c) diffusion
- (d) none of these

Q. 88 Milk is

- (a) fat dispersed in water
- (b) fat dispersed in milk
- (c) water dispersed in milk
- (d) fat dispersed in fat

Q. 89 Which of the following void has the largest size

- (a) tetrahedral
- (b) octahedral
- (c) cubic
- (d) triangular

Q. 90 A flask X contains 2 g of H_2 and flask Y contains 2 g of N_2 . Then, the number of molecules in flask X is

- (a) more than those in flask Y
- (b) less than those in flask Y
- (c) same as those in flask Y
- (d) none of these