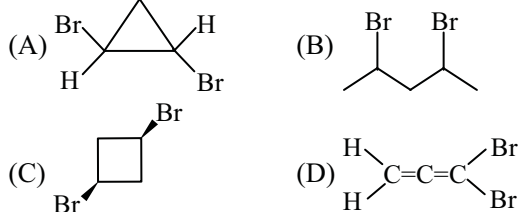


**INDIAN ASSOCIATION OF CHEMISTRY TEACHERS**  
**NATIONAL STANDARD EXAMINATION IN CHEMISTRY 2007-2008**

This is question paper contains 100 multiple-choice question. Each correct answer carries 3 marks and 1 mark will be deducted for each wrong answer. No weightage II be given to unattempted question.

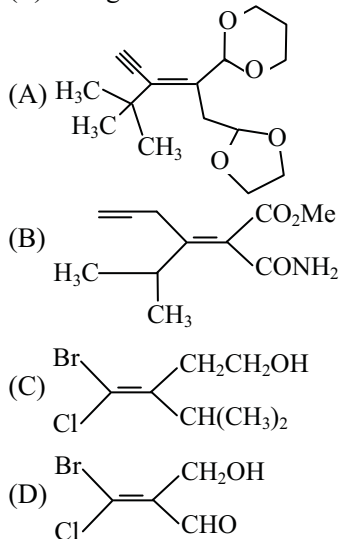
**Q.1** Identify the chiral species among the following



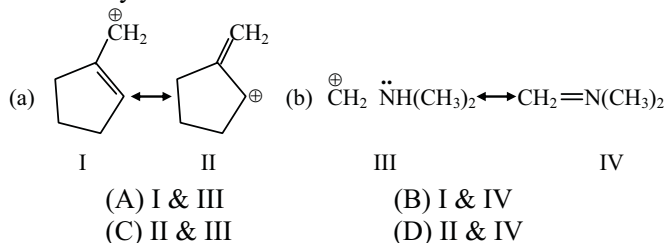
**Q.2** The achiral species among the following is :

- (A) a car (B) a screw driver  
 (C) a screw (D) a hand

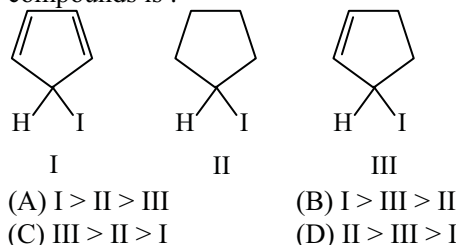
**Q.3** Which one of the following compounds has (Z) configuration about the C-C double bond ?



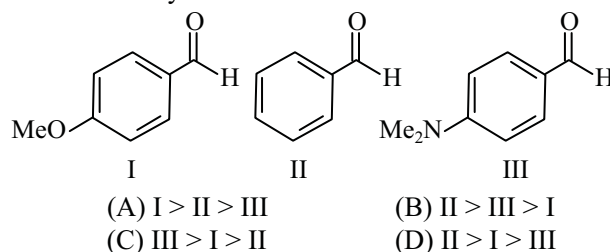
**Q.4** From the two pairs a and b of resonance structure given below, designate the ones that would contribute most to the resonance hybrid



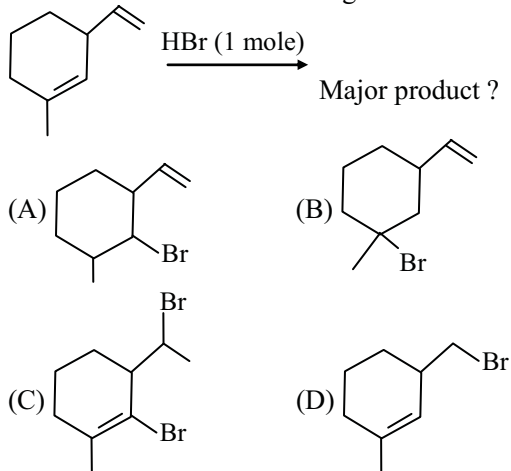
**Q.5** The order of the rate of formation of carbocations from the following iodo compounds is :



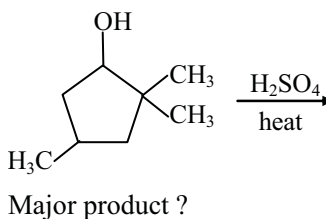
**Q.6** The  $K_{eq}$  values in HCN addition to following aldehydes are in the order :

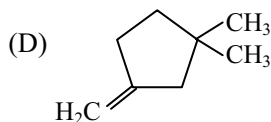
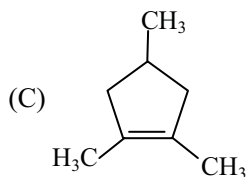
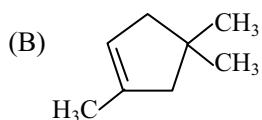
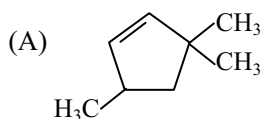


**Q.7** The major product formed upon addition of 1 mole of HBr in the following reactions is

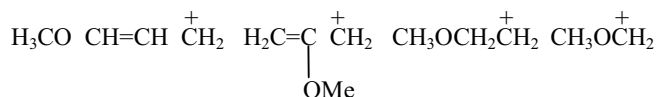


**Q.8** The major product formed in the following reaction is :





**Q.9** The relative stabilities of the following carbocations is :

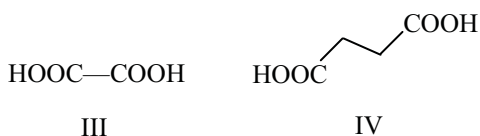
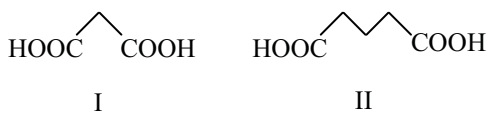


- (A) I > II > III > IV      (B) I > IV > II > III  
(C) II > III > IV > I      (D) III > I > II > IV

**Q.10** The first nobel prize in chemistry was awarded to which one of the following scientists for his work on rates of reactions, chemical equilibrium and osmotic pressure.

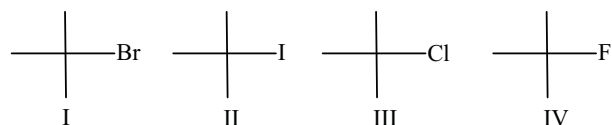
- (A) Arrhenius                      (B) van't Hoff  
(C) Enuil                            (D) Ramsay

**Q.11** Indicate the correct order of acidity (first ionization) in the following dicarboxylic acids :



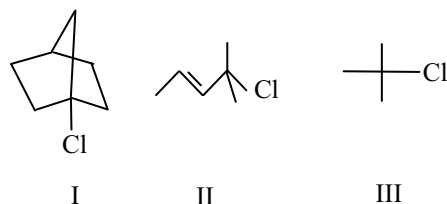
- (A) I > II > III > IV      (B) II < IV > I > III  
(C) III > I > IV > II      (D) IV > II > I > III

**Q.12** Arrange the following compounds in order of decreasing reactivity in the elimination (bimolecular) reaction with  $\text{C}_2\text{H}_5\text{ONa}$



- (A) II > I > III > IV      (B) IV > III > I > II  
(C) III > I > II > IV      (D) I > III > IV > II

**Q.13** Indicate the order of reactivity of the following compounds in nucleophilic substitution (unimolecular) reaction.



- (A) I > II > III                      (B) II > III > I  
(C) III > II > I                      (D) II > I > III

**Q.14** Identify the ester which upon addition of excess Grignard's reagent will provide a secondary alcohol.

- (A)  $\text{CH}_3\text{CO}_2\text{Et}$   
(B)  $(\text{CH}_3)_2\text{CHCO}_2\text{Et}$   
(C)  $\text{HCO}_2\text{Et}$   
(D)  $\text{C}_6\text{H}_5\text{CO}_2\text{Et}$

**Q.15** Repeating isoprene units are present in

- (A) alkaloids                      (B) peptides  
(C) nucleic acids                (D) terpenoids

**Q.16** The C-C-H bond angle in ethylene is

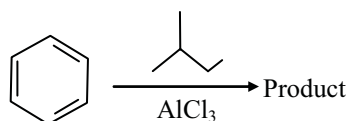
- (A)  $180^\circ$                               (B)  $109^\circ 28'$   
(C)  $120^\circ$                               (D)  $90^\circ$

**Q.17** The following symmetry element is present in the d as well as the l form of tartaric acid ( $\text{CO}_2\text{HCH}(\text{OH})\text{CH}(\text{OH})\text{CO}_2\text{H}$ )

- (A) centre of symmetry  
(B) axis of symmetry ( $\text{C}_2$ )  
(C) Plane of symmetry  
(D) None

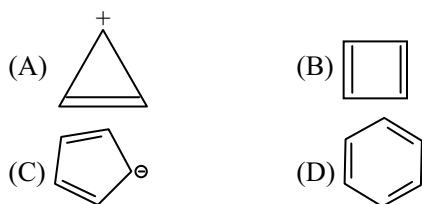
- Q.18** The carbocation  $(\text{CH}_3)_3\text{C}^+$  is stabilized primarily by  
 (A) hyperconjugation (B) tautomerism  
 (C) resonance (D) conjugation

- Q.19** Predict the product formed in the following reaction

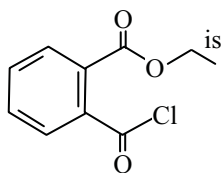


- (A) (B)   
 (C) (D)

- Q.20** Identify the odd species out (Which of the species among the following is different from others ?)

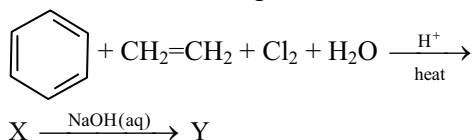


- Q.21** The IUPAC name of



- (A) 2-Chlorocarbonyl ethyl benzoate  
 (B) 2-Carboxyethylbenzoyl chloride  
 (C) Ethyl-2-(chlorocarbonyl) benzoate  
 (D) Ethyl-1-(chlorocarbonyl) benzoate

- Q.22** Consider the following reactions

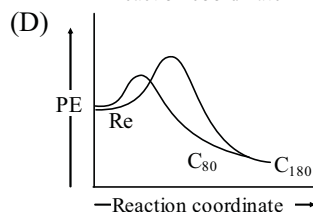
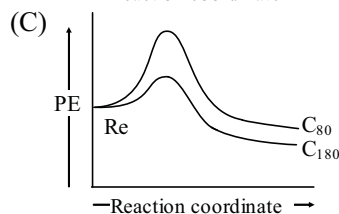
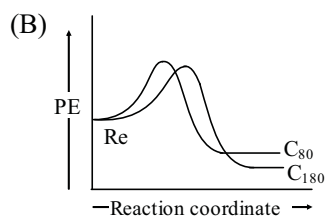
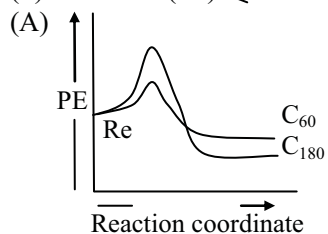


The major product (Y) of the reaction is :

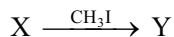
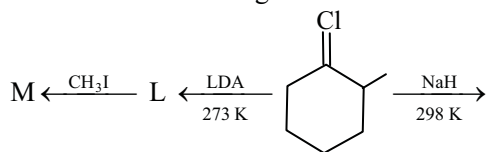
- (A)   
 (B)   
 (C)   
 (D)

- Q.23** Fullerenes are generated on a very rapid scale typically in milliseconds. In all techniques,  $\text{C}_{60}$  is produced in much greater quantities than  $\text{C}_{180}$  though latter is more stable. Which of the following graph represents the following two processes ?

- (i) Reactant (Re)  $\rightleftharpoons$   $3\text{C}_{60}$   
 (ii) Reactants (Re)  $\rightleftharpoons$   $\text{C}_{180}$

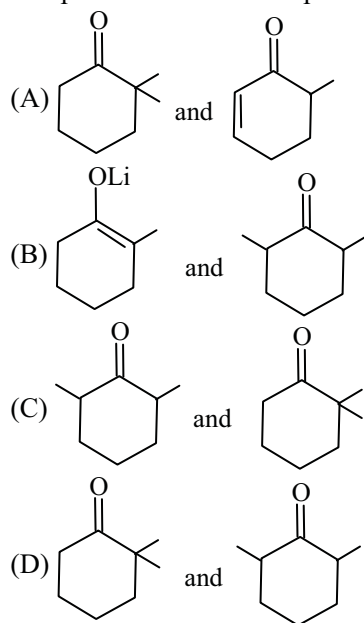


**Q.24** Consider the following reactions

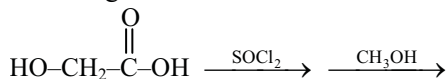


(LDA = lithiumdiisopropyl amide)

The products M and Y respectively are



**Q.25** What is the major product obtained from the following reaction ?

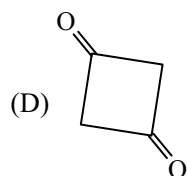
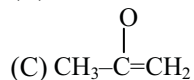


- (A)  $\text{HOCH}_2\text{COOCH}_3$   
 (B)  $\text{CH}_3\text{OCH}_2\text{COOCH}_3$   
 (C)  $\text{ClCH}_2\text{COOCH}_3$   
 (D)  $\text{CH}_3\text{OCH}_2\text{COOH}$

**Q.26** What is the major product obtained from the following reaction ?



- (A)  $\text{CH}_3\text{CHO} + \text{CH}_3\text{COOH}$   
 (B)  $\text{CH}_3\text{COCH}_3$



**Q.27** The correct order of acidity of the C-H proton is -

- (A) acetylene > ethylene > ethane  
 (B) ethylene > acetylene > ethane  
 (C) ethane > ethylene > acetylene  
 (D) acetylene > ethane > ethylene

**Q.28** In the petroleum industry, crude oil is separated into different fractions by

- (A) differential extraction  
 (B) fractional distillation  
 (C) chromatography  
 (D) leaching

**Q.29** The percentage of oxygen in a compound is determined by

- (A) Dumas method  
 (B) Kjeldahl's method  
 (C) Carius method  
 (D) subtracting the sum of percentages of all other elements present from 100

**Q.30** Conformational changes in a molecule leads to change in

- (A) torsional angle (B) bond angle  
 (C) bond length (D) all of the above

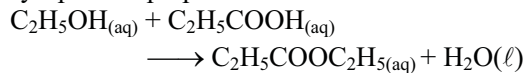
**Q.31** A qualitative analysis of papaverine, an opium alkaloid showed carbon, hydrogen and nitrogen. A quantitative analysis gave 70.8% carbon 6.2% hydrogen and 4.1% nitrogen. The empirical formula of papaverine is :

- (A)  $\text{C}_{20}\text{H}_{20}\text{N}_2$  (B)  $\text{C}_{20}\text{H}_{21}\text{O}_4\text{N}$   
 (C)  $\text{C}_{10}\text{H}_{11}\text{O}_3\text{N}$  (D)  $\text{C}_{21}\text{H}_{20}\text{N}$

**Q.32** Vision, the process of seeing, depends mainly on one reaction, namely the transformation of -

- (A) rods cells into cone cells in the eye  
 (B)  $\beta$ -carotene into retinol  
 (C) 11-cis-retinal into 11-trans-retinal  
 (D) 7-cis-retinol into 7-trans-retinal

**Q.33** Ethyl propanoate has a pineapple like odour and is used as a flavoring agent in fruit syrups. It is prepared as follows :



In an experiment, 349 grams of ethyl propanoate form 250 grams of ethanol, with propanoic acid in excess.

(M.W. of ethyl propanoate : 102, M.W. of ethanol : 46)

The percentage yield of the above reaction is

- (A) 48.2 (B) 62.9 (C) 54.6 (D) 32.7

- Q.34** In which of the following compounds is the oxidation number of the transition metal zero ?  
 (A)  $[\text{Ni}(\text{CO})_4]$   
 (B)  $[\text{Pt}(\text{C}_2\text{H}_4)\text{Cl}_3]$   
 (C)  $[\text{Co}(\text{NH}_3)_6]\text{Cl}_2$   
 (D)  $[\text{Fe}(\text{H}_2\text{O})_3](\text{OH})_2$
- Q.35** As the number of electrons in d orbitals of transition elements increases, the screening effect on the valence electrons -  
 (A) increases  
 (B) decreases greatly  
 (C) is not observed  
 (D) decreases slightly
- Q.36**  $[\text{NiCl}_4]^{2-}$  is paramagnetic and therefore its geometry is  
 (A) pyramidal (B) bi-pyramidal  
 (C) tetrahedral (D) square planar
- Q.37** The magnetic moment of  $\text{MnSO}_4 \cdot 4\text{H}_2\text{O}$  is :  
 (A) 1.73 BM (B) 3.87 BM  
 (C) 4.90 BM (D) 5.92 BM
- Q.38**  $dsp^2$  hybridization represents  
 (A) octahedral geometry  
 (B) square-planar geometry  
 (C) trigonal-bipyramidal geometry  
 (D) square-pyramidal geometry
- Q.39** Which type of bond exists between the two boron atoms in a diborane molecule ?  
 (A) 2-center-2-electron  
 (B) 2-center-3-electron  
 (C) 3-center-3-electron  
 (D) 4-center-4-electron
- Q.40** Which isomerism is exhibited by  $[\text{Co}(\text{NH}_3)_6][\text{Cr}(\text{CN})_6]$  and  $[\text{Cr}(\text{NH}_3)_6][\text{Co}(\text{CN})_6]$  ?  
 (A) Ionization (B) Linkage  
 (C) Coordination (D) Polymerization
- Q.41** The complex pentaamminecarbonatocobalt (III) chloride is  
 (A)  $[\text{Co}(\text{NH}_3)_5\text{CO}_3]\text{Cl}$   
 (B)  $[\text{Co}(\text{NH}_2)_5\text{CO}_3]\text{Cl}$   
 (C)  $[\text{Co}(\text{NH}_2)_5\text{CO}_2]\text{Cl}$   
 (D)  $[\text{Co}(\text{NH}_3)_5\text{CO}_2]\text{Cl}$
- Q.42** According to molecular orbital theory, the oxygen molecule is -  
 (A) Diamagnetic (B) Paramagnetic  
 (C) Ferromagnetic (D) Non magnetic
- Q.43** Which of the following has zero dipole moment ?  
 (A)  $\text{NH}_3$  (B)  $\text{NF}_3$  (C)  $\text{BF}_3$  (D)  $\text{CHCl}_3$
- Q.44** Thallium forms stable chloride,  $\text{TlCl}$ , unlike Aluminum which forms chloride  $\text{AlCl}_3$ . This is because :  
 (A) Inert pair effect makes  $\text{Tl}^+$  more stable than  $\text{Tl}^{3+}$   
 (B) Tl is not a group 13 element  
 (C) Tl-X bond is covalent while Al-Cl bond is ionic.  
 (D) Tl-X bond is ionic while Al-Cl bond is covalent
- Q.45** Which two of the following reactions are possible ?  
 (i)  $2\text{FeCl}_3 + \text{SnCl}_2 \rightarrow 2\text{FeCl}_2 + \text{SnCl}_4$   
 (ii)  $2\text{FeCl}_2 + \text{SnCl}_4 \rightarrow 2\text{FeCl}_3 + \text{SnCl}_2$   
 (iii)  $\text{PbCl}_2 + \text{SnCl}_4 \rightarrow \text{SnCl}_2 + \text{PbCl}_4$   
 (iv)  $\text{SnCl}_2 + \text{PbCl}_4 \rightarrow \text{PbCl}_2 + \text{SnCl}_4$   
 (A) i and ii (B) i and iii  
 (C) i and iv (D) ii and iv
- Q.46** Silicones are water repelling in nature because -  
 (A) they have highly covalent Si-O-Si linkages  
 (B) they have organic groups forming hydrophobic exterior.  
 (C) they are polymeric in nature.  
 (D) they have Si-H bonds as in hydrocarbons
- Q.47** Which of the following compounds is most basic in nature ?  
 (A)  $\text{Si}(\text{OH})_4$  (B)  $\text{Al}(\text{OH})_3$   
 (C)  $\text{Mg}(\text{OH})_2$  (D)  $\text{P}(\text{OH})_3$
- Q.48** Aqueous solutions having equimolar quantities of  $\text{Pb}(\text{NO}_3)_2$ ,  $\text{AgNO}_3$ ,  $\text{AgSO}_4$ ,  $\text{BaCl}_2$  and  $\text{K}_2\text{CrO}_4$  are allowed to react and the reaction mixture is then filtered. Which ions will be present in the filtrate in appreciable quantity  
 (A)  $\text{Pb}^{2+}$ ,  $\text{Ag}^+$ ,  $\text{Ba}^{2+}$ ,  $\text{K}^+$ ,  $\text{NO}_3^-$ ,  $\text{SO}_4^{2-}$ ,  $\text{CrO}_4^{2-}$ ,  $\text{Cl}^-$   
 (B)  $\text{Ba}^{2+}$ ,  $\text{K}^+$ ,  $\text{NO}_3^-$ ,  $\text{CrO}_4^{2-}$   
 (C)  $\text{Pb}^{2+}$ ,  $\text{Ba}^{2+}$ ,  $\text{K}^+$ ,  $\text{NO}_3^-$ ,  $\text{CrO}_4^{2-}$   
 (D)  $\text{K}^+$ ,  $\text{NO}_3^-$

- Q.49** Concentrated sulphuric acid on reaction with NaCl, NaBr and NaI produces HCl, bromine and iodine, respectively. What order of oxidizing of halogens with reference of sulphuric acid can be established on the basis of this reaction  
 (A)  $\text{H}_2\text{SO}_4 > \text{I}_2 > \text{Br}_2 > \text{Cl}_2$   
 (B)  $\text{Cl}_2 > \text{H}_2\text{SO}_4 > \text{Br}_2 > \text{I}_2$   
 (C)  $\text{H}_2\text{SO}_4 > \text{Cl}_2 > \text{Br}_2 > \text{I}_2$   
 (D)  $\text{Cl}_2 > \text{Br}_2 > \text{I}_2 > \text{H}_2\text{SO}_4$
- Q.50** According to the Crystal field theory, the energy of  $d_{xy}$  orbital is lower than  $d_{x^2-y^2}$  in an octahedral complex because  
 (A) the  $d_{xy}$  orbital is near the ligands.  
 (B) the repulsion between the  $d_{xy}$  electrons and ligand electrons is less than that between  $d_{x^2-y^2}$  and ligand electrons  
 (C) the repulsion between the  $d_{xy}$  electrons and ligand electrons is more than that between  $d_{x^2-y^2}$  and ligand electrons.  
 (D) the  $d_{x^2-y^2}$  orbital is away from the ligands
- Q.51** The orbitals of iron involved in the hybridization in  $\text{Fe}(\text{CO})_5$  are  
 (A) s,  $p_x$ ,  $p_y$ ,  $p_z$  and  $d_{x^2-y^2}$   
 (B) s,  $p_x$ ,  $p_y$ ,  $p_z$  and  $d_{z^2}$   
 (C) s,  $p_x$ ,  $p_y$ ,  $p_z$  and  $d_{z^2}$   
 (D) s,  $p_x$ ,  $p_z$ ,  $d_{xy}$  and  $d_{x^2-y^2}$
- Q.52** The crystal field stabilization energy (CFSE) in  $[\text{Co}(\text{SCN})_6]^{3-}$  is  
 (A)  $-24 \text{ Dq}$  (B)  $-18 \text{ Dq}$   
 (C)  $-4 \text{ Dq}$  (D)  $0 \text{ Dq}$
- Q.53** Element having (4,0,0, + 1/2) as a set of four quantum numbers for its valence electron is -  
 (A) Na (B) Ca  
 (C) K (D) Br
- Q.54** What is the correct order of stability of the complexes,  
 $[\text{Ni}(\text{NH}_3)_6]^{2+}$ ,  $[\text{Ni}(\text{en})_3]^{2+}$ ,  $[\text{Ni}(\text{DET})_2]^{2+}$  ?  
 [en = 1,2 diaminoethane,  $\text{H}_2\text{NCH}_2\text{CH}_2\text{NH}_2$   
 DET = Diethylenetriamine,  
 $\text{H}_2\text{NCH}_2\text{CH}_2\text{NHCH}_2\text{CH}_2\text{NH}_2$ ]  
 (A)  $[\text{Ni}(\text{NH}_3)_6]^{2+} \approx [\text{Ni}(\text{en})_3]^{2+} \approx [\text{Ni}(\text{DET})_2]^{2+}$   
 (B)  $[\text{Ni}(\text{NH}_3)_6]^{2+} < [\text{Ni}(\text{en})_3]^{2+} \approx [\text{Ni}(\text{DET})_2]^{2+}$   
 (C)  $[\text{Ni}(\text{NH}_3)_6]^{2+} < [\text{Ni}(\text{en})_3]^{2+} < [\text{Ni}(\text{DET})_2]^{2+}$   
 (D)  $[\text{Ni}(\text{NH}_3)_6]^{2+} > [\text{Ni}(\text{en})_3]^{2+} > [\text{Ni}(\text{DET})_2]^{2+}$
- Q.55** How many isomers are possible for a compound with formula,  $[\text{Rh}(\text{en})\text{Cl}(\text{NO}_2)]$  ?  
 (A) 2 (B) 4 (C) 6 (D) 8
- Q.56** Metal carbonyls have the metal ions in zero or unusually lower oxidation states. This is because  
 (A) carbonyl ligand is reducing in nature  
 (B) carbonyl is a highly electron rich ligand  
 (C) carbonyl is a strongly  $\sigma$ -bonding ligand  
 (D) carbonyl is a strongly  $\pi$ -acidic ligand
- Q.57** Europium forms stable  $\text{Eu}^{2+}$  ions because  
 (A) Europium is a lanthanide  
 (B)  $2^+$  is the common oxidation state of lanthanides  
 (C)  $\text{Eu}^{2+}$  has  $f^7$  valence electronic configuration  
 (D) All of the above reasons
- Q.58** Which of the following molecules contains the maximum% of sulphur by mass ?  
 (A)  $\text{Na}_2\text{SO}_4$  (B)  $\text{H}_2\text{SO}_4$  (C)  $\text{Li}_2\text{SO}_4$  (D)  $\text{PbSO}_4$
- Q.59** 17.1 grams of aluminum sulfate,  $\text{Al}_2(\text{SO}_4)_3$  is dissolved in enough water to prepare 1.00 L of solution. What the molarity of the sulfate ion in this solution ? (Neglect any hydrolysis)  
 (A)  $1.67 \times 10^{-2} \text{ M}$  (B)  $5.00 \times 10^{-2} \text{ M}$   
 (C)  $1.50 \times 10^{-1} \text{ M}$  (D)  $2.50 \times 10^{-1} \text{ M}$
- Q.60** Calculate the pH of a solution made by mixing  $150 \text{ cm}^3$  of 0.10 M  $\text{CH}_3\text{COONa}$  and  $250 \text{ cm}^3$  of 0.10  $\text{CH}_3\text{COOH}$   
 [Ka of  $\text{CH}_3\text{COOH} = 1.8 \times 10^{-5}$ ]  
 (A) 2.37 (B) 4.52  
 (C) 4.74 (D) 4.97

- Q.61** The solubility product constant,  $K_{sp}$ , of  $\text{Ag}_3\text{PO}_4$  is  $1.8 \times 10^{-18}$ . What is the molar solubility of  $\text{Ag}_3\text{PO}_4$  in water (neglect any hydrolysis)  
 (A)  $1.6 \times 10^{-5}$  (B)  $8.4 \times 10^{-7}$   
 (C)  $1.3 \times 10^{-9}$  (D)  $4.5 \times 10^{-19}$
- Q.62** Chlorine can be prepared by reacting HCl with  $\text{MnO}_2$ . The reaction is represented by the equation  

$$\text{MnO}_2(\text{s}) + 4\text{HCl}(\text{aq}) \rightarrow \text{Cl}_2(\text{g}) + \text{MnCl}_2(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$$
 Assuming the reaction goes to completion. What mass of concentrated HCl solution (36.0% HCl by mass) needed to produce 2.50 g of  $\text{Cl}_2$   
 (A) 5.15 g (B) 14.3 g  
 (C) 19.4 g (D) 26.4 g
- Q.63** In the unit cell of the crystal formed by the ionic compound of X and Y, the corners are occupied by X and Y centers of the faces by Y. The empirical formula of the compound is :  
 (A) XY (B)  $\text{X}_2\text{Y}$   
 (C)  $\text{XY}_3$  (D)  $\text{X}_5\text{Y}_6$
- Q.64** Which of the following pairs is a lewis acid & lewis base ?  
 (A)  $\text{Cl}^-$  &  $\text{Ag}^+$  (B)  $\text{NH}_3$  &  $\text{BF}_3$   
 (C)  $\text{SO}_4^{2-}$  &  $\text{HSO}_4^-$  (D)  $\text{H}^+$  &  $\text{OH}^-$
- Q.65** In which of the following reactions will an increase in system pressure favor the formation of the products ?  
 (A)  $\text{C}(\text{s}) + \text{H}_2\text{O}(\text{g}) \rightleftharpoons \text{CO}(\text{g}) + \text{H}_2(\text{g})$   
 (B)  $\text{H}_2(\text{g}) + \text{I}_2(\text{g}) \rightleftharpoons 2\text{HI}(\text{g})$   
 (C)  $4\text{NH}_3(\text{g}) + 5\text{O}_2(\text{g}) \rightleftharpoons 4\text{NO}(\text{g}) + 6\text{H}_2\text{O}(\text{g})$   
 (D)  $3\text{O}_2(\text{g}) \rightleftharpoons 2\text{O}_3(\text{g})$
- Q.66** What is the total pressure inside 2L vessel containing 1g of He, 14g of CO and 10g of NO at  $27^\circ\text{C}$  ?  
 (A) 0.25 atm (B) 13.2 atm  
 (C) 1.24 atm (D) 21.6 atm
- Q.67** Assuming a Lewis structure for  $\text{SO}_2$  in which all the atoms obey the octet rule, the formal charge on S is :  
 (A) +1 (B) 0 (C) +2 (D) -2
- Q.68** Which of the following will have the slowest rate of reaction with HCl ?  
 (A) Marble chips at  $40^\circ\text{C}$   
 (B) Powdered marble at  $25^\circ\text{C}$   
 (C) Marble chips at  $25^\circ\text{C}$   
 (D) Powdered marble at  $40^\circ\text{C}$
- Q.69** How many moles of  $\text{Na}^+$  ions are there in 20mL of 0.40 M solution of  $\text{Na}_3\text{PO}_4$  ?  
 (A) 0.008 (B) 0.020 (C) 0.024 (D) 0.008
- Q.70** The solubility of a gas in a liquid is directly proportional to the partial pressure of the gas over the solution. This statement is known as :  
 (A) Raoult's law  
 (B) Henry's law  
 (C) Boyle's law  
 (D) Charles and Gay Lussac's law
- Q.71** How many sigma bonds and pi bonds are present in  $\text{CH}_2=\text{C}=\text{CH}_2$  ?  
 (A) 6 sigma and 1 pi  
 (B) 8 sigma and 0 pi  
 (C) 4 sigma and 4 pi  
 (D) 6 sigma and 2 pi
- Q.72** A first-order reaction has a rate constant of  $0.003 \text{ s}^{-1}$ . The time required for completion of 75% reaction is  
 (A) 231 s (B) 201 s (C) 41.7 s (D) 462 s
- Q.73** The activation energy of a reaction is given by  
 (A)  $-R/(\text{slope of a plot of } \ln k \text{ vs. } 1/T)$   
 (B)  $-(\text{slope of a plot of } \ln k \text{ vs. } 1/T) R$   
 (C)  $-(\text{slope of a plot of } \ln k \text{ vs. } 1/T) \times R$   
 (D)  $+(\text{slope of a plot of } \ln k \text{ vs. } 1/T) \times R$
- Q.74** The activation energy  
 (A) decreases with increasing temperature  
 (B) increases with increasing temperature  
 (C) remains constant with temperature  
 (D) shows linear relation (with positive slope) with temperature

**Q.75** Which of the following is not a colligative property ?  
 (A) solubility  
 (B) vapor pressure lowering  
 (C) boiling point elevation  
 (D) osmotic pressure

**Q.76** Which of the following has the lowest freezing point and the highest boiling point ?  
 (A) 1.5 m magnesium phosphate  
 (B) 1.0 m sodium chloride  
 (C) 1.5 m aluminum nitrate  
 (D) 1.5 m calcium chloride

**Q.77** Which of the following changes the value of the equilibrium constant ?  
 (A) change in concentration  
 (B) change in pressure  
 (C) change in volume  
 (D) none of these

**Q.78** The change in free energy accompanied by the isothermal expansion of 1 mol of an ideal gas when it double its volume is  $\Delta G_1$ . The change in free energy accompanied by sudden isothermal inversible doubling of volume of 1 mol of the same gas is  $\Delta G_2$ . Ratio of  $\Delta G_1$  to  $\Delta G_2$  is :

- (A) 1      (B)  $\frac{1}{2}$       (C) -1      (D)  $-\frac{1}{2}$

**Q.79** By observing the reaction between gases A and B, the following data was obtained :

[A] mol L <sup>-1</sup>	[B] mol L <sup>-1</sup>	Initial rate mol L <sup>-1</sup> s <sup>-1</sup>
$2.16 \times 10^5$	$1 \times 10^5$	$1 \times 10^8$
$2.14 \times 10^5$	$2.01 \times 10^6$	$2 \times 10^9$
$2.18 \times 10^5$	$3.2 \times 10^5$	$3.25 \times 10^5$
$4.31 \times 10^5$	$1.1 \times 10^5$	$4.3 \times 10^9$
$8.60 \times 10^5$	$2.1 \times 10^5$	$3.3 \times 10^8$

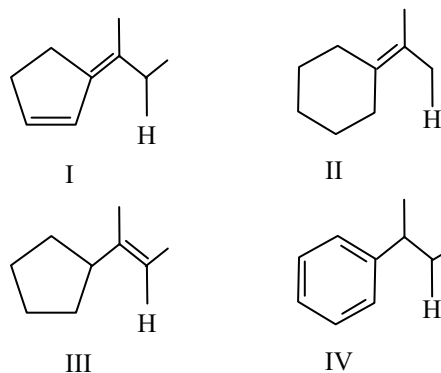
The reaction order with respect to A and B respectively are :

- (A) 1 and 2      (B) 0 and 2  
 (C) 2 and 1      (D) both are 1

**Q.80** If each of the following salts has  $K_{sp} = 1 \times 10^9$ , which of them is the least soluble in water ?  
 (A) XY      (B) XY<sub>2</sub>  
 (C) X<sub>2</sub>Y      (D) X<sub>3</sub>Y

**Q.81** The pH of a 0.01 M solution of ammonium acetate can be changed by changing  
 (A) the temperature  
 (B) the volume of solution  
 (C) the concentration  
 (D) the pressure on solution

**Q.82** Which of the following represents the true order of dissociation energy of the indicated C-H bond of the following molecules ?



- (A) I < II < IV < III      (B) III < IV < II < I  
 (C) IV < II < I < III      (D) III < IV < II < I

**Q.83** For a reaction of the nth order, the time required for half reaction is inversely proportional to  
 (A) a      (B) a<sup>(n-1)</sup>      (C) a<sup>(n+1)</sup>      (D)  $\sqrt{a}$

**Q.84** Consider the equilibrium reaction :  
 $4\text{NH}_3(\text{g}) + 3\text{O}_2(\text{g}) \rightleftharpoons 2\text{N}_2(\text{g}) + 6\text{H}_2\text{O}(\text{g})$   
 ( $\Delta H = -1268 \text{ kJ}$ )

Which change will cause the reaction to shift to the right ?

- (A) Increases the temperature  
 (B) Decreases the volume of the container  
 (C) Add a catalyst to speed up to reaction  
 (D) Remove the gaseous water by allowing it to react and be absorbed by KOH

**Q.85** The heat of combustion of glucose is -2840kJ. Therefore the energy required for the production of 0.18 g of glucose is :  
 (A) -5.68 kJ      (B) +5.68 kJ  
 (C) -2.84 kJ      (D) +2.84 kJ



- Q.86** For the reaction shown below, which statement is true ?  
 $2\text{Fe} + 3 \text{CdCl}_2 \rightleftharpoons 2\text{FeCl}_3 + 3\text{Cd}$   
 (A) Fe is the oxidizing agent  
 (B) Cd undergoes oxidation  
 (C) Cd is the reducing agent  
 (D) Fe undergoes oxidation
- Q.87** The voltage for the cell : Fe/Fe<sup>2+</sup> (0.001M) // Cu<sup>2+</sup> (0.10 M)/ Cu<sup>2+</sup> (0.10 M)/ Cu is 0.807 V at 25° C. What is the value of E° ?  
 (A) 0.629 V (B) 0.689 V  
 (C) 0.748 V (D) 0.866 V
- Q.88** A current of 2.0 A is used to plate Ni(s) from 500mL of a 1.0 M Ni<sup>2+</sup> aqueous solution. What is the [Ni<sup>2+</sup>] after 3.0 hours ?  
 (A) 0.39 M (B) 0.46 M  
 (C) 0.78 (D) 0.89 V
- Q.89** The number of amino acid residue of a polypeptide with molecular weight 55 kD may be  
 (A) 110 (B) 240 (C) 500 (D) 550
- Q.90** Titration of the amino acid lysine has three pKa values viz., pKa<sub>1</sub> (2.18), pKa<sub>2</sub> (8.95) and pKa<sub>3</sub> (10.53). The pH at which this amino acid will show no net migration in an electric field is  
 (A) 5.57 (B) 9.74 (C) 6.35 (D) 7.22
- Q.91** Increase in cell membrane fluidity with increasing temperature is due to change in the structure of  
 (A) Protein (B) lipid  
 (C) polysaccharide (D) DNA
- Q.92** Proteins present inside the cell membrane are stabilized by  
 (A) hydrogen bond  
 (B) disulfide bond  
 (C) hydrophobic force  
 (D) phosphor-diester bond
- Q.93** Synthesis of amino acids that will be affected due to prolonged uptake of food with no sulfur content is :  
 (A) lysine (B) tyrosine  
 (C) aspartic acid (D) cysteine
- Q.94** Presence of higher number of GC pairs in a DNA molecule makes it more stable at  
 (A) high temperature  
 (B) low temperature  
 (C) high pH  
 (D) high salt concentration
- Q.95** A polypeptide chain with 60 amino acids residue will have ..... number of nucleotides in its DNA ?  
 (A) 60 (B) 120 (C) 180 (D) 360
- Q.96** Electrophoretic mobility (without change in primary structure) of a multi-subunit protein sample with interchain disulfide bond will be affected if it is treated with  
 (A) performic acid (B) trypsin  
 (C) NaCl (D) CNBr
- Q.97** The molecule that cannot undergo esterification reaction is  
 (A) hemoglobin (B) adenine  
 (C) fatty acid (D) glycogen
- Q.98** Normally carbohydrates are not present as a part of ..... molecule in the cell.  
 (A) lipid (B) protein  
 (C) DNA (D) vitamin
- Q.99** The molecule that shows increase in absorbance in the UV region with increasing temperature is  
 (A) DNA (B) RNA  
 (C) Protein (D) chlorophyll
- Q.100** Proteins undergo degradation during starvation to act as a carbon source. The final byproduct of this reaction is  
 (A) glucose (B) ammonia  
 (C) ATP (D) amino acid

## ANSWER KEY

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<b>Que.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>	<b>21</b>	<b>22</b>	<b>23</b>	<b>24</b>	<b>25</b>
<b>Ans.</b>	A	B	B	D	C	D	B	C	B	B	C	A	B	C	D	C	D	A	B	B	C	C	A	C	C
<b>Que.</b>	<b>26</b>	<b>27</b>	<b>28</b>	<b>29</b>	<b>30</b>	<b>31</b>	<b>32</b>	<b>33</b>	<b>34</b>	<b>35</b>	<b>36</b>	<b>37</b>	<b>38</b>	<b>39</b>	<b>40</b>	<b>41</b>	<b>42</b>	<b>43</b>	<b>44</b>	<b>45</b>	<b>46</b>	<b>47</b>	<b>48</b>	<b>49</b>	<b>50</b>
<b>Ans.</b>	B	A	B	D	A	B	C	B	A	A	C	D	B	B	C	A	B	C	A	D	B	C	D	B	B
<b>Que.</b>	<b>51</b>	<b>52</b>	<b>53</b>	<b>54</b>	<b>55</b>	<b>56</b>	<b>57</b>	<b>58</b>	<b>59</b>	<b>60</b>	<b>61</b>	<b>62</b>	<b>63</b>	<b>64</b>	<b>65</b>	<b>66</b>	<b>67</b>	<b>68</b>	<b>69</b>	<b>70</b>	<b>71</b>	<b>72</b>	<b>73</b>	<b>74</b>	<b>75</b>
<b>Ans.</b>	C	A	C	C	C	D	C	B	C	B	A	B	C	D	A	B	A	C	C	B	D	D	C	A	A
<b>Que.</b>	<b>76</b>	<b>77</b>	<b>78</b>	<b>79</b>	<b>80</b>	<b>81</b>	<b>82</b>	<b>83</b>	<b>84</b>	<b>85</b>	<b>86</b>	<b>87</b>	<b>88</b>	<b>89</b>	<b>90</b>	<b>91</b>	<b>92</b>	<b>93</b>	<b>94</b>	<b>95</b>	<b>96</b>	<b>97</b>	<b>98</b>	<b>99</b>	<b>100</b>
<b>Ans.</b>	A	D	A	C	D	A	A	B	D	D	D	C	C	C	B	B	D	D	A	D	A	B	D	A	B

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