

# IIT-GATE: 2012

## Chemistry

### ❖ Question Paper

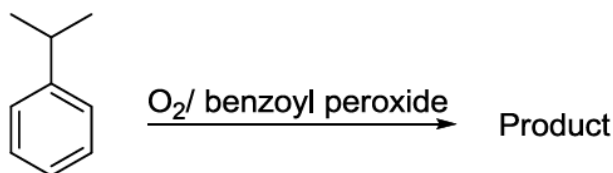
#### Section-A

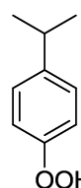
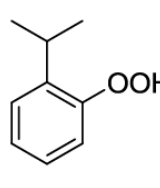
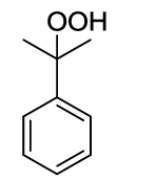
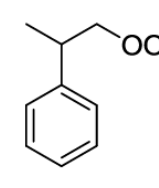
Q.1 – Q.25 carry one mark each.

Q.1 In the proton decoupled  $^{13}\text{C}$  NMR spectrum of 7-norbornanone, the number of signals obtained is

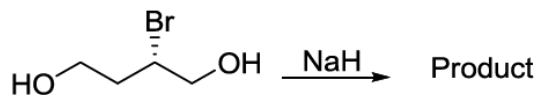
- (a) 7                      (b) 3                      (c) 4                      (d) 5

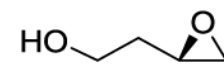
Q.2 Identify the most probable product in the given reaction



- (a)  (b)  (c)  (d) 

Q.3 In the cyclization reaction given below, the most probable product formed is



- (a)  (b)  (c)  (d) 

Q.4 If  $\Delta y$  and  $\Delta p_y$  are the uncertainties in the y-coordinate and the y component of the momentum of a particle respectively, then, according to uncertainty principle  $\Delta y \Delta p_y$  is ( $\hbar = \frac{h}{2\pi}$  and h is Planck's constant)

- (a)  $\geq \hbar$                       (b)  $> \hbar/2$                       (c)  $> \hbar$                       (d)  $\geq \hbar/2$

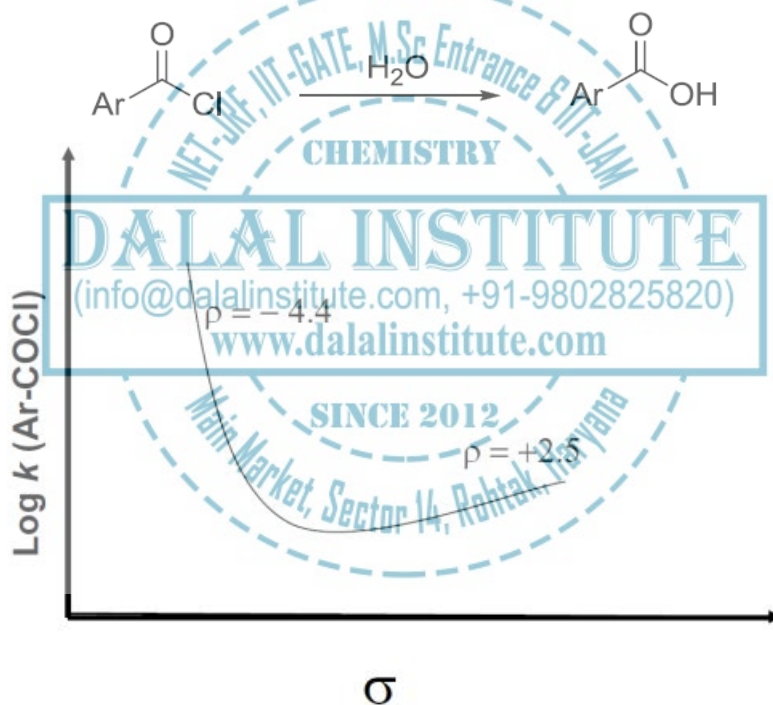
Q.5 The average length of a typical  $\alpha$ -helix comprised of 10 amino acids is

- (a) 10 Å                      (b) 15 Å                      (c) 36 Å                      (d) 54 Å

Q.6 Number of thymine residues in a 5000 kb DNA containing 23% guanine residues is

- (a)  $2.70 \times 10^6$                       (b)  $2.70 \times 10^7$                       (c)  $1.35 \times 10^6$                       (d)  $1.35 \times 10^7$

Q.7 Shown below is a Hammett plot obtained for the reaction



The change in slope of the plot indicates that

- (a) The reaction does not follow linear free energy relationship.  
 (b) Electrons are being withdrawn from the transition state in the mechanism.  
 (c) Electrons are being donated to the transition state in the mechanism.  
 (d) The mechanism of the reaction is changing.

Q.8 The ratio of relative intensities of the two molecular ion peaks of methyl bromide ( $\text{CH}_3\text{Br}$ ) in the mass spectrum is

- (a)  $M^+ : (M+2)^+ = 1:3$     (b)  $M^+ : (M+2)^+ = 3:1$     (c)  $M^+ : (M+2)^+ = 1:1$     (d)  $M^+ : (M+2)^+ = 1:2$

Q.9 A disaccharide that will not give Benedict's test and will not form osazone is

- (a) Maltose                      (b) Lactose                      (c) Cellobiose                      (d) Sucrose

Q.10 Choose the allowed transition

- (a)  ${}^1\Sigma_g^+ \rightarrow {}^3\Sigma_u^+$               (b)  ${}^1\Sigma_g^+ \rightarrow {}^3\Sigma_u^-$               (c)  ${}^1\Sigma_g^+ \rightarrow {}^1\Sigma_u^+$               (d)  ${}^1\Sigma_g^+ \rightarrow {}^3\Sigma_u^-$

Q.11 The angular part of the wavefunction for the electron in a hydrogen atom is proportional to  $\sin^2\theta \cos\theta e^{2i\phi}$ . The values of the azimuthal quantum number ( $l$ ) and the magnetic quantum number ( $m$ ) are, respectively

- (a) 2 and 2                      (b) 2 and  $-2$                       (c) 3 and 2                      (d) 3 and  $-2$

Q.12 Let  $\phi_x^C$  and  $\phi_z^C$  denote the wavefunctions of the  $2p_x$  and  $2p_z$  orbitals of carbon, respectively, and  $\phi_x^O$  and  $\phi_z^O$  represent the wavefunctions of the  $2p_x$  and  $2p_z$  orbitals of oxygen, respectively. If  $1c$  and  $2c$  are constants used in linear combinations and the CO molecule is oriented along the  $z$  axis, then, according to molecular orbital theory, the  $\pi$ -bonding molecular orbital has a wavefunction given by

- (a)  $c_1\phi_z^C + c_2\phi_x^O$               (b)  $c_1\phi_z^C + c_2\phi_z^O$               (c)  $c_1\phi_x^C + c_2\phi_z^O$               (d)  $c_1\phi_x^C + c_2\phi_x^O$

Q.13 The bond that gives the most intense band in the infrared spectrum for its stretching vibration is

- (a) C—H                      (b) N—H                      (c) O—H                      (d) S—H

Q.14 If  $x_A$  and  $x_B$  are the respective mole fractions of A and B in an ideal solution of the two and  $T_A$ ,  $T_B$ ,  $T$  are the fusion temperatures of pure A, pure B and the ideal solution respectively, then

- (a)  $1 - x_B = \exp\left[\frac{-\Delta H_{fus(B)}^0}{R}\left(\frac{1}{T} - \frac{1}{T_B}\right)\right]$               (b)  $1 - x_B = \exp\left[\frac{\Delta H_{fus(A)}^0}{R}\left(\frac{1}{T} - \frac{1}{T_A}\right)\right]$

$$(c) \quad 1 - x_B = \exp \left[ \frac{\Delta H^0_{fus(B)}}{R} \left( \frac{1}{T} - \frac{1}{T_B} \right) \right] \quad (d) \quad 1 - x_B = \exp \left[ \frac{-\Delta H^0_{fus(A)}}{R} \left( \frac{1}{T} - \frac{1}{T_A} \right) \right]$$

Q.15 For a reaction involving two steps given below



assume that the first step attains equilibrium rapidly. The rate of formation of P is proportional to

- (a)  $[G]^{1/2}$                       (b)  $[G]$                       (c)  $[G]^2$                       (d)  $[G]^{3/2}$

Q.16 A metal chelate that can be used for separation and quantitative analysis of aluminum ions by gas chromatography is

- (a) EDTA    (b) Ethylene glycol  
(c) Dinonyl phthalate    (d) Trifluoroacetylacetone

Q.17 The enthalpies of hydration of  $\text{Ca}^{2+}$ ,  $\text{Mn}^{2+}$  and  $\text{Zn}^{2+}$  follow the order

- (a)  $\text{Mn}^{2+} > \text{Ca}^{2+} > \text{Zn}^{2+}$     (b)  $\text{Zn}^{2+} > \text{Ca}^{2+} > \text{Mn}^{2+}$     (c)  $\text{Mn}^{2+} > \text{Zn}^{2+} > \text{Ca}^{2+}$     (d)  $\text{Zn}^{2+} > \text{Mn}^{2+} > \text{Ca}^{2+}$

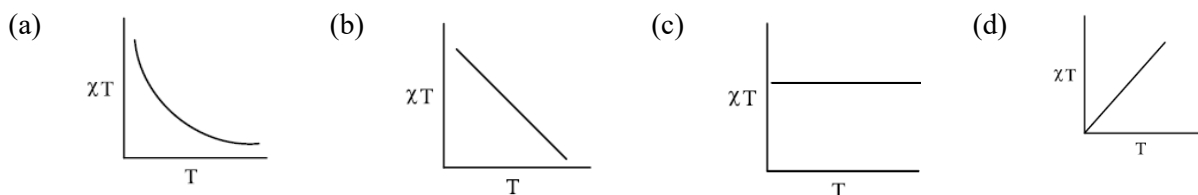
Q.18 The number of terminal carbonyl groups present in  $\text{Fe}_2(\text{CO})_9$  is

- (a) 2    (b) 5    (c) 6    (d) 3

Q.19 Among the following substituted silanes, the one that gives cross-linked silicone polymer upon hydrolysis is

- (a)  $(\text{CH}_3)_4\text{Si}$                       (b)  $\text{CH}_3\text{SiCl}_3$                       (c)  $(\text{CH}_3)_2\text{SiCl}_2$                       (d)  $(\text{CH}_3)_3\text{SiCl}$

Q.20 The plot of  $\chi T$  versus T (where  $\chi$  is molar magnetic susceptibility and T is the temperature) for a paramagnetic complex which strictly follows Curie equation is



Q.21 Among the following donors, the one that forms most stable adduct with the Lewis acid  $B(CH_3)_3$  is

- (a) 4-methylpyridine (b) 2,6-dimethylpyridine  
 (c) 4-nitropyridine (d) 2,6-di-tert-butylpyridine

Q.22 The complex with inverse-spinel structure is

- (a)  $Co_3O_4$  (b)  $Fe_3O_4$  (c)  $MgAlO_4$  (d)  $Mn_3O_4$

Q.23 The IUPAC nomenclature of  $Na[PCl_6]$  is

- (a) Sodium hexachlorophosphine(V) (b) Sodium hexachlorophosphate(V)  
 (c) Sodium hexachlorophosphine (d) Sodium hexachlorophosphite(V)

Q.24 An intermediate formed during the hydroformylation of olefins using  $Co_2(CO)_8$  as catalyst is

- (a)  $HCo(CO)_6$  (b)  $H_4Co(CO)_3$  (c)  $H_2Co(CO)_4$  (d)  $HCo(CO)_4$

Q.25 The order of polarity of  $NH_3$ ,  $NF_3$  and  $BF_3$  is

- (a)  $NH_3 < NF_3 < BF_3$  (b)  $BF_3 < NF_3 < NH_3$  (c)  $BF_3 < NH_3 < NF_3$  (d)  $NF_3 < BF_3 < NH_3$

**Q.26 to Q.55 carry two marks each.**

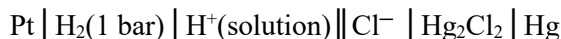
Q.26 From a carboxymethyl-cellulose column at pH 6.0, arginine, valine and glutamic acid will elute in the order

- (a) arginine, valine, glutamic acid (b) arginine, glutamic acid, valine  
 (c) glutamic acid, arginine, valine (d) glutamic acid, valine, arginine

Q.27 Symmetry operations of the four  $C_2$  axes perpendicular to the principal axis belong to the same class in the point group(s)

- (a)  $D_4$  (b)  $D_{4d}$  (c)  $D_{4h}$  (d)  $D_{4h}$  and  $D_{4d}$

Q.28 At 298 K, the EMF of the cell



is 0.7530 V. The standard potential of the calomel electrode is 0.2802 V. If the liquid junction potential is zero, the pH of the solution is

- (a) 4.7 (b) 7.4 (c) 8.0 (d) 12.7

Q.29 The wavefunction of a 1-D harmonic oscillator between  $x = +\infty$  and  $x = -\infty$  is given by

$\Psi(x) = N(2x^2 - 1)e^{-x^2/2}$ . The value of N that normalizes the function  $\Psi(x)$  is

(Given:  $\int_{-\infty}^{+\infty} x^{2n} e^{-x^2} dx = \frac{1.3.5 \dots (2n-1)}{2^n} \sqrt{\pi}$ )

- (a)  $\left(\frac{1}{8\sqrt{\pi}}\right)^{\frac{1}{2}}$  (b)  $\left(\frac{1}{3\sqrt{\pi}}\right)^{\frac{1}{2}}$  (c)  $\left(\frac{1}{2\sqrt{\pi}}\right)^{\frac{1}{2}}$  (d)  $\left(\frac{1}{4\sqrt{\pi}}\right)^{\frac{1}{2}}$

Q.30 Consider the reaction



The molecular diameters of  $\text{H}_2$  and  $\text{C}_2\text{H}_4$  are 1.8 Å and 3.6 Å respectively. The pre-exponential factor in the rate constant calculated using collision theory in  $\text{m}^3(\text{mole})^{-1} \text{s}^{-1}$  is approximately.

(For this reaction at 300 K,  $\left(\frac{8k_B T}{\pi \mu}\right)^{\frac{1}{2}} N_A = 1.11 \times 10^{27} \text{m}(\text{mol})^{-1} \text{s}^{-1}$ , where the symbols have their usual meanings)

- (a)  $2.5 \times 10^8$  (b)  $2.5 \times 10^{14}$  (c)  $9.4 \times 10^{17}$  (d)  $9.4 \times 10^{23}$

Q.31 The molecular partition function of a system is given by

$q(T) = \left(\frac{k_B T}{hc}\right)^{3/2} \left(\frac{8\pi^3 m k_B T}{h^2}\right)^{3/2}$ , where the symbols have their usual meanings.

The heat capacity at constant volume for this system is

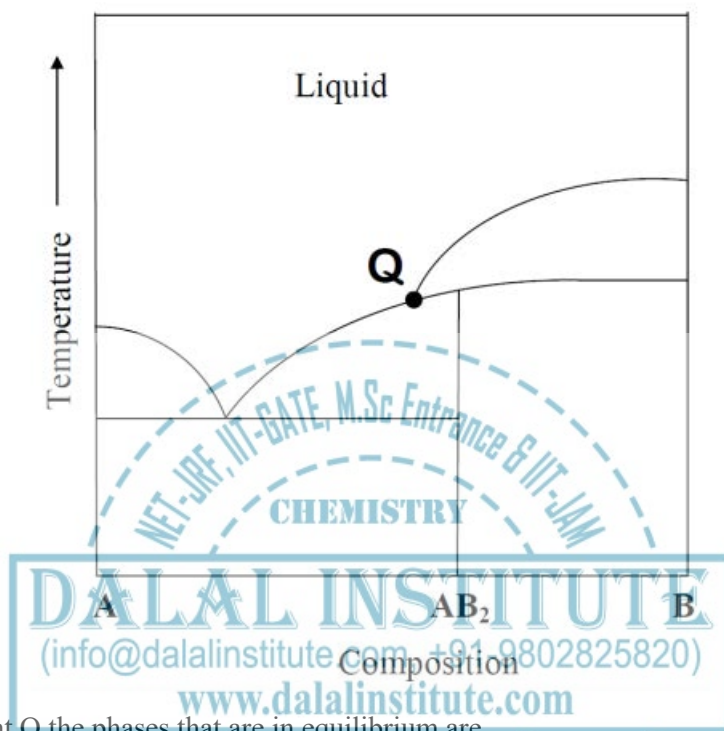
(a) 3R

(b) 6R

(c) 9R/2

(d) 3R/2

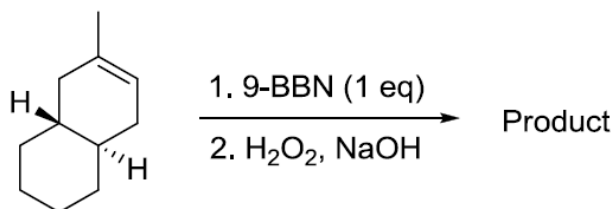
Q.32 Consider the phase diagram given below.



At the intersection point Q the phases that are in equilibrium are

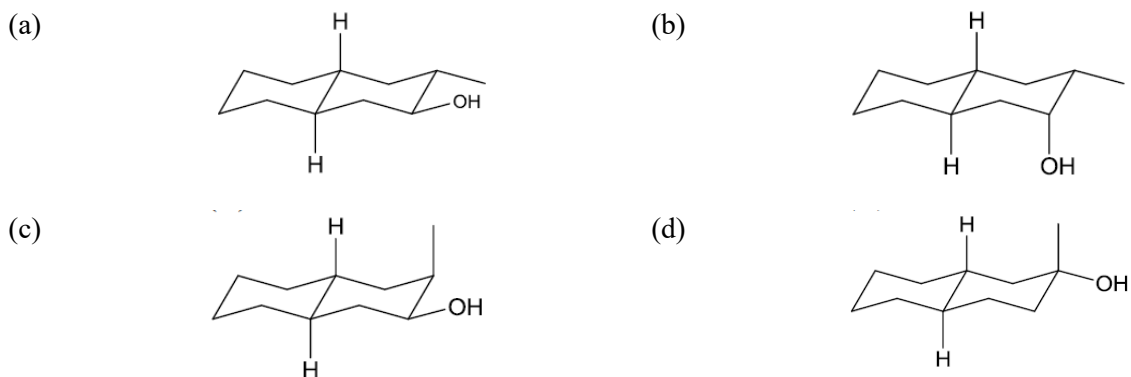
- (a) Solid A, solid B and solid AB<sub>2</sub>      (b) Solid A, solid AB<sub>2</sub> and liquid  
 (c) Solid B, solid AB<sub>2</sub> and liquid      (d) Solid A, solid B, solid AB<sub>2</sub> and liquid

Q.33 Identify the product from the following reaction

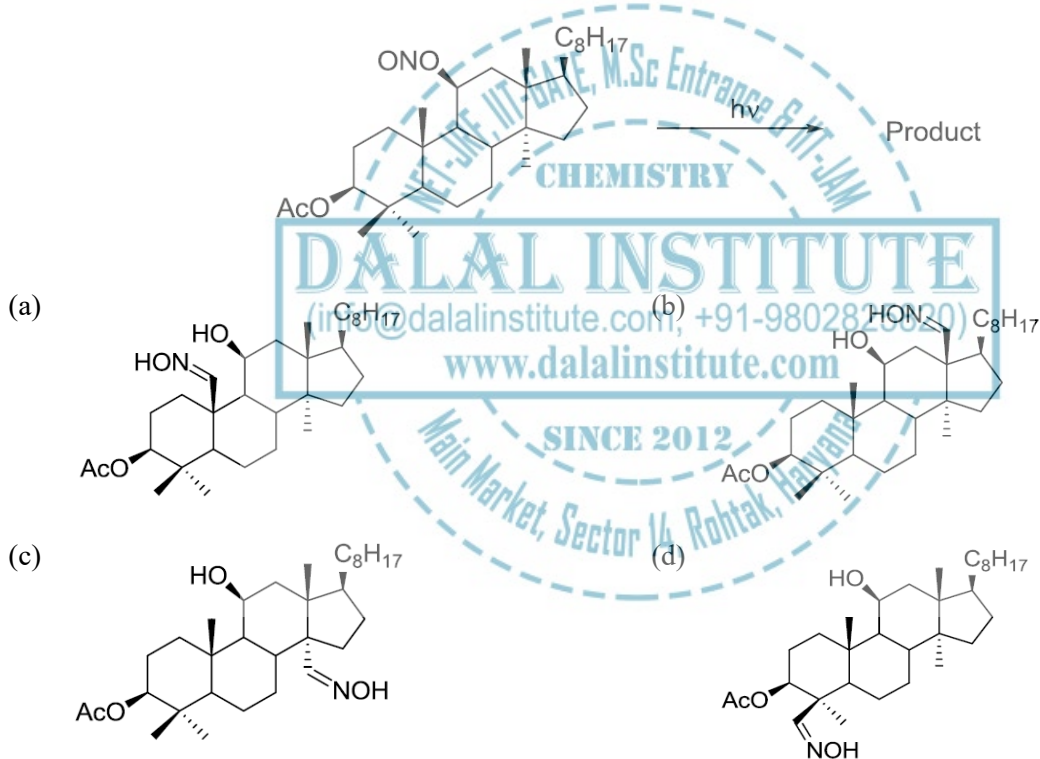


(9-BBN = 9-Borabicyclo[3•3•1] nonane)

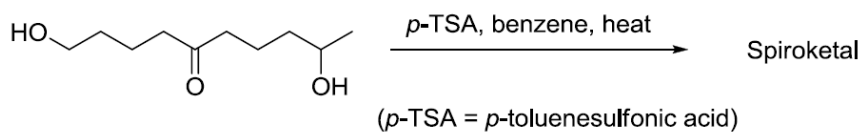




Q.34 The product from the following reaction is

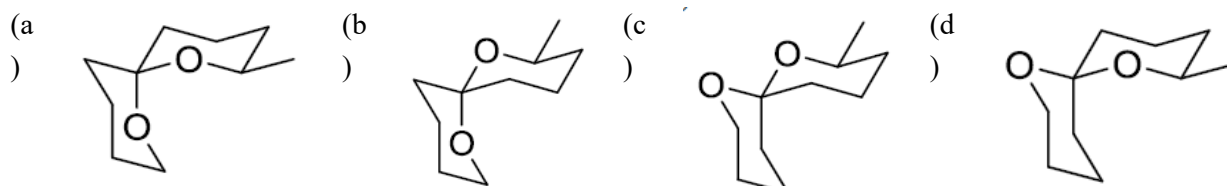


Q.35 The acid catalyzed cyclization of 5-ketodecan-1,9-diol is given below



The most predominant spiroketal is





Q.36 For a face centered cubic lattice, the Miller indices for the first Bragg's peak (smallest Bragg angle) Are

- (a) 0 0 2                      (b) 1 1 1                      (c) 0 0 1                      (d) 1 1 0

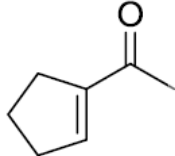
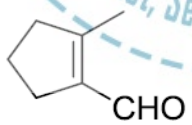
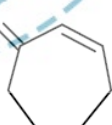
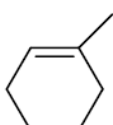
Q.37 For the titration of a 10 mL (aq) solution of  $\text{CaCO}_3$ , 2 mL of 0.001 M  $\text{Na}_2\text{EDTA}$  is required to reach the end point. The concentration of  $\text{CaCO}_3$  (assume molecular weight of  $\text{CaCO}_3 = 100$ ) is

- (a)  $5 \times 10^{-4} \text{g/mL}$                       (b)  $2 \times 10^{-4} \text{g/mL}$                       (c)  $5 \times 10^{-5} \text{g/mL}$                       (d)  $2 \times 10^{-5} \text{g/mL}$

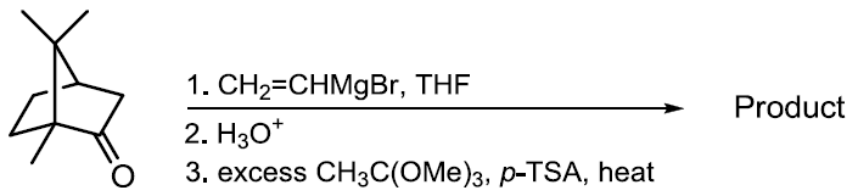
Q.38 In the reaction



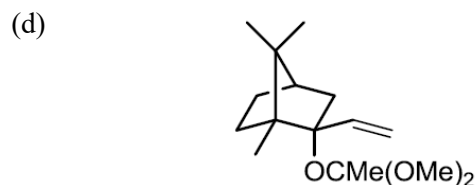
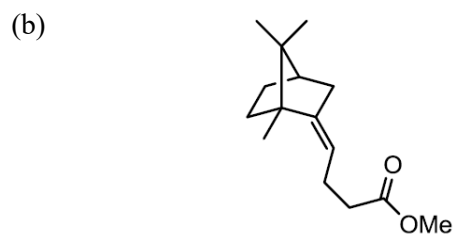
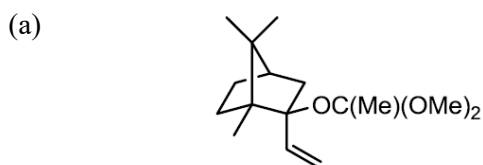
the product formed is

- (a)  (b)  (c)  (d) 

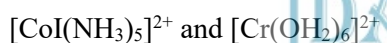
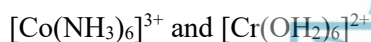
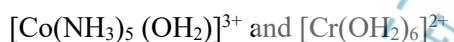
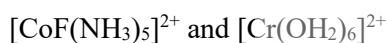
Q.39 In the reaction given below, identify the product



(*p*-TSA = *p*-toluenesulfonic acid; THF = tetrahydrofuran)



Q.40 Consider the following pairs of complexes



The electron transfer rate will be fastest in the pair

- (a)  $[\text{CoF}(\text{NH}_3)_5]^{2+}$  and  $[\text{Cr}(\text{OH}_2)_6]^{2+}$  (b)  $[\text{Co}(\text{NH}_3)_5(\text{OH}_2)]^{3+}$  and  $[\text{Cr}(\text{OH}_2)_6]^{2+}$   
 (c)  $[\text{Co}(\text{NH}_3)_6]^{3+}$  and  $[\text{Cr}(\text{OH}_2)_6]^{2+}$  (d)  $[\text{CoI}(\text{NH}_3)_5]^{2+}$  and  $[\text{Cr}(\text{OH}_2)_6]^{2+}$

Q.41 The extent of Mössbauer quadrupole splitting of iron follows the order

- (a)  $\text{FeCl}_2 \cdot 4\text{H}_2\text{O} > \text{K}_2[\text{Fe}(\text{CN})_5(\text{NO})] > \text{FeCl}_3 \cdot 6\text{H}_2\text{O}$   
 (b)  $\text{K}_2[\text{Fe}(\text{CN})_5(\text{NO})] > \text{FeCl}_2 \cdot 4\text{H}_2\text{O} > \text{FeCl}_3 \cdot 6\text{H}_2\text{O}$   
 (c)  $\text{FeCl}_3 \cdot 6\text{H}_2\text{O} > \text{K}_2[\text{Fe}(\text{CN})_5(\text{NO})] > \text{FeCl}_2 \cdot 4\text{H}_2\text{O}$   
 (d)  $\text{FeCl}_2 \cdot 4\text{H}_2\text{O} > \text{FeCl}_3 \cdot 6\text{H}_2\text{O} > \text{K}_2[\text{Fe}(\text{CN})_5(\text{NO})]$

Q.42 Hemoglobin is an oxygen carrying protein. The correct statement about oxy-hemoglobin is that

- (a) The metal is low-spin in +3 oxidation state while dioxygen is in  $\text{O}_2^-$  form  
 (b) The metal is high-spin in +3 oxidation state while dioxygen is in  $\text{O}_2^-$  form.

- (c) The metal is low-spin in +3 oxidation state while dioxygen is in neutral form.  
 (d) The metal is high-spin in +3 oxidation state while dioxygen is in neutral form

Q.43 If a mixture of NaCl, conc.  $\text{H}_2\text{SO}_4$  and  $\text{K}_2\text{Cr}_2\text{O}_7$  is heated in a dry test tube, a red vapour (P) is formed. This vapour (P) dissolves in aqueous NaOH to form a yellow solution, which upon treatment with  $\text{AgNO}_3$  forms a red solid (Q). P and Q are, respectively

- (a)  $\text{CrO}_2\text{Cl}_2$  and  $\text{Ag}_2\text{Cr}_2\text{O}_7$  (b)  $\text{Na}_2[\text{CrOCl}_5]$  and  $\text{Ag}_2\text{CrO}_4$   
 (c)  $\text{Na}_2[\text{CrOCl}_5]$  and  $\text{Ag}_2\text{Cr}_2\text{O}_7$  (d)  $\text{CrO}_2\text{Cl}_2$  and  $\text{Ag}_2\text{CrO}_4$

Q.44 For the following reaction



$E^\circ(\text{MnO}_4^-/\text{Mn}^{2+}) = +1.51 \text{ V}$  and  $E^\circ(\text{CO}_2/\text{H}_2\text{C}_2\text{O}_4) = -0.49 \text{ V}$ . At 298 K, the equilibrium constant is

- (a)  $10^{500}$  (b)  $10^{338}$  (c)  $10^{38}$  (d)  $10^{833}$

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Q.45 The ground states of high-spin octahedral and tetrahedral Co(II) complexes are, respectively

- (a)  ${}^4\text{T}_{2g}$  and  ${}^4\text{A}_2$  (b)  ${}^4\text{T}_{1g}$  and  ${}^4\text{A}_2$  (c)  ${}^3\text{T}_{1g}$  and  ${}^4\text{A}_2$  (d)  ${}^4\text{T}_{1g}$  and  ${}^3\text{T}_1$

Q.46 The INCORRECT statement about Zeise's salt is

- (a) Zeise's salt is diamagnetic.  
 (b) The oxidation state of Pt in Zeise's salt is +2.  
 (c) All the Pt–Cl bond lengths in Zeise's salt are equal.  
 (d) C–C bond length of ethylene moiety in Zeise's salt is longer than that of free ethylene molecule.

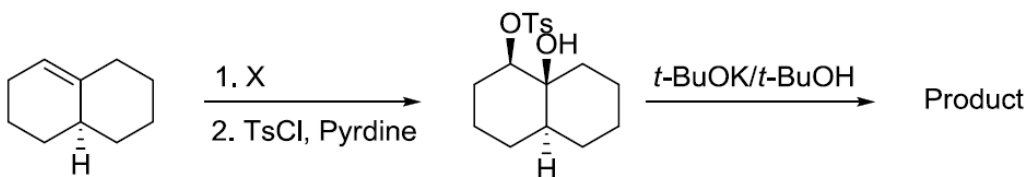
Q.47 The number of possible isomers for the square planar mononuclear complex  $[(\text{NH}_3)_2\text{M}(\text{CN})_2]$  of a metal M is

- (a) 2 (b) 4 (c) 6 (d) 3

## Common Data Questions:

## Common Data for Questions 48 and 49:

Consider the reaction sequence shown below:



TsCl = *p*-toluenesulfonyl chloride

Q.48 The oxidant X used in step 1 is

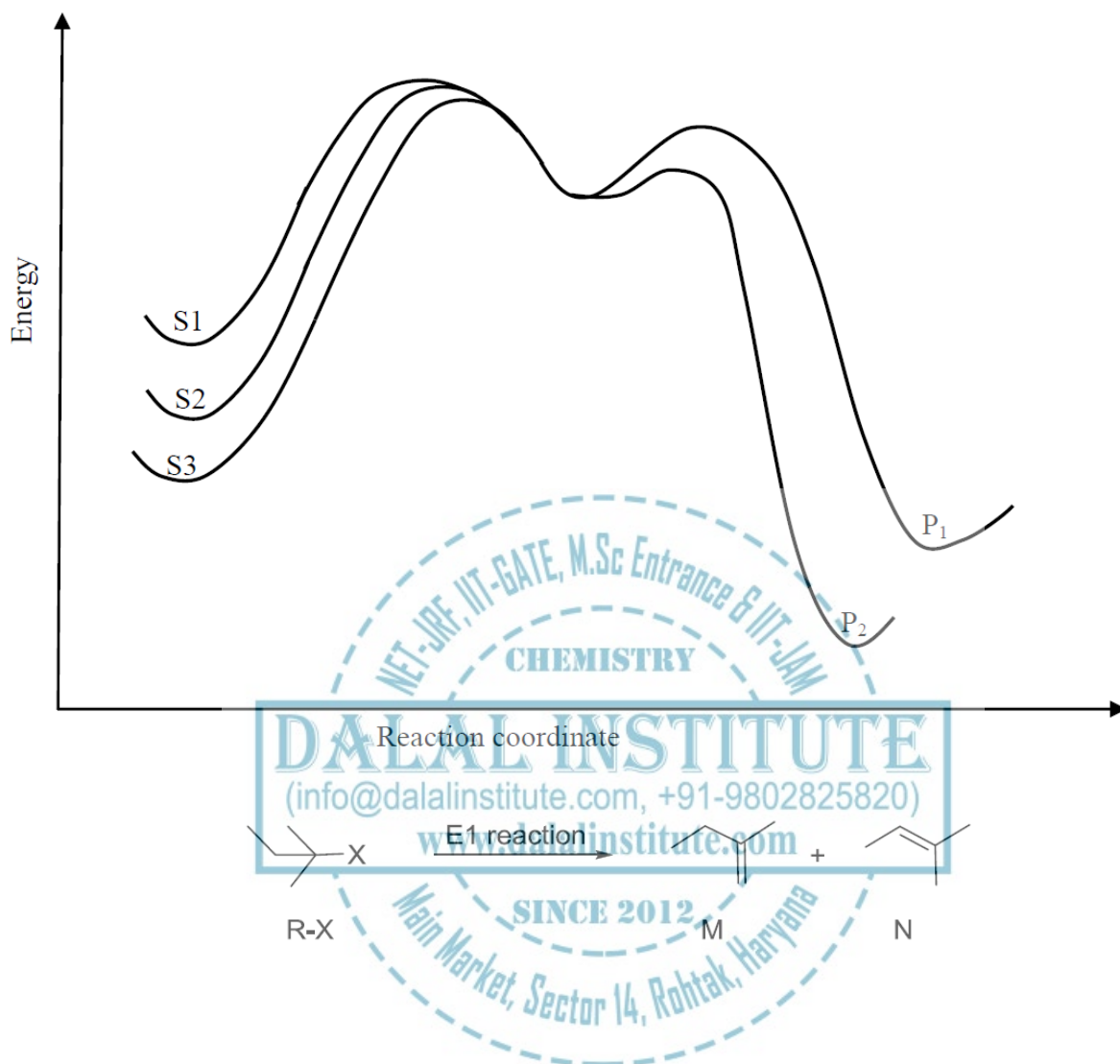
- (a)  $\text{CrO}_3$  (b)  $\text{OsO}_4$   
 (c)  $\text{NaIO}_4$  (d) *m*-CPBA followed by NaOH

Q.49 The product is

- (a) (b) (c) (d)

## Common Data for Questions 50 and 51:

Consider the E1 reaction of tert-amyl halides from the energy profile given below.



Q.50 In the above reaction, X = Cl, Br or I. Based on the graph, identify the alkyl halides (R-X) as S1, S2 and S3

- |                                       |                                       |
|---------------------------------------|---------------------------------------|
| (a) S1 = R-Cl, S2 = R-Br and S3 = R-I | (b) S1 = R-I, S2 = R-Br and S3 = R-Cl |
| (c) S1 = R-Cl, S2 = R-I and S3 = R-Br | (d) S1 = R-I, S2 = R-Cl and S3 = R-Br |

Q.51 Identify product P<sub>1</sub> and its yield relative to P<sub>2</sub>

- |  |  |
|--|--|
| (a) P <sub>1</sub> is M and is the major product | (b) P <sub>1</sub> is N and is the minor product |
| (c) P <sub>1</sub> is N and is the major product | (d) P <sub>1</sub> is M and is the minor product |

## Linked Answer Questions

**Statement for Linked Answer Questions 52 and 53:**

A 20491  $\text{cm}^{-1}$  laser line was used to excite oxygen molecules (made of  $^{16}\text{O}$  only) to obtain the rotational Raman spectrum. The resulting rotational Raman spectrum of oxygen molecule has the first Stokes line at 20479  $\text{cm}^{-1}$ .

Q.52 The rotational constant (usually denoted as B) for the oxygen molecule is

- (a) 1.2  $\text{cm}^{-1}$                       (b) 2.0  $\text{cm}^{-1}$                       (c) 3.0  $\text{cm}^{-1}$                       (d) 6.0  $\text{cm}^{-1}$

Q.53 The next rotational Stokes line is expected at

- (a) 20467  $\text{cm}^{-1}$                       (b) 20469  $\text{cm}^{-1}$                       (c) 20471  $\text{cm}^{-1}$                       (d) 20475  $\text{cm}^{-1}$

**Statement for Linked Answer Questions 54 and 55:**

Hückel molecular orbital theory can be applied to the allene radical;  $\text{CH}_2=\text{CH}-\dot{\text{C}}\text{H}_2$

Q.54 The secular determinant (where  $\alpha$ ,  $\beta$  and E have their usual meanings) is given by

- (a) 
$$\begin{vmatrix} \alpha - E & \beta & 0 \\ \beta & \alpha - E & \beta \\ 0 & \beta & \alpha - E \end{vmatrix}$$
                      (b) 
$$\begin{vmatrix} \alpha - E & 0 & 0 \\ 0 & \alpha - E & \beta \\ 0 & \beta & \alpha - E \end{vmatrix}$$
- (c) 
$$\begin{vmatrix} \alpha - E & \beta & 0 \\ \beta & \alpha - E & 0 \\ 0 & 0 & \alpha - E \end{vmatrix}$$
                      (d) 
$$\begin{vmatrix} \alpha - E & -\beta & 0 \\ -\beta & \alpha - E & -\beta \\ 0 & -\beta & \alpha - E \end{vmatrix}$$

Q.55 The possible values of E are

- (a)  $\alpha + \sqrt{2}\beta, \alpha, \alpha - \sqrt{2}\beta$                       (b)  $\alpha + 2\sqrt{2}\beta, \alpha, \alpha - 2\sqrt{2}\beta$
- (c)  $\alpha + \beta, \alpha, \alpha - \beta$                       (d)  $\alpha + 2\beta, \alpha, \alpha - 2\beta$



## Section-B

**Q.56 – Q.60 carry one mark each.**

Q.56 If  $(1.001)^{1259} = 3.52$  and  $(1.001)^{2062} = 7.85$ , then  $(1.001)^{3321} =$

- (a) 2.23                      (b) 4.33                      (c) 11.37                      (d) 27.64

Q.57 One of the parts (A, B, C, D) in the sentence given below contains an ERROR. Which one of the following is INCORRECT?

I requested that he should be given the driving test today instead of tomorrow.

- (a) Requested that                      (b) Should be given  
(c) The driving test                      (d) Instead of tomorrow

Q.58 Which one of the following options is the closest in meaning to the word given below?

Latitude

- (a) Eligibility                      (b) Freedom                      (c) Coercion                      (d) Meticulousness

Q.59 Choose the most appropriate word from the options given below to complete the following sentence:

Given the seriousness of the situation that he had to face, his \_\_\_ was impressive.

- (a) Beggary                      (b) Nomenclature                      (c) Jealousy                      (d) Nonchalance

Q.60 Choose the most appropriate alternative from the options given below to complete the following sentence:

If the tired soldier wanted to lie down, he \_\_\_ the mattress out on the balcony.

- (a) Should take                      (b) Shall take                      (c) Should have taken                      (d) Will have taken

**Q.61 - Q.65 carry two marks each.**

Q.61 One of the legacies of the Roman legions was discipline. In the legions, military law prevailed and discipline was brutal. Discipline on the battlefield kept units obedient, intact and fighting, even when the odds and conditions were against them.

Which one of the following statements best sums up the meaning of the above passage?

- (a) Thorough regimentation was the main reason for the efficiency of the Roman legions even in adverse circumstances.
- (b) The legions were treated inhumanly as if the men were animals.
- (c) Discipline was the armies' inheritance from their seniors.
- (d) The harsh discipline to which the legions were subjected to led to the odds and conditions being against them.

Q.62 A and B are friends. They decide to meet between 1 PM and 2 PM on a given day. There is a condition that whoever arrives first will not wait for the other for more than 15 minutes. The probability that they will meet on that day is

- (a)  $\frac{1}{4}$  (b)  $\frac{1}{16}$  (c)  $\frac{7}{16}$  (d)  $\frac{9}{16}$

Q.63 The data given in the following table summarizes the monthly budget of an average household.

Category	Amount (Rs.)
Food	4000
Clothing	1200
Rent	2000
Savings	1500
Other expenses	1800

The approximate percentage of the monthly budget NOT spent on savings is

- (a) 10% (b) 14% (c) 81% (d) 86%

Q.64 There are eight bags of rice looking alike, seven of which have equal weight and one is slightly heavier. The weighing balance is of unlimited capacity. Using this balance, the minimum number of weighing's required to identify the heavier bag is

- (a) 2 (b) 3 (c) 4 (d) 8

Q.65 Raju has 14 currency notes in his pocket consisting of only Rs. 20 notes and Rs. 10 notes. The total money value of the notes is Rs. 230. The number of Rs. 10 notes that Raju has is

- (a) 5                      (b) 6                      (c) 9                      (d) 10



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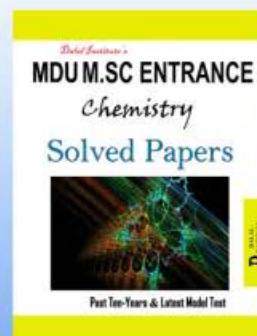
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