

Association of Chemistry Teachers
NATIONAL STANDARD EXAMINATION IN CHEMISTRY 2010-2011

Date of Examination 28th November 2010

Time 12.30 to 14.30 Hrs

Instructions to Candidates

01. On the answer sheet, fill up all the entries carefully in the space provided, **ONLY IN BLOCK CAPITALS**. Use only **BLUE or BLACK BALL PEN** for making entries and marking answers. **Incomplete / incorrect / carelessly filled information may disqualify your candidature.**
02. The question paper contains 80 multiple-choice questions. Each question has 4 options, out of which only one is correct. Choose the correct answer and mark a **cross** in the corresponding box on the answer sheet as shown below :

Q.	a	b	c	d
22			X	

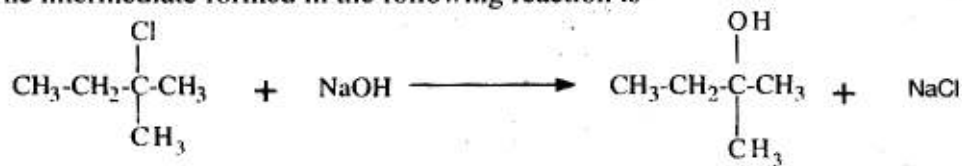
03. A correct answer carries 3 marks and 1 mark will be deducted for each wrong answer.
04. All rough work may be done on the blank sheet provided at the end of the question paper.
05. **PLEASE DO NOT MAKE ANY MARK OTHER THAN (X) IN THE SPACE PROVIDED ON THE ANSWER SHEET.**
Answer sheets are evaluated with the help of a machine. Due to this, **CHANGE OF ENTRY IS NOT ALLOWED.**
06. **Scratching or overwriting may result in wrong score. DO NOT WRITE ANYTHING ON BACK OF ANSWER SHEET.**
07. Use of a nonprogrammable calculator is allowed.
08. Periodic table and log table are provided at the end of this question paper.
09. The answers / solutions to this question paper will be available on our website - www.iapt.org.in by 3 rd December 2010.

Certificates & Awards

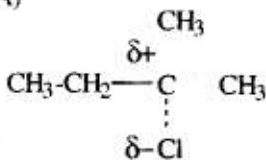
- i) Certificates to top 10% students of each centre.
- ii) Merit certificates to statewide Top 1% students.
- iii) Merit certificate and a prize in the form of a book to Nationwide Top 1% students.
10. Result sheets and the "centre top 10%" certificates of NSEC are dispatched to the professor in charge of the centre. Thus you will get your marks from the Professor in charge of your centre by January 2011 end.
11. TOP 300 (or so) students are called for the next examination - Indian National Chemistry Olympiad (INChO). Individual letters are sent to these students **ONLY**.
12. Gold medals will be awarded to TOP 35 students in this entire process.
13. No queries will be entertained in this regard.

- (1) The orange colour of carrot is due to the presence of β -carotene in it. β -carotene is coloured due to the presence of
 (A) Aromatic ring (B) Extended conjugation (C) Cyclic conjugation
 (D) Carbonyl group
- (2) Keto and enol forms of a compound are related to each other as
 (A) Resonance structures (B) Conformations (C) Configurational isomers
 (D) Constitutional isomers
- (3) A solution of 0.10M NaZ has $\text{pH} = 8.90$. The K_a of HZ is
 (A) 1.6×10^{-4} (B) 1.6×10^{-5} (C) 6.3×10^{-10} (D) 6.3×10^{-11}
- (4) The structure of SF_4 is
 (A) Trigonal bipyramidal (B) Square planar (C) Tetrahedral (D) Octahedral
- (5) The conversion which represents oxidation is
 (A) $\text{NO}_2^- \rightarrow \text{N}_2$ (B) $\text{VO}_2^+ \rightarrow \text{VO}_3^-$ (C) $\text{ClO}^- \rightarrow \text{Cl}^-$ (D) $\text{CrO}_4^{2-} \rightarrow \text{Cr}_2\text{O}_7^{2-}$
- (6) The number of all types of isomers of chlorobutane is
 (A) 2 (B) 4 (C) 6 (D) 5
- (7) The secondary structure of a protein molecule can be promoted by the presence of
 (A) Proline residues (B) Glycine residues
 (C) Leucine residues (D) Aspartic acid residues
- (8) A container having volume V contains an ideal gas at 1 atm pressure. It is connected to another evacuated container having volume 0.5 dm^3 through a tube having negligible volume. After some time the first container is found to have pressure 570 mm of Hg. If temperature is constant V is
 (A) 1.0 dm^3 (B) 1.5 dm^3 (C) 2.0 dm^3 (D) 2.5 dm^3
- (9) The set that contains all nucleophiles is
 (A) H_2O , BF_3 , Cl^- , NH_3 (B) $\text{CH}_3\text{-NH}_2$, H_2O , I^- , $\text{CH}_3\text{-SH}$
 (C) AlCl_3 , H^+ , BF_3 , I_2 (D) AlCl_4^- , OH^- , Br^- , H_2
- (10) The pair which contains both molecules polar is
 (A) O_2 & H_2O (B) CO_2 & PCl_3 (C) SO_2 & SCl_2 (D) CS_2 & NO_2

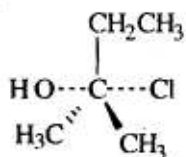
(11) The intermediate formed in the following reaction is



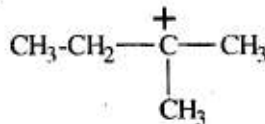
(A)



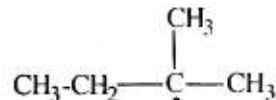
(B)



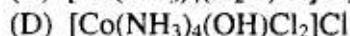
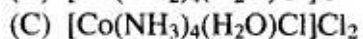
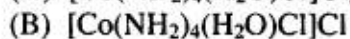
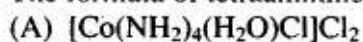
(C)



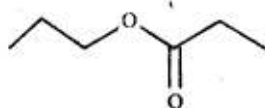
(D)



(12) The formula of tetraammineaquochlorocobalt(III)chloride is



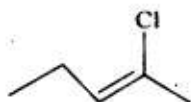
(13) The IUPAC name of the following compound is



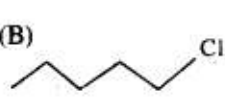
- (A) n-propyl ethanoate (B) ethyl propanoate (C) pentanoic anhydride
(D) n-propyl propanoate

(14) The compound which would undergo $\text{S}_{\text{N}}2$ reaction fastest is

(A)



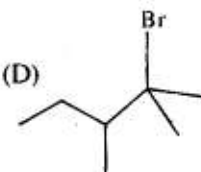
(B)



(C)



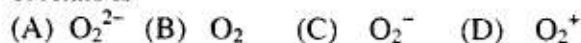
(D)



(15) A reaction will **never** be spontaneous at any temperature and pressure if



(16) The species that contains maximum number of electrons in the antibonding molecular orbitals is



(17) Body-centred cubic lattice has a co-ordination number of



(18) Cyclohexene reacts with limited amount of bromine in the presence of light to form product X ($\text{C}_6\text{H}_9\text{Br}$). The statement correct about X is

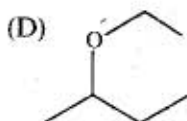
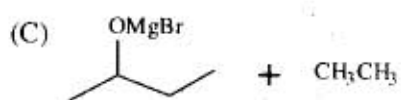
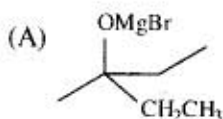
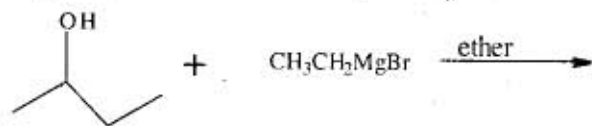
- (A) It is a racemate
- (B) It is a product of an addition reaction
- (C) It is formed through a cationic intermediate
- (D) It is optically active

(19) The compound that would undergo hydration very easily is
 (A) $\text{CH}_3\text{COCH}_2\text{Cl}$ (B) $\text{CH}_3\text{CH}_2\text{CHO}$ (C) $\text{Cl}_3\text{C-CHO}$ (D) $\text{Cl}_3\text{CCH}_2\text{COCH}_3$

(20) In a DNA molecule –
 (A) $A = C$ (B) $A + G = C + T$ (C) $T = G$ (D) $A/T = 2$

(21) Some heavy water is added to pure water. The numbers of different molecules and ions present in the mixture at equilibrium are
 (A) 2, 0 (B) 6, 3 (C) 3, 6 (D) 3, 4

(22) The product/s of the following reaction is/are

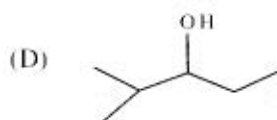
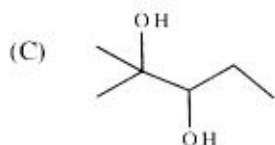
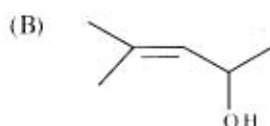
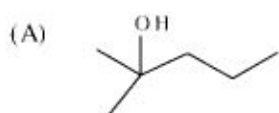
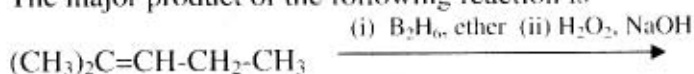


(23) A compound containing beryllium has the following composition. Be= 6.1%, N=37.8%, Cl=48%, H= 8.1%. One mole of the compound has mass of 148g and average atomic mass of beryllium is 9. The molecular formula of the compound is

- (A) $\text{BeN}_4\text{H}_{12}\text{Cl}_2$ (B) $\text{BeN}_2\text{H}_{10}\text{Cl}$ (C) $\text{BeN}_4\text{H}_2\text{Cl}_3$ (D) $\text{Be}_2\text{N}_4\text{H}_{10}\text{Cl}_2$

(24) The product formed when chlorine gas is passed over hot iron is
 (A) Iron(II)chloride is formed
 (B) Iron(III) chloride is formed
 (C) A mixture of iron(II)chloride and iron(III)chloride is formed
 (D) No reactions will take place

(25) The major product of the following reaction is



(26) 20g of compound X are dissolved in 500 mL of water and the osmotic pressure of the resulting solution is 500mm of Hg at 10°C. The average molecular mass of X is

- (A) 1115.42 (B) 1150.70 (C) 1412.84 (D) 1163.88

(27) The compound that has the highest ionic character associated with the X-Cl bond is

- (A) PCl_5 (B) BCl_3 (C) CCl_4 (D) SiCl_4

(28) When an apple is cut, the exposed part begins to turn brown. Often the browning action can be arrested by adding a few drops of lemon juice to the exposed area. The basis for this treatment is

- (A) lemon juice is an antioxidant
(B) denaturation of proteins of the enzymes
(C) decolourization due to lemon juice
(D) activation of decolourizing enzymes under acidic medium

(29) (i) $\text{CH}_2=\text{CH}-\text{CH}_2-\text{CH}=\text{CH}_2$ (ii) $\text{CH}_2=\text{CH}-\text{CH}=\text{CH}-\text{CH}_3$

(iii) $\text{CH}_3-\text{CH}=\text{CH}-\text{CH}=\text{CH}-\text{CH}_3$

The numbers of possible geometric isomers for the above compounds respectively are

- (A) 0,2,4 (B) 2,2,4 (C) 0,3,3 (D) 0,2,3

(30) The velocity of an electron in the second Bohr orbit of an atom of an element is $1.1 \times 10^6 \text{ m sec}^{-1}$. Its velocity in the third orbit is

- (A) $3.3 \times 10^6 \text{ m sec}^{-1}$ (B) $2.2 \times 10^6 \text{ m sec}^{-1}$ (C) $7.333 \times 10^5 \text{ m sec}^{-1}$
(D) $3.666 \times 10^5 \text{ m sec}^{-1}$

(31) The compound which **does not react** with bromine easily at room temperature is

- (A) phenol (B) 2-butyne (C) chlorobenzene (D) 1-pentene

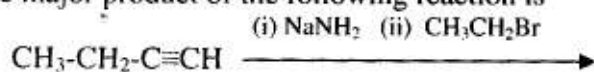
(32) The oxidation number and co-ordination number of chromium in complex ion

$[\text{Cr}(\text{C}_2\text{O}_4)_2(\text{H}_2\text{O})_2]^-$ are

- (A) 3,6 (B) 2,6 (C) 2,8 (D) 3,8

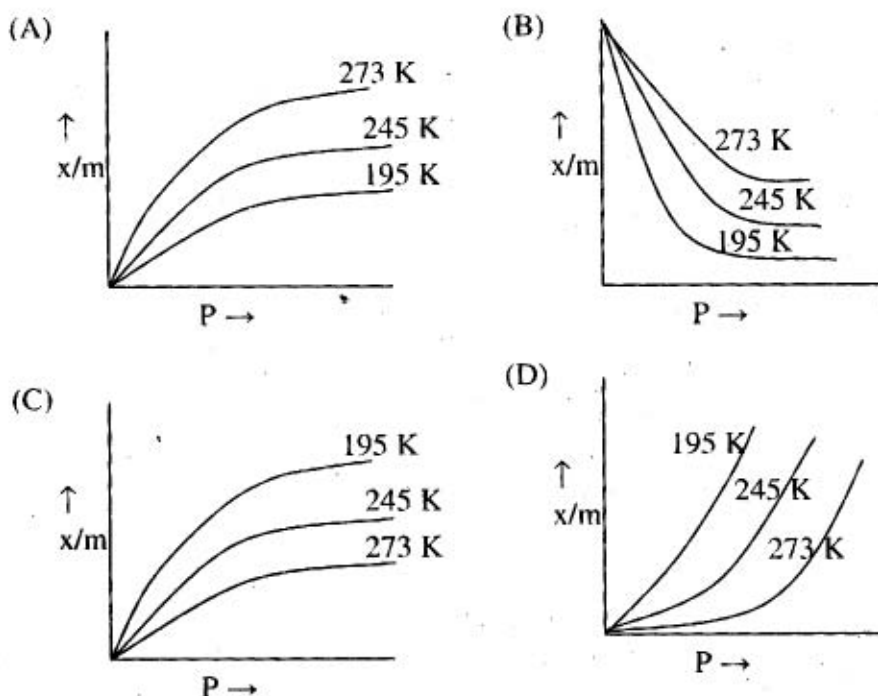
- (33) The change in hybridization of aluminum when Al_2Cl_6 decomposes in the gas phase is
 (A) $sp^2 \rightarrow sp^3$ (B) $sp \rightarrow sp^2$ (C) $sp \rightarrow sp^3$ (D) $sp^3 \rightarrow sp^2$
- (34) The molarity of 20% w/w sulphuric acid of density 1.14g cm^{-3} is
 (A) 2.32 (B) 2.02 (C) 2.12 (D) 2.22
- (35) The pH of a solution made by mixing 200 mL of 0.0657M NaOH, 140 mL of 0.107M HCl and 160 mL of water is
 (A) 3.04 (B) 2.43 (C) 2.74 (D) 2.27
- (36) An inorganic bromide impurity in a sample is precipitated as silver bromide. 2.00g of the sample required 6.4 mL of 0.20 M AgNO_3 to completely precipitate the impurity. The mass percentage of the impurity is
 (A) 5.11 (B) 2.56 (C) 9.15 (D) 1.28

- (37) The major product of the following reaction is



- (A) $\text{H}_3\text{C-CH}_2\text{-C}\equiv\text{C-CH}_2\text{-CH}_3$ (B) $\text{H}_3\text{C-CH(CH}_2\text{CH}_3\text{)-C}\equiv\text{CH}$
- (C) $\text{H}_3\text{C-CH}_2\text{-CH(NH}_2\text{)-CH}_3$ (D) $\text{H}_3\text{C-CH}_2\text{-C}\equiv\text{C-NH}_2$
- (38) The compound which can act as an oxidizing agent as well as a reducing agent is
 (A) HNO_2 (B) HI (C) HCN (D) HCOOH
- (39) The sum of all the quantum numbers of hydrogen atom is
 (A) -1 (B) 0 (C) $+1/2$ (D) $3/2$
- (40) The bond having the highest bond energy is
 (A) C=C (B) C=S (C) C=O (D) P=N
- (41) Adding powdered Pb and Fe to a solution containing 1M each of Pb^{2+} and Fe^{2+} ions would result in the formation of - ($E^0_{\text{Pb}^{2+}/\text{Pb}} = -0.126\text{V}$ and $E^0_{\text{Fe}^{2+}/\text{Fe}} = -0.44\text{V}$)
 (A) more of Pb and Fe^{2+} ions
 (B) more of Fe and Pb^{2+} ions
 (C) more of Pb and Fe
 (D) more of Pb^{2+} and Fe^{2+} ions
- (42) The formal charge on the sulphur atom in the structure given below is
 $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-SO-CH}_3$
 (A) 0 (B) +1 (C) -1 (D) +2

- (43) The number of transition state/s and intermediate/s in a unimolecular nucleophilic substitution reaction are respectively -
 (A) 3,1 (B) 2,2 (C) 2,1 (D) 1,1
- (44) Cyclohexanone oxime is converted into ϵ -caprolactam by the treatment with
 (A) dil HCl (B) NaOC_2H_5 (C) ammonia (D) conc H_2SO_4
- (45) Freundlich adsorption isotherms are properly represented as in



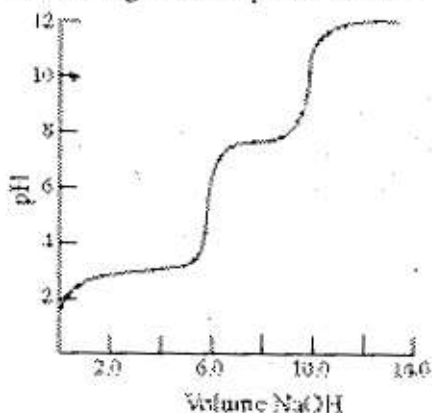
- (46) The cell $\text{Al}_{(s)} | \text{Al}^{3+}_{(aq)} (0.001\text{M}) || \text{Cu}^{2+}_{(aq)} (0.10\text{M}) | \text{Cu}_{(s)}$ has a standard cell potential, $E^{\circ} = 2.00\text{V}$ at 25°C . The cell potential at the given concentrations will be
 (A) 2.07V (B) 2.03V (C) 1.97V (D) 1.94V
- (47) Ethylene undergoes polymerization to polyethylene. The monomer/s of the following polymer is/are
 $(-\text{CH}_2-\text{CH}(\text{OCOCH}_3)-\text{CH}_2-\text{CH}(\text{OCOCH}_3)-)_n$
 (A) $\text{CH}_2=\text{CH}-\text{OH} + \text{CH}_3\text{COCl}$ (B) $\text{CH}_2=\text{CH}-\text{COOCH}_3$
 (C) $\text{CH}_2=\text{CH}-\text{OCOCH}_3$ (D) $\text{CH}=\text{C}-\text{OCOCH}_3$
- (48) Though proteins have a range of molecular weights and different compositions, the percentage of carbon in any protein is
 (A) 50-55% (B) 40-45% (C) 60-65% (D) 70-75%
- (49) The mass of copper deposited when a current of 10A is passed through a solution of copper(II) nitrate for 30.6s is

- (A) 0.101g (B) 0.201g (C) 0.403g (D) 6.04g
- (50) The correct order of acidity of the following compounds is
 (I) CH_3COOH (II) ClCH_2COOH (III) $\text{O}_2\text{NCH}_2\text{COOH}$ (IV) HOCH_2COOH
 (A) $\text{IV} > \text{II} > \text{III} > \text{I}$ (B) $\text{I} > \text{IV} > \text{II} > \text{III}$ (C) $\text{II} > \text{III} > \text{I} > \text{IV}$ (D) $\text{III} > \text{II} > \text{IV} > \text{I}$
- (51) Maximum number of moles of barium phosphate formed when 0.9 mole of barium chloride is mixed with 0.4 mole of sodium phosphate is
 (A) 0.2 (B) 0.4 (C) 0.9 (D) 1.3
- (52) The internal energy change involved when a system goes from state A to state B is 40kJ. If the system goes from A to B by a reversible path and returns to A by an irreversible path, the net change in internal energy is
 (A) 40kJ (B) $> 40\text{kJ}$ (C) $< 40\text{kJ}$ (D) zero
- (53) The molarity of NH_3 solution of pH 12.0 at 25°C is (K_b of NH_3 at 25°C is 1.8×10^{-5})
 (A) 0.55 M (B) 5.5 M (C) 0.01M (D) 11.7 M
- (54) The highest magnetic moment is shown by a transition metal ion with the outer electronic configuration
 (A) $3d^2$ (B) $3d^5$ (C) $3d^7$ (D) $3d^9$
- (55) A ring system is aromatic if it is planar, has cyclic closed conjugation and has $(4n+2)\pi$ electrons delocalized over the ring. Here n is
 (A) number of rings (B) an integer including zero (C) an integer except zero
 (D) number of π -bonds
- (56) For the following reaction, the value of K changes with
 $\text{N}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2 \text{NO}(\text{g}) \quad \Delta H = + 180 \text{ kJ mol}^{-1}$
 (A) change in pressure (B) change in concentration of oxygen
 (C) introduction of $\text{NO}(\text{g})$ (D) change in temperature
- (57) The part of a DNA molecule responsible for the absorption of UV light is
 (A) Deoxyribose (B) Nitrogen base
 (C) Phosphodiester bond (D) Phosphate group
- (58) A weak acid HA has $K_a 1.00 \times 10^{-5}$ at 25°C . If 0.100 mole of this acid is dissolved in 1L water, the percentage of the acid dissociated at equilibrium will be closest to
 (A) 0.100% (B) 99.0% (C) 1.00% (D) 99.9%
- (59) Thorium -232 loses a total of 6α particles and 4β particles in a decay process. The isotope produced at the end is
 (A) ${}^{208}_{78}\text{Pt}$ (B) ${}^{208}_{82}\text{Pb}$ (C) ${}^{202}_{78}\text{Pt}$ (D) ${}^{208}_{83}\text{Bi}$

- (60) Ethyl phenyl ether is treated with conc HI at 0°C and the mixture of products is treated with thionyl chloride. The products formed are-
- (A) Ethanol + Chlorobenzene (B) Phenol + Iodoethane
(C) Iodoethane + Chlorobenzene (D) Chloroethane + Phenol
- (61) The correct order of the size of the species is
- (A) $\text{Ca}^{2+} < \text{Ar} < \text{K}^{+} < \text{Cl}^{-}$
(B) $\text{Ca}^{2+} < \text{K}^{+} < \text{Ar} < \text{S}^{2-}$
(C) $\text{K}^{+} < \text{Ar} < \text{Cl}^{-} < \text{S}^{2-}$
(D) $\text{Ar} < \text{Ca}^{2+} < \text{K}^{+} < \text{Cl}^{-}$
- (62) Pure germanium is an example of –
- (A) an intrinsic semiconductor (B) a n-type semiconductor
(C) a p-type semiconductor (D) a n-p type semiconductor
- (63) A nonapeptide in rat on hydrolysis gave the following identifiable tripeptides: Gly-Ala-Phe, Ala-Leu-Val, Gly-Ala-Leu, Phe-Glu-His, and His-Gly-Ala. The sequence in the nonapeptide is
- (A) Gly-Ala-Leu-Val- Phe-Glu-His- His-Gly
(B) Ala-Phe-Leu-Val- Gly-Leu- Phe-Glu-His
(C) Gly-Ala-Phe-Glu-His-Gly-Ala-Leu-Val
(D) Phe- Ala-Leu-Val- Gly-Glu-His-Gly-Ala
- (64) The enthalpy of formation of carbon dioxide and water are -395kJ and -285kJ , respectively, and the enthalpy of combustion of acetic acid is -869kJ . Hence the enthalpy of formation of acetic acid is
- (A) 235kJ (B) -235kJ (C) 420kJ (D) 491kJ
- (65) The complex that exhibits co-ordination isomerism is
- (A) $[\text{Cr}(\text{NCS})(\text{H}_2\text{O})_5]^{2+}$ (B) $[\text{Cr}(\text{NH}_3)_6]\text{Cl}_3$
(C) $[\text{Cr}(\text{NH}_3)_6][\text{Co}(\text{CN})_6]$ (D) $[\text{CoCl}_2(\text{NH}_3)_4]\text{Cl}\cdot\text{H}_2\text{O}$
- (66) The solubility of a salt MX is $3.60 \times 10^{-5} \text{ mol dm}^{-3}$. The K_{sp} of MX is
- (A) 3.60×10^{-5} (B) 12.96×10^{-10} (C) 7.20×10^{-5} (D) 1.80×10^{-10}
- (67) The correct order of increasing first ionization energy is
- (A) $\text{Ca} < \text{K} < \text{Ne} < \text{P} < \text{F}$
(B) $\text{F} < \text{Ca} < \text{Ne} < \text{P} < \text{K}$
(C) $\text{K} < \text{Ca} < \text{P} < \text{F} < \text{Ne}$
(D) $\text{Ne} < \text{F} < \text{P} < \text{Ca} < \text{K}$
- (68) The strong field ligand is
- (A) SCN^{-} (B) NO_2 (C) I^{-} (D) S^{2-}

- (69) When an inert atmosphere is required in metallurgical operation nitrogen is commonly used. However in the extraction of titanium from TiCl_4 using magnesium, helium is used as nitrogen reacts with
- TiCl_4 to form titanium nitride
 - magnesium to form magnesium nitride
 - titanium to form titanium nitride
 - chlorine to form nitrogen chloride which inhibits the reaction
- (70) If the size of a gene is 1000kD, the approximate molecular weight of the corresponding mRNA is
- 250kD
 - 500kD
 - 1000kD
 - 2000kD

- (71) The following curve represents the titration of



- a diprotic acid
 - two monoprotic acids with the same K_a , but different concentrations
 - two monoprotic acids with different K_a , but the same concentration
 - two monoprotic acids with different K_a , and different concentrations
- (72) The formation of ammonia from nitrogen and hydrogen gases can be written by the following two equations
- $\frac{1}{2}\text{N}_2(\text{g}) + \frac{3}{2}\text{H}_2(\text{g}) \rightleftharpoons \text{NH}_3(\text{g})$
 - $\frac{1}{3}\text{N}_2(\text{g}) + \text{H}_2(\text{g}) \rightleftharpoons \frac{2}{3}\text{NH}_3(\text{g})$

The two equations have equilibrium constants K_1 and K_2 , respectively. The relationship between the equilibrium constants is

- $K_1 = K_2^2$
 - $K_1^3 = K_2^2$
 - $K_1^{2/3} = K_2$
 - $K_1 = K_2^{3/2}$
- (73) The largest number of molecules are present in
- 70g of Sulphur dioxide
 - 64g of Nitrogen pentoxide
 - 36g of Water
 - 34g of Carbon dioxide

- (74) For a first order reaction, the half-life $t_{(1/2)}$ is related to the rate constant (k) by the relation
- (A) $t_{(1/2)} = \frac{2.303}{k} \log 2$ (B) $t_{(1/2)} = \frac{1}{k}$
- (C) $t_{(1/2)} = \frac{k}{2.303} \log 2$ (D) $t_{(1/2)} = \frac{2.303}{k}$
- (75) A mixture of two liquids which boils without change in composition is called
- (A) Stable mixture
 (B) Binary liquid mixture
 (C) Azeotropic mixture
 (D) Zerotropic mixture
- (76) The aqueous solution having osmotic pressure nearest to that of an equimolar solution of $K_4[Fe(CN)_6]$ is
- (A) K_2SO_4 (B) Na_3PO_4 (C) $Al_2(SO_4)_3$ (D) $C_6H_{12}O_6$
- (77) For the reaction $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$
 Which of the following is correct ?
- (A) $\Delta H = \Delta E$ (B) $\Delta H > \Delta E$
 (C) $\Delta H < \Delta E$ (D) $\Delta H = 2\Delta E$
- (78) A gold sol is prepared by
- (A) dissolving gold in Aqua-regia and precipitation by dilution
 (B) double decomposition of $AuCl_3$
 (C) Bredy's arc method
 (D) grinding in a colloidal mill
- (79) The rate constants k_1 and k_2 of two reactions are in the ratio 2:1. The corresponding energies of activation of the two reactions will be related by
- (A) $E_1 > E_2$ (B) $E_1 < E_2$ (C) $E_1 = E_2$ (D) $E_1 = 2E_2$
- (80) The correct statement about order of reaction is
- (A) it can be predicted from the stoichiometric coefficients of the reactants
 (B) it has always positive integral values
 (C) it has always positive integral or fractional values
 (D) it has to be determined experimentally

Antilogarithms

	Mean Differences									
	0	1	2	3	4	5	6	7	8	9
-00	1000	1002	1005	1007	1009	1012	1014	1016	1019	1021
01	1023	1026	1028	1030	1033	1035	1038	1040	1042	1045
02	1047	1050	1052	1054	1057	1059	1062	1064	1067	1069
03	1071	1074	1076	1079	1081	1084	1086	1088	1091	1094
04	1096	1099	1102	1104	1107	1109	1112	1114	1117	1119
05	1122	1125	1127	1130	1132	1135	1138	1140	1143	1146
06	1148	1151	1153	1156	1159	1161	1164	1167	1169	1172
07	1175	1178	1180	1183	1186	1189	1191	1194	1197	1199
08	1202	1205	1208	1211	1213	1216	1219	1222	1225	1227
09	1230	1233	1236	1239	1242	1245	1247	1250	1253	1256
10	1259	1262	1265	1268	1271	1274	1276	1279	1282	1285
11	1288	1291	1294	1297	1300	1303	1306	1309	1312	1315
12	1316	1321	1324	1327	1330	1334	1337	1340	1343	1346
13	1349	1352	1355	1358	1361	1365	1368	1371	1374	1377
14	1380	1384	1387	1390	1393	1396	1400	1403	1406	1409
15	1413	1416	1419	1422	1426	1429	1432	1435	1438	1442
16	1445	1449	1452	1456	1459	1462	1466	1469	1472	1476
17	1479	1483	1486	1489	1493	1496	1500	1503	1507	1510
18	1514	1517	1521	1524	1528	1531	1535	1538	1542	1545
19	1549	1552	1556	1560	1563	1567	1570	1574	1578	1581
20	1585	1589	1592	1596	1600	1603	1607	1611	1614	1618
21	1622	1626	1629	1633	1637	1641	1644	1648	1652	1656
22	1660	1663	1667	1671	1675	1679	1684	1687	1690	1694
23	1698	1702	1706	1710	1714	1718	1722	1726	1730	1734
24	1738	1742	1746	1750	1754	1758	1762	1766	1770	1774
25	1778	1782	1786	1791	1795	1798	1803	1807	1811	1815
26	1820	1824	1828	1832	1837	1841	1845	1849	1854	1858
27	1862	1866	1871	1875	1879	1884	1888	1892	1897	1901
28	1905	1910	1914	1919	1923	1928	1932	1936	1941	1945
29	1950	1954	1959	1963	1968	1972	1977	1982	1986	1991
30	1995	2000	2004	2009	2014	2018	2023	2028	2032	2037
31	2042	2046	2051	2056	2061	2065	2070	2075	2080	2084
32	2089	2094	2099	2104	2109	2113	2118	2123	2128	2133
33	2138	2143	2148	2153	2158	2163	2168	2173	2178	2183
34	2188	2193	2198	2203	2208	2213	2218	2223	2228	2234
35	2239	2244	2249	2254	2259	2265	2270	2275	2280	2286
36	2291	2296	2301	2307	2312	2317	2323	2328	2333	2339
37	2344	2350	2355	2360	2366	2371	2377	2382	2388	2393
38	2398	2404	2410	2415	2421	2427	2432	2438	2443	2449
39	2455	2460	2466	2472	2477	2483	2489	2495	2500	2506
40	2512	2518	2523	2529	2535	2541	2547	2553	2559	2564
41	2570	2576	2582	2588	2594	2600	2606	2612	2618	2624
42	2630	2636	2642	2648	2655	2661	2667	2673	2679	2685
43	2692	2698	2704	2710	2716	2723	2729	2735	2742	2748
44	2754	2761	2767	2773	2780	2786	2793	2799	2805	2812
45	2818	2825	2831	2838	2844	2851	2858	2864	2871	2877
46	2884	2891	2897	2904	2911	2917	2924	2931	2938	2944
47	2951	2958	2965	2972	2979	2985	2992	2999	3006	3013
48	3020	3027	3034	3041	3048	3055	3062	3069	3076	3083
49	3090	3097	3105	3112	3119	3126	3133	3141	3148	3155

Antilogarithms

Mean	Mean Differences									
	0	1	2	3	4	5	6	7	8	9
60	3162	3170	3177	3184	3192	3199	3206	3214	3221	3228
61	3236	3243	3251	3258	3266	3273	3281	3289	3296	3304
62	3311	3319	3327	3334	3342	3350	3357	3365	3373	3381
63	3388	3396	3404	3412	3420	3428	3436	3444	3452	3460
64	3467	3475	3483	3491	3499	3508	3516	3524	3532	3540
65	3548	3556	3565	3573	3581	3589	3597	3606	3614	3622
66	3631	3639	3648	3656	3664	3673	3681	3690	3698	3707
67	3715	3724	3733	3741	3750	3758	3767	3776	3784	3793
68	3802	3811	3819	3828	3837	3846	3855	3864	3873	3882
69	3890	3899	3908	3917	3926	3935	3944	3953	3962	3971
70	3980	3989	3998	4007	4016	4025	4034	4043	4052	4061
71	4071	4080	4089	4098	4107	4116	4125	4134	4143	4152
72	4162	4171	4180	4189	4198	4207	4216	4225	4234	4243
73	4253	4262	4271	4280	4289	4298	4307	4316	4325	4334
74	4344	4353	4362	4371	4380	4389	4398	4407	4416	4425
75	4435	4444	4453	4462	4471	4480	4489	4498	4507	4516
76	4527	4536	4545	4554	4563	4572	4581	4590	4599	4608
77	4617	4626	4635	4644	4653	4662	4671	4680	4689	4698
78	4708	4717	4726	4735	4744	4753	4762	4771	4780	4789
79	4800	4809	4818	4827	4836	4845	4854	4863	4872	4881
80	4893	4902	4911	4920	4929	4938	4947	4956	4965	4974
81	4987	4996	5005	5014	5023	5032	5041	5050	5059	5068
82	5077	5086	5095	5104	5113	5122	5131	5140	5149	5158
83	5168	5177	5186	5195	5204	5213	5222	5231	5240	5249
84	5259	5268	5277	5286	5295	5304	5313	5322	5331	5340
85	5350	5359	5368	5377	5386	5395	5404	5413	5422	5431
86	5441	5450	5459	5468	5477	5486	5495	5504	5513	5522
87	5532	5541	5550	5559	5568	5577	5586	5595	5604	5613
88	5624	5633	5642	5651	5660	5669	5678	5687	5696	5705
89	5715	5724	5733	5742	5751	5760	5769	5778	5787	5796
90	5807	5816	5825	5834	5843	5852	5861	5870	5879	5888
91	5898	5907	5916	5925	5934	5943	5952	5961	5970	5979
92	5989	5998	6007	6016	6025	6034	6043	6052	6061	6070
93	6081	6090	6099	6108	6117	6126	6135	6144	6153	6162
94	6172	6181	6190	6199	6208	6217	6226	6235	6244	6253
95	6264	6273	6282	6291	6300	6309	6318	6327	6336	6345
96	6355	6364	6373	6382	6391	6400	6409	6418	6427	6436
97	6446	6455	6464	6473	6482	6491	6500	6509	6518	6527
98	6537	6546	6555	6564	6573	6582	6591	6600	6609	6618
99	6628	6637	6646	6655	6664	6673	6682	6691	6700	6709

CHEMISTRY

- | | | | | | | | |
|-----|---|-----|---|-----|---|-----|--------|
| 1. | b | 21. | c | 41. | a | 61. | b |
| 2. | d | 22. | c | 42. | b | 62. | a |
| 3. | c | 23. | a | 43. | c | 63. | c |
| 4. | a | 24. | b | 44. | d | 64. | d |
| 5. | b | 25. | d | 45. | c | 65. | c |
| 6. | d | 26. | c | 46. | b | 66. | b |
| 7. | c | 27. | d | 47. | c | 67. | c |
| 8. | b | 28. | b | 48. | a | 68. | b |
| 9. | b | 29. | d | 49. | a | 69. | b |
| 10. | c | 30. | c | 50. | d | 70. | b |
| 11. | c | 31. | c | 51. | a | 71. | d |
| 12. | c | 32. | a | 52. | d | 72. | c or d |
| 13. | d | 33. | d | 53. | a | 73. | c |
| 14. | c | 34. | a | 54. | b | 74. | a |
| 15. | c | 35. | b | 55. | b | 75. | c |
| 16. | a | 36. | a | 56. | d | 76. | c |
| 17. | a | 37. | a | 57. | b | 77. | c |
| 18. | a | 38. | a | 58. | c | 78. | c |
| 19. | c | 39. | d | 59. | b | 79. | b |
| 20. | b | 40. | c | 60. | d | 80. | d |