Sample Question Paper
Chemistry
(313)

Time: 3 hr. **Maximum Marks: 80**

Note:

i. This question paper consists of 43 questions in all.
ii. All questions are compulsory.
iii. Marks are given against each question.
iv. Use log tables if necessary.
v. Section A consists of

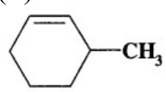
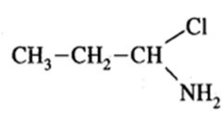
- **a. Q.No. 1 to 16** – Multiple Choice type questions (MCQs) carrying 1 mark each. Select and write the most appropriate option out of the four options given in each of these questions. An internal choice has been provided in some of these questions. You have to attempt only **one** of the given choices in such questions.
- **b. Q.No. 17 to 28** – Objective type questions. **Q.No. 17 to 28** carry 02 marks each (with 2 sub-parts of 1 mark each). Attempt these questions as per the instructions given for each of the questions 17 – 28.

v. **Section B** consists of

- **a. Q.No. 29 to 37** – Very Short questions carrying 02 marks each to be answered in the range of 30 to 50 words.
- **b. Q.No. 38 to 41** – Short Answer type questions carrying 03 marks each to be answered in the range of 50 to 80 words.
- **c. Q.No. 42 and 43** – Long Answer type questions carrying 05 marks each to be answered in the range of 80 to 120 words.

Part-A		
Q. No.	**Questions**	**Distribution of Marks**
<u>Q.No. 1 to 16</u> are the multiple choice questions of 1 mark each: *An internal choice has been provided in some of these questions. You have to attempt only **one** of the given choices in such questions.*		
1.	Which of the following is responsible for the mass of an atom? **A.** Only protons. **B.** Only neutrons. **C.** Neutrons and protons. **D.** Protons and electrons.	1
2.	Increasing order (lowest first) for the values of e/m (charge / mass) for electron (e), proton (p), neutron (n) and α-particle (α) is: **A.** e, p, n, α **B.** n, p, e, α **C.** n, p, α, e **D.** e, n, α, p	1
3.	(i) The ionization enthalpy of hydrogen atom is 1.312×10^6 J mol^{-1}. The energy required to excite the electron in the atom from n = 1 to n = 2 is? **A.** 8.51×10^5 J mol^{-1} **B.** 6.56×10^5 J mol^{-1} **C.** 7.56×10^5 J mol^{-1} **D.** 9.84×10^5 J mol^{-1} **OR** (ii) All noble gas molecules are………..	1

	A. Monoatomic **B.** Diatomic **C.** Triatomic **D.** Both I and II	
4.	How many number of orbitals could be present in the following set of quantum numbers, $n = 3, l = 1, m_l = 0$? **A.** 3 **B.** 1 **C.** 4 **D.** 2	1
5.	(i) The orientation of atomic orbitals is depending on their……… **A.** Spin quantum number **B.** Magnetic quantum number **C.** Azimuthal quantum number **D.** Principal quantum number **OR** (ii) The magnetic quantum number specifies? **A.** Size of orbitals **B.** Shape of orbitals **C.** Orientation of orbitals **D.** Nuclear Stability	1
6.	(i) A body of mass 10 mg is moving with a velocity of 100 ms^{-1}. The wavelength of de-Broglie wave associated with it would be? (Note: $h = 6.63 \times 10^{-34}$ Js) **A.** 6.63×10^{-37} m **B.** 6.63×10^{-31} m **C.** 6.63×10^{-34} m **D.** 6.63×10^{-35} m **OR** (ii) Nucleus contains………… % of the mass of the atom. **A.** 75 **B.** 18.9 **C.** 99.98 **D.** 100	1
7.	(i) The chemical formula of baking powder is————- **A.** $NaHCO_3$ **B.** Na_2CO_3 **C.** Na_2SO_4 **D.** $NaCl$ **OR** (ii) Which has the maximum electropositive character? **A.** Cu **B.** Cs **C.** Ba **D.** Cr	1
8.	Which of the following has square planar structure?	1

	A. $[NiCl_4]^{2-}$ **B.** $[Ni(CO)_4]$ **C.** $[Ni(CN)_4]^{2-}$ **D.** None of these	
9.	Mohr's salt is…………….. **A.** $Fe_2(SO_4)_3.(NH_4)2SO_4.6H_2O$ **B.** $FeSO_4.(NH_4)_2.SO_4.6H_2O$ **C.** $MgSO_4.7H_2O$ **D.** $FeSO_4.7H_2O$	1
10.	(i) Among the following alkenes: 1-butane (I), cis-2-butene (II), trans-2-butene (III), the decreasing order of stability is…………… **A.** III > II > I **B.** III > I > II. **C.** I > II > III **D.** II > I > III **OR** (ii) The I.U.P.A.C. name of…………………  **A.** 3-Methyl cyclohexene **B.** 1-methyl cylohex-2-ene. **C.** 6-methyl cyclohexene **D.** 1-methyl cyclohex5-ene.	1
11.	(i) When $CH_3CH_2CHCl_2$ is treated with $NaNH_2$, the product is………… **A.** $CH_3 - CH - CH_2$ **B.** $CH_3 - C \equiv CH$ **C.** $CH_3CH_2CH\ (NH_2)_2$ **D.**  **OR** (ii) The treatment of benzene with isobu.ene in the presence of sulphuric acid gives…………….. **A.** Isobutyl benzene **B.** Tert-butyl benzene **C.** n-Butyl benzene **D.** No reaction	1
12.	(i) When phenol is treated with excess bromine water it gives………. **A.** m-bromophenol **B.** o- and p-bromophenol **C.** 2,4-dibromophenol **D.** 2,4,6-tribromophenol **OR** (ii) Dehydration of alcohol is an example of……………… **A.** addition reaction **B.** elimination reaction **C.** substitution reaction	1

	D. redox reaction	
13.	Ester is formed by a reaction between………… **A.** An acid and an alcohol **B.** An acid and a base **C.** An alkane and an alcohol **D.** A ketone and an alcohol	1
14.	Which of the following compounds is not prepared by Sandmeyer's reaction? **A.** Chlorobenzene **B.** Iodobenzene **C.** Benzene nitrile **D.** Bromobenzene	1
15.	(i) The functional group which is found in amino acids is **(A)** COOH **(B)** $-NH_2$ **(C)** $-CH_3$ **(D)** Both (A) and (B). **OR** (ii) The vitamins absorbed from intestine along with fats are **A.** A and D **B.** A, B **C.** A, C **D.** D, B	1
16.	The protein responsible for blood clotting is **A.** Albumins **B.** Globulins **C.** Fibroin **D.** Fibrinogen	1

<u>Q. No. 17 to 28</u> are the objective types questions of 2 mark each:
An internal choice has been provided in some of these questions.

17.	Complete the following by given options below: ***(Out of four attempt any two)*** *(Chalgogens, Rhombic sulphur, pale blue, diatomic, dioxygen and ozone, Oxyacetylene, Suffocating, Sulphurdioxide)* 1. Elements belonging group 16 are called ………… 2. Under ordinary condition oxygen exists as a …………. gas. 3. Allotrophic form of oxygen is …………. and ………… 4. Pure ozone is …………. gas.	1×2=2
18.	**Read the passage given below and answer the following questions:** The Chemistry teacher was explaining the properties of two hydrides of Sulphur and Oxygen: H_2S and H_2O. H_2S and H_2O are having same hybridization states but different bond angles. H_2S have indefinite volume while H_2O has definite volume. H_2S cannot be placed in an open container but H_2O can be placed due to their different physical states. (***Out of four attempt any two)*** 1. Write the hybridization states of central atom in H_2S and H_2O. 2. What are the physical states of H_2S and H_2O? 3. Write bond angle of H_2O. 4. Draw the Lewis structures of both the hydrides.	1×2=2

19.	**Write TRUE (T) for correct statement and FALSE (F) for incorrect statements:** ***(Out of four attempt any two)*** 1. Ionic bond involves a transfer of electrons whereas covalent bond involves sharing of electrons. 2. Formation of dative bond involves only transfer of electrons from donor to acceptor. 3. The term chemical bond does not express the existence of strong forces of attraction between the atoms. 4. The formation of a chemical involves an increase in the potential energy of the system.	1×2=2
20.	**Complete the following by given options below:** ***(Out of four attempt any two)*** *(nucleus, 20, 21, 11, 12, 23, mass number, atomic number)* 1. The number of protons in the nucleus of an atom is called its .... 2. The total number of protons and neutrons in the nucleus of an atom is called its .... 3. An atom has atomic mass number 23 and atomic number 11. The atom has .... electrons. 4. An atom of an element has 11 protons, 11 electrons and 12 neutrons. The atomic mass of the atom is	1×2=2
21.	**Complete the following by given options below:** ***(out of four attempt any two)*** *(absence of d - orbital, $CaOCl_2$, paramagentic , diamagnetic, N_2O_5, Dibasic, BiF_4, CaO)* 1. Due to ____ , nitrogen does not from pentahalides. 2. In the gaseous state, nitric oxide is ____ but in the liquid state it is ____. 3. _____ is formed on dehydration of HNO_3 by P_4O_{10} 4. H_3PO_3 is a _______acid.	1×2=2
22.	**Read the passage given below and answer the following questions:** At a sweet shop in Hyderabad, Rishi bought some sweets. He requested the sales boy to put the sweets in a polythene bag. The sales boy refused to do so; instead he kept the sweet box in a paper bag. ***(Out of four attempt any two)*** 1. Why did the sales boy refuse to put the sweet box in a polythene bag? 2. As a student of chemistry, why would you advocate the use paper bags instead of polythene bags? 3. Give a use of biodegradable polymer. 4. Which of the following is a natural polymer? ***Buna-S, Proteins, PVC***	1×2=2
23.	**Read the passage given below and answer the following questions:**	1×2=2

The f-block elements are those in which the differentiating electrons enters the (n-2)f orbitals. There are two series of f-Block elements corresponding to filling of 4f and 5f-orbitals. The series of 4f-orbitals is called lanthanides. Lanthanides show different oxidation states depending upon stability of f^0, f^7 and f^{14} configurations, though the most common oxidation states are +3. There is a regular decrease in the size of lanthanides ions with increase in atomic number which is known as lanthanides contraction.

The following questions are multiple choice questions. Choose the most appropriate answer: ***(Out of four attempt any two)***

1. The atomic number of three lanthanides elements X, Y and Z are 65, 68 and 70 respectively, their Ln^{3+} electronic configuration is

(a) $4f^8$, $4f^{11}$, $4f^{13}$

(b) $4f^{11}$, $4f^8$, $4f^{13}$

(c) $4f^0$, $4f^2$, $4f^{11}$

(d) $4f^3$, $4f^7$, $4f^9$

2. Lanthanide contraction is observed in........

(a) Gd

(b) At

(c) Xe

(d) Te

3. Identify the incorrect statement among the following.

(a) Lanthanide contraction is the accumulation of successive shrinkages.

(b) As a result of lanthanide contraction, the properties of 4d series of the transition elements have no similarities with the 5d series of elements.

(c) Shielding power of 4f electrons is quite weak.

(d) There is a decrease in the radii of the atoms or ions proceeds from La to Lu.

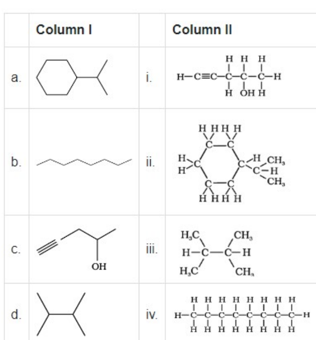
4. People residing near villages have a tendency to dispose waste in water A person was disposing mercury cells in water. A student Raju, asked the person not to do so.

(a)What are the harmful effects of mercury?

(b)What values are associated with the above discussion?

24. Match the item in column I with Column II — 2

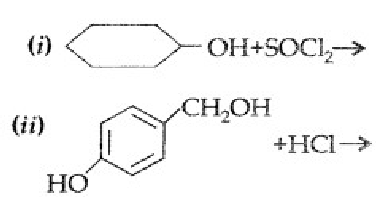
(All question are compulsory)



Identify the right option given below:

1. a-ii; b-iv; c-i, d-iii
2. a-iii; b-iv; c-ii, d-i
3. a-iv; b-iii; c-i, d-ii
4. a-i; b-iv; c-ii, d-iii

25.	Complete the following reactions: ***(Out of four attempt any two)*** (i) $CH_3CH_2CH_2CHO \xrightarrow{Pd/H_2/Ni}$ (ii) $CH_3CH=CHCH_2OH \xrightarrow{PCC}$ (iii) $CH_3CH=CH_2 \xrightarrow[(2)\ 3H_2O_2/OH^-]{(1)\ B_2H_6}$ (iv) $C_6H_5OH \xrightarrow[(2)\ CO_2,H^+]{(1)\ Aq.NaOH}$	1×2=2
26.	**Read the passage given below and answer the following questions:** Two students Prakhar and Pragati were discussing the allotropes of carbon. Prakhar asked Pragati, why one allotrope of carbon is very hard to use to make jewellery meanwhile Pragati told Prakhar that the other allotrope of carbon is a good conductor and used to make pencils. ***(Out of four attempt any two)*** 1. Name the above two allotropes of carbon. 2. Why one allotrope is conductor and other is not? 3. Name the allotrope used to make pencil. 4. What values are associated with these allotropes?	1×2=2
27.	**Write TRUE (T) for correct statement and FALSE (F) for incorrect statements:** ***(Out of four attempt any two)*** 1. An element is a pure substance that contains only one type of atom. 2. Pure gold is made up of 3 kinds of atoms. 3. If a scientist breaks up a sample of a substance she would find many of the same type of atoms. 4. Elements are made when atoms are combined.	1×2=2
28.	**Read the passage given below and answer the questions given-** Soaps are cleansing agents and find application in daily life. They may be sodium or potassium salts of esters of fatty acids. Large varieties of soaps are available in market right from bathing soaps to washing to shaving, to laundry etc. We also have perfumed ones, medicated ones, soap powders& liquid soaps. Detergents are much in vogue these days and get preference over soaps because they work well in hard water. Synthetic detergents are classified into three categories- anionic, cationic, and nonionic. Each category has got specific use. Detergents with straight chain hydrocarbons are preferred over branched chain as the latter are non-biodegradable, cause foaming in water bodies even though they are subjected to effluent treatment, thus leading to water pollution. ***(Out of four attempt any two)*** 1. Why do detergents work well in hard water? 2. Name the compound added to give antiseptic property to soap. 3. Sodium laurylsulphate is a _____________ detergent. 4. Liquid dish washing detergents are example of __________ detergent.	1×2=2

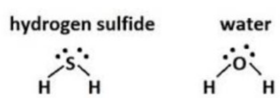
Q. No.	Questions	Distribution of Marks
	Section-B	
	<u>Q.No. 29 to 43</u> are the subjective types questions: *An internal choice has been provided in some of these questions.*	
29.	(i) Explain the terms: a) buffer capacity b) buffer index **OR** (ii) Define freezing point and boiling point.	2
30.	Explain the relationship between enthalpy and spontaneity of a reaction?	2
31.	(i) Two litres of an ideal gas at a pressure of 10 atm expands isothermally into a vacuum until its total volume is 10 liters. How much heat is absorbed and how much work is done in the expansion? **OR** (ii) Which of the following will increase the internal energy of a system and why? (a) Heat given to the system (b) Work done by the system	2
32.	(i) Why we usually study enthalpy change and not internal energy change? **OR** (ii) Comment on the bond energies of four C-H bonds in CH4.	2
33.	Explain neutralization reaction according to Arrhenius theory.	2
34.	What is the effect of adding a catalyst on (a) Activation energy (Ea), and (b) Gibbs energy (AG) of a reaction?	2
35.	(i) Why is Bi(v) a stronger oxidant than Sb(v)? **OR** **(ii)** Draw the structure of XeF2 molecule.	
36.	How would you obtain ethane-1, 2-diol from ethanol?	2
37.	Complete the following reaction equations:  	2
38.	Define the following terms : A. Mole fraction B. Isotonic solutions C. Van't Hoff factor	3

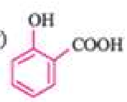
39.	**(i)** How can you remove the hard calcium carbonate layer of the egg without damaging its semipermeable membrane? Can this egg be inserted into a bottle with a narrow neck without distorting its shape? Explain the process involved. **OR** **(ii)** Calculate the molarity of each of the following solutions: (a) 30 g of $Co(NO_3)26H_2O$ in 4·3 L of solution. (b) 30 mL of 0-5 M H_2SO_4 diluted to 500 mL.	3
40.	Explain how the $[H^+]$ or $[OH^-]$ concentration decides a solution as acidic, neutral, or alkaline.	3
41.	(i) What is the cause of anomalous behaviour of the top element in each group of the p-block elements? **OR** (ii) Comment on the nature (ionic/covalent) of the hydrides of the p-block elements.	3
42.	(i) Answer the following: B. Write the IUPAC name of the complex $[Cr(NH_3)_4Cl_2]$ Cl. C. What type of Isomerism is exhibited by the complex $[Co(en)_3]^{3+}$? (en = ethane-1, 2-diamine) D. Why is $[Ni(Cl)_4]^{2-}$ paramagnetic but $[Ni(CO)_4]$ is diamagnetic? (At. No.: Cr = 24, Co = 27, Ni = 28) **OR** (ii)Explain the types of hybridization and magnetic behaviour of the following complexes on the basis of VB theory: (a) $[Fe(CN)_6]^{4-}$ (b) $[Cr(NH_3)_6]^{2+}$ (c) $[Fe(CN)_6]^{3-}$ (d) $[NiCl_4]^{2-}$ (e) $Ni(CO)_4$	5
43.	(i)What are the difference between α-glucose and β-glucose? What is meant by the pyranose structure of glucose? **OR** (ii) (A).Why water soluble vitamins must be supplied regularly in the diet? Give one example of it. (B).Differentiate between the following: (a). Essential and non-essential amino acids. (b).Fibrous and globular proteins.	5

Marking scheme
Chemistry
(313)

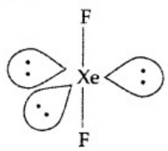
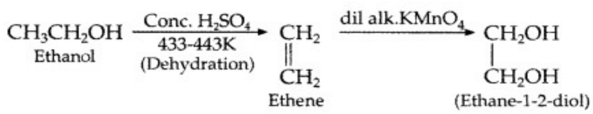
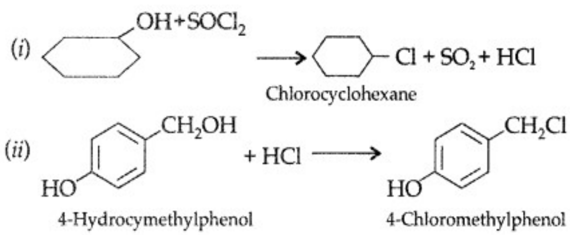
Time 3.00 hrs **Maximum Marks 80**

Part-A		
Q. No.	**Expected value points**	**Distribution of Marks**
1.	**D)** protons and electrons	1
2.	**D)** n, α, p, e	1
3.	**(i) D)** 9.84×10^{5} J mol^{-1} **OR** **(ii)**A) Monoatomic	1
4.	B) 1	1
5.	**(i)B)** Magnetic quantum number **OR** **(ii)C)** Orientation of orbitals	1
6.	**(i)B)** 6.63×10^{-31} m **OR** **(ii) C)** 99.98	1
7.	(i)A)$NaHCO_3$ **OR** **(ii)B)** Cs	1
8.	C)$[Ni(CN)_4]^{2-}$	1
9.	B)$FeSO_4.(NH_4)_2.SO_4.6H_2O$	1
10.	(i)A) III > II > I **OR** (ii)A) 3-Methyl cyclohexene	1
11.	(i) B)$CH_3 - C \equiv CH$ **OR** (ii)B) Tert-butyl benzene	1

12.	(i) D)2,4,6-tribromophenol **OR** (ii) B) elimination reaction	1
13.	A)An acid and an alcohol	1
14.	B)Iodobenzene	1
15.	(i)D) Both (A) and (B). **OR** (ii)A)A and D	1
16.	D)Fibrinogen	1
17.	1. Chalgogens 2. diatomic 3. dioxygen and ozone 4. pale blue	1×2=2
18.	1. Sp^3 in both cases (H_2O and H_2S) 2. H_2O is liquid while H_2S is a gas. 3. H_2O the bond angle is 104.5° 4. 	1×2=2
19.	1. TRUE 2. TRUE 3. TRUE 4. FALSE	1×2=2
20.	1. atomic number 2. mass number 3. 11 4. 23	1×2=2
21.	1. absence of d - orbital , 2. paramagentic , diamagnetic 3. N_2O_5 4. Dibasic	1×2=2

22.	1. Polythene is banned because of being non-degradable. 29. Use of polythene bags results in pollution as polythene is non-biodegradable value. 30. In packaging. 31. ***Proteins***	1×2=2
23.	1. (a) $4f^8$, $4f^{11}$, $4f^{13}$ 2. (a) Gd 3. (b) As a result of lanthanide contraction, the properties of 4d series of the transition elements have no similarities with the 5d series of elements. 4. **(a)** impaired neurological development, carcinogenic **(b)** Care for environment and mankind.	1×2=2
24.	3. a-iv; b-iii; c-i, d-ii	1×2=2
25.	(i) $CH_3CH_2CH_2CH_2OH$ (ii) $CH_3CH = CHCH_2 - OH$ (iii) $CH_3CH_2CH_2OH$ (iv) 	1×2=2
26.	1. Diamond and Graphite. 2. Graphite conducts electricity, due to delocalization of the pi bond electrons above and below the planes of the carbon atoms. 3. Graphite 4. To aware the types of allotropes and its use.	1×2=2
27.	1. TRUE 2. FALSE 3. TRUE 4. FLASE	1×2=2
28.	1. Calcium and magnesium salts of detergents are also soluble in water and does not form scum unlike soaps. 2. Bithionol, Dettol, Savlon. 3. Anionic 4. Nonionic 5. True 6. False	1×2=2

Q.No.	Section-B	Distribution of Marks
29.	(i)The buffer capacity is the ability of the buffer to resist changes in pH by the addition of small quantities of acid or base. The quantitative measure of buffer capacity is the buffer index. $\beta = \frac{dB}{d(pH)}$ **OR** (ii)The temperature at which a liquid boils at normal atmospheric pressure is its boiling point. The boiling point of water is 100^0C. Freezing point of a liquid is the temperature at which it freezes to solid at normal atmospheric pressure.	2
30.	Most of the exothermic reactions are spontaneous due to an increase in energy. Burning a substance is a spontaneous process. $C(s) + O_2(g) \rightarrow CO_2(g), \Delta H = -394 \text{ kJ mol}^{-1}$ Many spontaneous reactions start with the absorption of heat. Conversion of water into water vapour is an endothermic spontaneous reaction.	2
31.	(i)We have $q = -w = p_{ext}(10L - 2L) = 0 \times 8 = 0$ No. work is done; No heat is absorbed. **OR** (ii)The correct option is a. Heat given to the system will increase the internal energy of the system. Explanation: When we will give heat to the system internal energy will increase.	2
32.	(i)Most of the processes including reactions are carried out in open vessels at constant pressure. **OR** (ii)The bond energies of 1^{st}, 2^{nd}, 3^{rd} and 4^{th} C-H bonds are not equal and so average values are taken.	2
33.	Arrhenius acid + Arrhenius base = water + salt. When an Arrhenius acid reacts with an Arrhenius base, the products are usually water plus a salt. These reactions are also sometimes called neutralization reactions. $H^+_{(aq)} + Cl^-_{(aq)} + Na^+_{(aq)} + OH^-_{(aq)} \longrightarrow Na^+_{(aq)} + Cl^-_{(aq)} + H_2O_{(l)}$ OR $H^+_{(aq)} + OH^-_{(aq)} \longrightarrow H_2O_{(l)}$	2
34.	(a) On adding catalyst in a reaction, the activation energy reduces and rate of reaction is fastened. (b) A catalyst does not alter Gibbs energy (AG) of a reaction.	2

35.	(i)The stability of +5 oxidation state decreases and that of +3 state increases due to inert pair effect down the group therefore Bi(v) accepts two electrons and gets reduced to Bi (v). $Bi^{5+} + 2e^- \rightarrow Bi^{3+}$ **OR** (ii) XeF_2:  ***Shape :*** Linear	2
36.		2
37.		2
38.	A. **Mole fraction:** Mole fraction is the ratio of number of moles of one component to the total number of moles in a mixture. B. **Isotonic solution:** Two solutions having same osmotic pressure at a given temperature are called *Isotonic* solutions. C. **van't Hoff factor :** *van't Hoff* factor is expressed as : $i =$ normal molar mass /abnormal molar mass	3

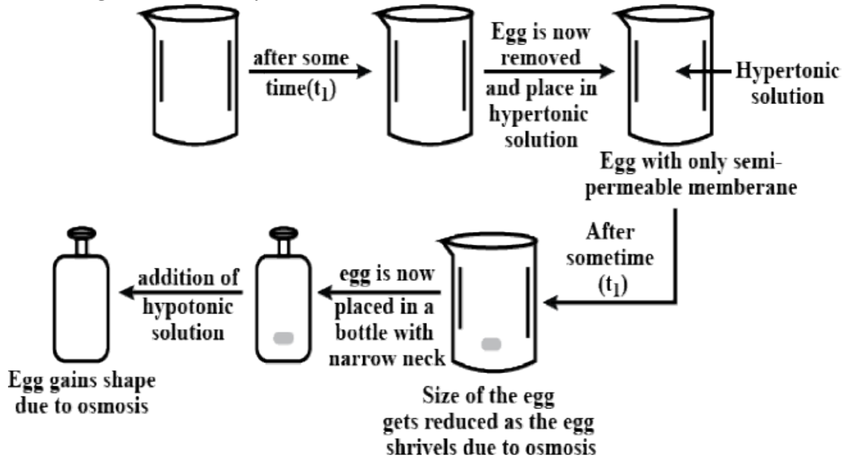
39.

(i)This can be achieved as under:

A. Place the egg in a mineral acid solution for about 2 hours. The outer shell of the egg dissolves.

B. Remove any portion of it is left with your fingers. Place the egg in a saturated solution (hypertonic) of sodium chloride for about 3 hours. Size of the egg is reduced as the egg shrivels due to osmosis.

C. Inert the egg in a bottle with a narrow neck. Add water to the bottle. Water will act as hypotonic solution; Egg regains shape due to osmosis. This is shown diagrammatically as under:-



OR

(ii)

(a) $$\text{Molarity of solution} = \frac{\text{Mass of solute / Molar mass of solute}}{\text{Volume of solution in litres}}$$

Mass of solute, $Co(NO_3)_2.6\ H_2O$ = 30 g.

Molar mass of solute, $Co(NO_3)_2.6H_2O = 59 + 2 \times 14 + 6 \times 16 + 6 \times 18 = 291\ g\ mol^{-1}$.

Volume of solution = 4·3 L

$$\text{Molarity (M)} = \frac{(30g)/(291g\ mol^{-1})}{(4{\cdot}3L)} = 0{\cdot}024\ mol\ L^{-1} = \mathbf{0{\cdot}024\ M}$$

(b) Volume of undiluted H_2SO_4 solution (V_1) = 30 mL

Molarity of undiluted H_2SO_4 solution (M_1) = 0·5 M

Volume of diluted H_2SO_4 solution (V_2) = 500 mL

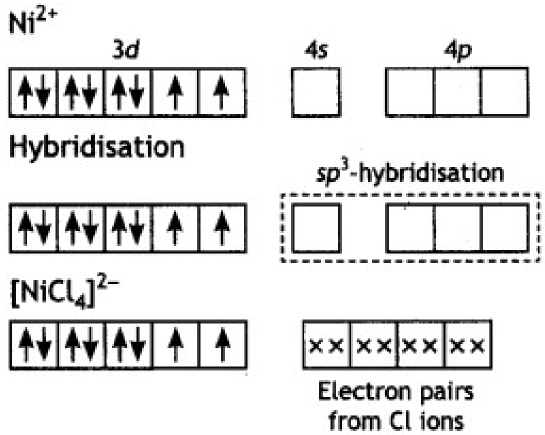
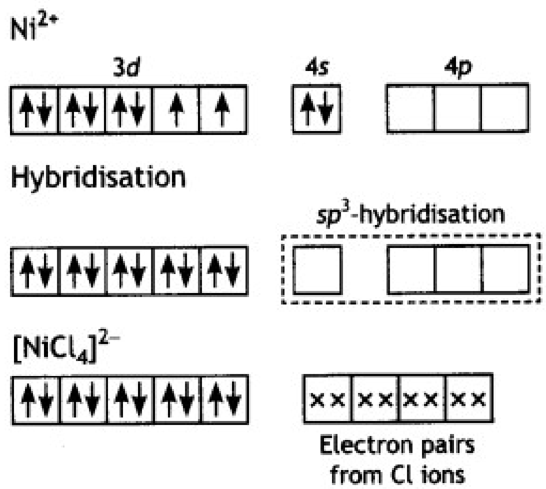
Molarity of diluted H_2SO_4 (M_2) can be calculated as :

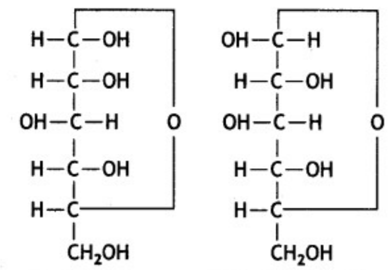
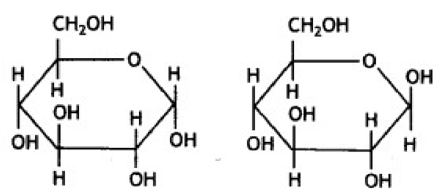
$$M_1V_1 = M_2V_2$$

or $$M_2 = \frac{M_1V_1}{V_2} = \frac{(30mL) \times (0{\cdot}5M)}{(500mL)} = \mathbf{0{\cdot}03\ M}$$

3

40.	In neutral solutions, $[H^+] = [OH^-] = 10^{-7}$ M. In acidic solutions, $[H^+] > [OH^-]$ or $[H^+] > 10^{-7}$ M; $[OH^-] < 10^{-7}$. In alkaline solutions, $[H^+] < [OH^-]$ or $[H^+] < 10^{-7}$ or $[OH^-] > 10^{-7}$. $[H^+]$ 10^{-0} 10^{-1} 10^{-2} 10^{-3} 10^{-4} 10^{-5} 10^{-6} (Acidic) $[H^+]$ 10^{-7} (neutral) $[H^+]$ 10^{-14} 10^{-13} 10^{-12} 10^{-11} 10^{-10} 10^{-9} 10^{-8} (alkaline) $[OH^-]$ 10^{-14} 10^{-13} 10^{-12} 10^{-11} 10^{-10} 10^{-9} 10^{-8} (acidic) $[OH^-]$ 10^{-7} (neutral) $[OH^-]$ 10^{-0} 10^{-1} 10^{-2} 10^{-3} 10^{-4} 10^{-5} 10^{-6} 10^{-7} (alkaline)	3
41.	(i)First member of each group of representative elements (i.e., s-and p- block elements) shows anomalous behaviour due to (i) small size (ii) Higher ionisation enthalpy (iii) higher electronegativity and (iv) absence of d- orbitals. In p- block elements, first member of each group has four orbitals, one 2s orbital and three 2 p orbitals in their valence shell. So, these elements show a maximum covalency of four while other members of the same group or different group show a maximum covalency beyond four due to the availability of vacant d - orbitals. **OR** (ii)Ionic and covalent nature of the hydrides can be explained on the basis of the reaction of hydrogen with the elements. Ionic and covalent nature of the hydrides can be explained on the basis of the reaction of hydrogen with the elements. Ionic hydrides are formed by the elements of s-block. Covalent hydrides are formed by the p-block elements as hydrogen shows reaction with similar electronegative elements like silicon etc. So, hydrides of p-block elements are covalent in nature.	3

42.	**A.** Tetraamminedichloridochromium (III) chloride. **B.** Optical isomerism **C.** In $[NiCl_4]^{2-}$ complexion, nickel is in +2 oxidation state and the configuration is $3d^8$. Since the molecule is tetrahedral, it involves sp^3 hybridisation as shown below:  The molecule is paramagnetic because it contains two unpaired electrons. In $[Ni(CO)_4]$, nickel is in O oxidation state and has the configuration $4s^2$ $3d^8$ or $3d^{10}$. The molecule is tetrahedral and involves sp^3-hybridisation as given below:  Each CO donates a pair of electrons forming four Ni—CO bond. The compound is diamagnetic since it contains no unpaired electron.	5

43.	(i) α-form and β-form of glucose differ in the orientation of -H and -OH groups around C, atom. The isomer having the -OH group on the right is called α-D-glucose while the one having -OH group on the left is called β-D-glucose. Such pairs of optical isomers which differ in the configuration only around C_1 are called anomers. The structures of these two may be shown below:  α-D–(+)-Glucose β-D–(+)-Glucose These two forms are crystalline and have different melting points and optical rotations. For example, α-form of glucose has m.p. 419 K and $\|\alpha\|_D = +\ 111°$ and the β-form of glucose has m.p. 423 K and $\|\alpha\|_D = +\ 19.2°$. The α-D-glucose and β-D-glucose can be drawn in a simple six-membered ring form called pyranose structures. These resemble pyran which is a six-membered heterocyclic ring containing five carbon atoms and one oxygen atom. These are known as pyranose structures and are shown below:  α-D-glucose β-D-glucose **OR** (ii) (A)Water soluble vitamins must be supplied regularly in the diet because they are regularly excreted in urine and cannot be stored in our body. For eg., Vitamin C, Vitamin B, etc. (B) **(a) Essential amino acids:** Amino acids which the body cannot synthesize are called essential amino acids. Example: Valine, leucine etc. Therefore they must be supplied in diet. **Non-essential amino acids:** Amino acids which the body can synthesize are called non-essential amino acids. Therefore, they may or may not be present in diet. Example; Glycine, alanine etc.	5

(b)

Globular Proteins	Fibrous Proteins
1. Globular proteins have almost spheroidal shape due to folding of the polypeptide chain.	1. Polypeptide chains of fibrous proteins consist of thread like molecules which tend to lie side by side to form fibres.
2. Globular proteins are soluble in water.	2. Fibrous proteins are insoluble in water.
3. Globular proteins are sensitive to small changes of temperature and pH. Therefore they undergo denaturation on heating or on treatment with acids/bases	3. Fibrous proteins are stable to moderate changes of temperature and pH.
4. They possess biological activity that's why they act as enzymes.	4. They do not have any biological activity but serve as chief structural material of animal tissues.
Example: Maltase, invertase etc., hormones (insulin) antibodies, transport agents (haemoglobin), etc.	Example: Keratin in skin, hair, nails and wool, collagen in tendons, fibroin in silk etc.