

FINAL EXAMINATION 2021-22

TERM – II

CHEMISTRY THEORY (043)

Class-XI

MM:35 marks

Time: 2 Hours

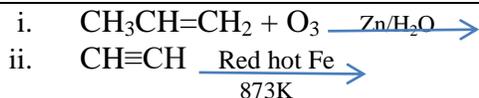
GENERAL INSTRUCTIONS:

Read the following instructions carefully.

1. There are 12 questions in this question paper with internal choice.
2. SECTION A - Q. No. 1 to 3 are very short answer questions carrying 2 marks each.
3. SECTION B - Q. No. 4 to 11 are short answer questions carrying 3 marks each.
4. SECTION C- Q. No. 12 is case based question carrying 5 marks.
5. All questions are compulsory.
6. Use of log tables and calculators is not allowed

	SECTION A	
1	Give one point to differentiate the following thermodynamics. (a) Extensive properties and intensive properties, (b) Isothermal process and isobaric process.	2
2	(a) Why do gases deviate from ideal behaviour? (b) Write Van der Waals equation for real gases stating the significance of each term involved?	2
3	At 25°C and 760 mm of Hg pressure a gas occupies 600 mL volume. What will be its pressure at a height where temperature is 10°C and volume of the gas is 640mL?	2
	SECTION B	
4	a) Arrange the following compounds in decreasing order of their reactivity towards an electrophile: Toluene, 4- Nitrotoluene, 2,4-Dinitrotoluene (b) Convert tert- Butyl bromide to isobutyl bromide. (c) But-1-yne liberates hydrogen gas on reaction with sodium metal while But-2-yne does not. Explain.	3
	OR	

	<p>(a) The dipole moment of trans 1,2-dichloroethane is less than the cis – isomer. Explain.</p> <p>(b) Ethyne is acidic in nature in comparison to ethene and ethane. Give reason.</p> <p>(c) Write the chemical reaction to show the products obtained by addition reactions of HBr to pent-1-ene In the presence of benzoylperoxide.</p>	
5	<p>a) State Le Chatelier's principle</p> <p>b) Discuss the effect of the following on equilibrium</p> <p>I. Addition of catalyst</p> <p>II. Increase in pressure for :</p> $\text{CO(g)} + 3 \text{H}_2\text{(g)} \rightleftharpoons \text{CH}_4\text{(g)} + \text{H}_2\text{O(g)}$ <p>OR</p> <p>a) Define solubility product.</p> <p>b) Calculate the solubility of A_3B_5 in pure water assuming that neither kind of ion reacts with water. The solubility product of A_3B_5, $K_{sp} = 1.7 \times 10^{-23}$</p>	3
6	<p>Give reason</p> <p>a) Gallium has higher ionization enthalpy than aluminium.</p> <p>b) Conc. HNO_3 can be transported in an aluminium container.</p> <p>c) PbCl_2 is more stable as compared to PbCl_4.</p>	3
7	<p>a) At 298K , K_p for the reaction $\text{N}_2\text{O}_4\text{(g)} \rightleftharpoons 2 \text{NO}_2\text{(g)}$, is 0.98. Predict whether the reaction is spontaneous or not.</p> <p>b) For the reaction</p> $\text{N}_2\text{(g)} + 3 \text{H}_2\text{(g)} \rightarrow 2 \text{NH}_3\text{(g)}$ <p>$\Delta H = -95.4 \text{ kJ}$, $\Delta S = -198.3 \text{ J/k}$</p> <p>Calculate the temperature at which Gibb's free energy is equal to zero. Predict the nature of the reaction at this temperature.</p>	3
8	<p>a) Write the conjugate acids for H_2O & NH_3</p> <p>b) PCl_5, PCl_3 and Cl_2 are at equilibrium at 500 K and having concentration 1.59M PCl_3, 1.59M Cl_2 and 1.41 M PCl_5. Calculate K_c for the reaction, $\text{PCl}_5 \rightleftharpoons \text{PCl}_3 + \text{Cl}_2$</p>	3
9	<p>a) What is diagonal relationship?</p> <p>b) In what ways beryllium shows similarities to Aluminium in its chemical behaviour? Write any two similarities.</p> <p>OR</p> <p>a) What is inert pair effect?.</p> <p>b) Draw the structure of BeCl_2 in vapour phase and in solid phase</p>	1+2
10	<p>Draw the resonating structures of phenol and explain the directive influence of –OH group and its effect on the reactivity of the compound.</p>	3
11	<p>a) Draw the structure of :</p> <p>5-sec-Butyl-4-isopropyldecane</p> <p>b) Identify the products in the following reactions:</p>	3



OR

Explain and write the chemical reactions involved in the following.

- Wurtz reaction
- Nitration of Benzene.
- Friedal Craft's Alkylation.

SECTION C

12

Read the passage given below and answer the questions that follow

5

The group 1 and group 2 elements of the periodic table are referred to as the s-block elements. Further, group 1 elements are called alkali metals, and the group 2 elements are called alkaline earth metals. They are named so due to the alkaline nature of the oxides and hydroxides. Two s-electrons characterize the Alkaline earth metals, and the alkali metals are characterized by one s-electron in the valence shell of their atoms. Both these metals form a mono positive ion and di positive ions and are extremely reactive. The ions have a lot of water in them. The degree of hydration is proportional to the size of the ion. As a result, from Li^+ to Cs^+ , the degree of hydration falls. As a result, electrical conductivity diminishes as hydration increases.

Table 10.1 Atomic and Physical Properties of the Alkali Metals

Property	Lithium Li	Sodium Na	Potassium K	Rubidium Rb	Caesium Cs	Francium Fr
Atomic number	3	11	19	37	55	87
Atomic mass (g mol ⁻¹)	6.94	22.99	39.10	85.47	132.91	(223)
Electronic configuration	[He] 2s ¹	[Ne] 3s ¹	[Ar] 4s ¹	[Kr] 5s ¹	[Xe] 6s ¹	[Rn] 7s ¹
Ionization enthalpy / kJ mol ⁻¹	520	496	419	403	376	~375
Hydration enthalpy/kJ mol ⁻¹	-506	-406	-330	-310	-276	-
Metallic radius / pm	152	186	227	248	265	-
Ionic radius M ⁺ / pm	76	102	138	152	167	(180)
m.p. / K	454	371	336	312	302	-
b.p / K	1615	1156	1032	961	944	-

- Why are melting and boiling points of alkali metals low?
- Give reason for the colour imparted to the flame by alkali metals
- Why Lithium has high hydration enthalpy?
- Why s-block elements forms blue solution with liquid ammonia?
- Arrange the sulphates of alkaline earth metals in decreasing order of their insolubility in water.

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