



INDIAN SCHOOL SOHAR
UNIT TEST- 2 (2023-24)
CHEMISTRY THEORY (043)
SET-1

CLASS : XI
 DATE : 18 / 01/24


MAX. MARK : 20
 TIME : 40 MINUTES

General instructions:

1. There are **10** questions in this question paper with internal choice.
2. **SECTION A-** consists of 6 multiple-choice questions carrying **1** mark each.
3. **SECTION B-** consists of 1 very short answer questions carrying **2** marks each.
4. **SECTION C-** consists of 1 short answer questions carrying **3** marks each.
5. **SECTION D-** consists of 1 case-based question carrying **4** marks.
6. **SECTION E-** consists of 1 long answer questions carrying **5** marks with internal choice.
7. **All questions are compulsory.**
8. **Use of log tables and calculators is not allowed**

SECTION- A

SECTION- A		
Question no. 1 to 6 are multiple choice (MCQ) type questions, carrying 1 mark each.		
1.	Phenylpropene on acidic hydration gives : (a) 2 – Phenyl – 2 – propanol (b) 2 – Phenyl – 1 – propanol (c) 3 – Phenyl – 1 – propanol (d) 1 – Phenyl – 2 – propanol	1
2.	Polarity in a molecule and the dipole moment depends primarily on electronegativity of the constituent atoms and shape of a molecule. Which of the following has the highest dipole moment? (a) CO ₂ (b) HI (c) H ₂ O (d) SO ₂	1
3.	Which of the following is incorrect for electrophilic substitution? (a) -NO ₂ is deactivating and m-directing (b) -Cl is activating and o, p-directing (c) -OH is activating and o, p-directing (d) -CH ₃ is activating and o, p-directing	1
4.	Boiling point of NH₃ is more than PH₃ because : (a) molecular weight of NH ₃ is high (b) NH ₃ has ionic bond whereas PH ₃ , has covalent bond (c) NH ₃ forms hydrogen bond (d) None of the above	1
	In the following questions (Q.No.5 and 6) a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices: (a) Assertion and Reason both are correct statements and Reason is the correct explanation for assertion. (b) Assertion and Reason both are correct statements but reason is not the correct explanation for assertion. (c) Assertion is correct statement, but Reason is wrong statement. (d) Assertion and reason both are wrong statements.	

5.	<p>Assertion: Among the two O–H bonds in H₂O molecule, the energy required to break the first O–H bond and the other O–H bond is the same.</p> <p>Reason : This is because the electronic environment around oxygen is the same even after breakage of one O–H bond</p>	1
6.	<p>Assertion (A) : The compound cyclooctatetraene has the following structural formula :</p>  <p>It is cyclic and has conjugated 8π-electron system but it is not an aromatic compound.</p> <p>Reason (R) : (4n + 2) π electrons rule does not hold good and ring is not planar.</p>	1
SECTION- B		
7.	<p>Balance the following equation in basic medium by oxidation number method.</p> $P_4(s) + OH^-(aq) \longrightarrow PH_3(g) + H_2PO_2^-(aq)$	2
SECTION- C		
8.	<p>a) Using VSEPR theory draw the structure of XeF₄.</p> <p>b) Using molecular orbital theory compare the bond energy and magnetic character of N₂⁺ and N₂⁻ species.</p> <p>c) Explain why PCl₅ is trigonal bipyramidal whereas IF₅ is square pyramidal.</p>	3
SECTION- D		
This question is a case-based questions. Read the case carefully and answer the question that follow.		
9.	<p>Oxidation-reduction was primarily used to describe the reaction of combination and /or removal of oxygen or from chemical substances, respectively. Simultaneously, the removal and /or the addition of hydrogen were also used to differentiate among oxidation and reduction, respectively. The definition were extended to a broader level, and the changes in the oxidation number or oxidation state of elements were considered to define oxidation and reduction. The increase in the oxidation number leads to oxidation and its alternative process yields reduction. This vast definition encompasses the recent and exact interpretation of “redox” reaction that is acceptance and donation of the electrons between the reacting entities. Consequently, the redox phenomenon indicates a simple reaction, formation of carbon dioxide as a consequence of the oxidation of carbon and /or formation of methane by the reduction of carbon, for example, and the complex reaction consisting of a number of electron transfer reactions during the oxidation of sugar in the human body to produce energy.</p> <p>The redox reaction involves an oxidant or oxidizing agent and a reductant or reducing agent. The oxidant takes the electron and oxidizes the reductant. The reductant, however, donates the electron and reduces the oxidant.</p> <p>a. Identify the type of following reaction</p> $3ClO^- \longrightarrow ClO_3^- + 2Cl^-$ <p>b. Calculate the oxidation number of ‘Fe’ in [Fe(CN)₆]⁴⁻</p> <p>c. Write the anode and cathode reaction from the given electrode potential value. Also write the net reaction involved.</p> <p>[Given: E⁰_{Cr³⁺/Cr = -0.74 V, E⁰_{Fe²⁺/Fe = -0.44 V]}}</p> <p style="text-align: center;">OR</p> <p>Calculate the standard electrode potential value for the Fe-Cr cell, and write the cell representation. [Given: E⁰_{Cr³⁺/Cr = -0.74 V, E⁰_{Fe²⁺/Fe = -0.44 V]}}</p>	4

SECTION- E		
The following question is long answer type, carrying 5 marks with an internal choice.		
10.	<p>a) The combustion of one mole of benzene takes place at 298 K and 1atm. After combustion, CO₂(g) and H₂O(l) are produced and -3267.0 kJ of heat is liberated. Calculate the standard enthalpy of formation of benzene ($\Delta_f H^\circ$) .</p> <p style="text-align: center;">$\Delta_f H^\circ \text{CO}_2(\text{g}) = -393.5 \text{ kJmol}^{-1}$ and $\Delta_f H^\circ \text{H}_2\text{O}(\text{l}) = -285.83 \text{ kJmol}^{-1}$.</p> <p>b) Calculate the standard Gibbs energy change for the formation of propane at 298 K.</p> <p style="text-align: center;">$3\text{C}(\text{graphite}) + 4\text{H}_2(\text{g}) \rightarrow \text{C}_3\text{H}_8(\text{g})$.</p> <p>$\Delta_f H^\circ$ for propane C₃H₈ is -103.8 kJmol⁻¹</p> <p>Given : $S^\circ_m \text{C}_3\text{H}_8(\text{g}) = 270.2 \text{ JKmol}^{-1}$,</p> <p style="padding-left: 40px;">$S^\circ_m \text{C}(\text{graphite}) = 5.70 \text{ JKmol}^{-1}$ and</p> <p style="padding-left: 40px;">$S^\circ_m \text{H}_2(\text{g}) = 130.7 \text{ JKmol}^{-1}$</p>	5
OR		
	<p>a) State Hess's Law of constant heat summation. How does it follow from the first law of thermodynamics?</p> <p>b) Calculate the standard enthalpy change($\Delta_r H^\circ$) and standard Internal energy change ($\Delta_r U^\circ$) for the following reaction at 300 K.</p> <p style="text-align: center;">$\text{OF}_2(\text{g}) + \text{H}_2\text{O}(\text{g}) \rightarrow \text{O}_2(\text{g}) + 2\text{HF}(\text{g})$.</p> <p>Standard enthalpy of formation ($\Delta_f H^\circ$) of various species are given below.</p> <p style="text-align: center;">$\Delta_f H^\circ / \text{kJmol}^{-1}$, OF₂ (g) = + 23.0 , H₂O(g) = -241.8 , HF(g) = -268.6.</p>	
