DELHI PUBLIC SCHOOL JAMMU

CLASS - XII

SESSION - 2024 - 2025

Assignment

CHEMISTRY

	Section A	
1	A galvanic cell can behave as an electrolytic cell when: a) $E_{cell} > E_{ext}$ b) $E_{cell} = E_{ext}$ c) $E_{ext} > E_{cell}$ d) $E_{cell} = 0$	**[1]**
2	The correct cell to represent the following reaction is: $Zn + 2Ag^{+} \rightarrow Zn^{2+} + 2Ag$ a) $2Ag \mid Ag^{+} \parallel Zn \mid Zn^{2+}$ b) $Zn \mid Zn^{2+} \parallel Ag^{+} \mid Ag$ c) $Ag \mid Ag^{+} \parallel Zn \mid Zn^{2+}$ d) $Ag^{+} \mid Ag \parallel Zn^{2+} \mid Zn$	**[1]**
3	The half - life of a reaction is halved as the initial concentration of the reactant is doubled. The order of the reaction is: a) 1 b) 0 c) 2 d) 3	**[1]**
4	For an endothermic reaction where ΔH represents the enthalpy of the reaction in kJ/mol . The minimum value for the energy of activation will be a) Equal to ΔH b) Zero	**[1]**

	c) More thanΔH d) Less thanΔH	
5	**Assertion (A):** Zinc is not regarded as a transition element. **Reason (R):** In zinc, 3d orbitals are completely filled in its ground state as well as in its oxidised state. a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). b) Both Assertion (A) and Reason (R) are true, but Reason (R) is **not** the correct explanation of the Assertion (A). c) Assertion (A) is true, but Reason (R) is false. d) Assertion (A) is false, but Reason (R) is true.	**[1]**
6	**Assertion (A):** Cu is less reactive than hydrogen. **Reason (R):** $E^{\Theta}_{Cu^{2+}/Cu}$ is negative. a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A. c) A is true but R is false. d) A is false but R is true.	**[1]**
7	**Assertion (A):** The molecularity of the reaction is $H_2 + Br_2 = 2HBr$is two. **Reason (R):** The order of this reaction is $\frac{3}{2}$. a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A. c) A is true but R is false. d) A is false but R is true.	**[1]**
8	**Assertion (A):** According to transition state theory, for the formation of an activated complex, one of the vibrational degrees of freedom is converted into a translational degree of freedom. **Reason (R):** The energy of the activated complex is higher than the energy of reactant molecules.	**[1]**

<table>
<tr><td></td><td>a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.</td><td></td></tr>
<tr><td>9</td><td>Calculate the equilibrium constant, K, for the reaction at 298 K.
Zn(s) + Cu $^{2+}$ (aq) ⇌ Zn $^{2+}$ (aq)+ Cu (s)
ΔG° = - 212.300 kJ mol $^{-1}$
[Given, $E_{Zn^{2+\circ}/Zn}$ = - 0.76V, $E^{o}_{Cu^{2+}/Cu}$ = +0.34 V] .</td><td>[2]</td></tr>
<tr><td>10</td><td>Write the symbolic notation for standard hydrogen electrode and its potential.</td><td>[2]</td></tr>
<tr><td>11</td><td>Identify the reaction order for each of the following rate constant -
1. k = 2.3× 10 $^{-5}$ L mol $^{-1}$ s $^{-1}$
2. k = 3× 10 $^{-4}$ s $^{-1}$</td><td>[2]</td></tr>
<tr><td>12</td><td>Distinguish between molecularity and order of reaction.</td><td>[2]</td></tr>
<tr><td>13</td><td>How long will it take an electric current of 0.15 A to deposit all the copper from 500 ml of 0.15 M copper sulphate solution?</td><td>[3]</td></tr>
<tr><td>14</td><td>How would you determine the standard electrode potential of the system Mg^{2+} |Mg?</td><td>[3]</td></tr>
<tr><td>15</td><td>The following results have been obtained during the kinetic studies of the reaction:
<table>
<tr><th>Experiment</th><th>$A/mol\ L^{-1}$</th><th>$B/mol\ L^{-1}$</th><th>Initial rate of formation of $D/mol\ L^{-1}\min^{-1}$</th></tr>
<tr><td>I</td><td>0.1</td><td>0.1</td><td>6.0×10^{-3}</td></tr>
<tr><td>II</td><td>0.3</td><td>0.2</td><td>7.2×10^{-2}</td></tr>
<tr><td>III</td><td>0.3</td><td>0.4</td><td>2.88×10^{-1}</td></tr>
<tr><td>IV</td><td>0.4</td><td>0.1</td><td>2.40×10^{-2}</td></tr>
</table>
Determine the rate law and the rate constant for the reaction.</td><td>[3]</td></tr>
<tr><td>16</td><td>A chemical reaction $2A \Leftrightarrow 4B + C$ in gas phase occurs in a closed vessel. The concentration of B is found to be increased by $5 \times 10^{-3} molL^{-1}$ in 10 second.
Calculate
1. the rate of appearance of B
2. the rate of disappearance of A?</td><td>[3]</td></tr>
</table>

17	Electrolysis is the process in which electrical energy is converted to chemical energy. In electrolytic cell, oxidation takes place at anode and reduction at cathode. Electrode process depends on the electrode taken for electrolysis. Amount of substance liberated at an electrode is directly proportional to hte amount of charge passed through it. The mass of substance liberated at electrode is calculated using the following relation:$m = \frac{ItE}{96500}$ Here, E represents the equivalent mass and 96500 C is called the Faraday constant. Faraday (96500 C) is the charge of 1 mole electron, i.e., 6.023×10^{23} electrons; it is used to liberate one gram equivalent of the substance. **Answer the following questions:** 1. The passage of current liberates H_2 at cathode & Cl_2 at the anode. The solution is (a) copper chloride in water (b) NaCl in water 2. What is obtained at the anode on electrolysis of dilute H_2SO_4 using platinum electrodes as a product? 3. The platinum electrodes were immersed in a solution of cupric sulphate ($CuSO_4$) and the electric current is passed through the solution. After some time, it was observed that the colour of copper sulphate disappeared with the evolution of gas at the electrode. The colourless solution contains _____. 4. Calculate the volume of gas liberated at the anode at S.T.P. during the electrolysis of a $CuSO_4$ solution by a current of 1 A passed for 16 minutes and 5 seconds. [Hint: At anode: $2OH^- \rightarrow H_2O + 1/2\ O_2 + 2e^-$ (Oxygen gas is evolve) ,Equivalent volume V_e of oxygen = 5.6 litre] . **OR** 5. What is the change in free energy for a galvanic cell?	**[5]**
18	**Read the given passage and answer the questions that follow:** The concentration dependence of the rate is called a differential rate equation. It is not always convenient to determine the instantaneous rate, as it is measured by the determination of slope of the tangent at point't' in concentration vs. time plot. This makes it difficult to determine the rate law and hence the order of the reaction. In order to avoid this difficulty, we can integrate the differential rate equation to give a relation between directly measured experimental data, i.e., concentrations at different times and rate constant. The integrated rate equations are different for the reactions of different reaction orders. The half - life of a reaction is the time in which the	**[5]**

	concentration of a reactant is reduced to one half of its initial concentration. It is represented as t $_{$. 1. A first - order reaction has a rate constant$1.15 \times 10^{-3} s^{-1}$. . How long will 5g of this reactant take to reduce to 3g? 2. The half - life of a reaction becomes half when initial concentrations of reactants are made double. The order of the reaction will be: a. 1 b. 2 c. 0 d. 3 3. The rate of reaction sometimes does not depend on concentration. Give reason. 4. For a reaction A+B→ Products, the rate law is; Rate =k[A] [B] $^{3/2}$ .Can the reaction be an elementary reaction? Explain? **OR** 5. The plot of concentration of reactant vs. time for a reaction is a straight line with a negative slope. Identify the order of the reaction.	
19	1. CalculateΔ G ^{o} for the reaction Zn (s) + Cu $^{2+}$ (aq) → Zn $^{2+}$ (aq) + Cu(s) Given: E ^{o} for Zn $^{2+}$ /Zn = - 7.6 V and E ^{o} for Cu $^{2+}$ /Cu = +0.34 V R = 8.314 JK $^{-1}$ mol $^{-1}$ F = 96500 C mol $^{-1}$. 2. Given two advantages fo fuel cells.	**[5]**
20	The following data were obtained during the first order thermal decomposition ofSO_2Cl_2 at a constant volume. $SO_2Cl_2(g) \rightarrow SO_2(g) + Cl_2(g)$ | **Experiment**	$Time/s^{-1}$	**Total pressure/atm**
1	0	0.5
2	100	0.6 | Calculate the rate of the reaction when total pressure is 0.65 atm.	**[5]**