DAYANANDA SAGAR COLLEGE OF ENGINEERING

(An Autonomous Institute Affiliated to VTU, Belagavi)

ShavigeMalleshwara Hills, Kumaraswamy Layout, Bengaluru-560078

Model Question Bank 2018-19 Unit wise

Program: B.E.

Course: Engineering Chemistry Semester: I/II

Course Code: 18CH1ICCHY/18CH2ICCHY

Q. No	Question Description	Marks	BL	COs
1	In a cell containing Zn/Zn^{2+} and Sn^{2+}/Sn couples, a) Solve for the cell potential if the $[Zn^{2+}] = 3.0$ M and $[Sn^{2+}] = 2 \times 10^{-5}$ M at 298 K. b) Detect the ΔG and $\Delta G°$ for the reduction of 1.0 M of Sn^{2+} by Zn. [Given $E°_{cell} = 0.62$ V]		3 6	CO3 CO3
2	The standard reduction potentials of Zn/Zn^{2+} and Ag^{+}/Ag electrodes are -0.76 and 0.80 V respectively. Construct a galvanic cell using these electrodes so that its standard emf is positive. Solve for the concentration of Ag^{+} that result the 0 emf for the cell at 25°C if $[Zn^{+2}] = 0.02$ M.		3	CO3
3	A cell is formed by dipping Zn rod in 0.05 M Zn2+ solution and Cu rod in 0.15 M Cu2+ solution. The standard electrode potential of Zn and Cu are -0.76 V and 0.34 V respectively. Execute the cell representation, cell reaction and calculate the emf of the cell		3	CO3
4	Detect the valency of copper ions with the help of the following cell: $Cu\|CuSO_4$ (0.005 M) ‖ $CuSO_4\|Cu$ (0.05 M), when the emf is 0.029 V.		6	CO3
5	The emf of the cell, $Ag\|AgNO_3$ (0.02 M) ‖ $AgNO_3$ (x M)$\|Ag$ is 0.0764 V at 25° C. Find the concentration x.		1	CO3
	Reasoning			
	1) Always reduction potential is taken for calculating the cell voltage, Clarify		2	CO2
	2) Retrieve the reason for the origin of single electrode potential.		1	CO2
	3) Defend potential of SHE is taken as zero.		6	CO2
	4) Explain salt bridge is used in the construction of Daniel cell?		2	CO2
	5) Assess electrochemical cells stop working after some time?		6	CO2
	6) Defend calomel electrode is called a secondary reference electrode?		6	CO2
	7) Nickel spatula cannot be used to stir copper sulphate solution, evaluate		6	CO2
	8) Blue color of copper sulphate fades when electrolyzed using platinum electrode, describe?		1	CO2

	9) Explain: EMF of a cell is always positive.		2	CO2
	10) Analyze: Reactivity of the metal varies inversely with its electrode potential.		4	CO2
	11) EMF of the concentration cell decrease gradually: check for reason.		6	CO2
	12) No electricity flows out of concentration cell when the metal ion concentration at the two electrodes is same: clarity		2	CO2
	13) The potential of concentration cell doubles when the concentration ratio is changed from 0.0001 to 0.01: justify.		6	CO2
	14) A dry cell does becomes dead after sometime even if it has not been used, find the reason.		2	CO1
	15) Interpret the order in which Clements are arranged in electrochemical series		2	CO1
	16) Categorize the Ag/Agcl electrode		2	CO1
	17) Classify the calomel electrode		2	CO1
	18) Assess the decrease in the EMF of calomel electrode with increase in the concentration of KCL		6	CO2
	19) Connect the concentration of ions and electrode potential by referring to Nernst equation		4	CO2
	20) Clarify the principle on which Nernst equ is derived		2	CO1
	21) Define the anode material used in the lithium ion battery		1	CO2
	22) Identify the cathode material for lithium ion battery		1	CO1
	23) Conclude the role of separator in rechargeable battery		6	CO1
	24) Outline the direction of flow of electrons during discharge of battery		4	CO1
	25) Name the battery generally used in the mobile phones			CO
	26) Illustrate the cell representation for Ni-MH battery		3	CO
	27) Illustrate the cell representation for Li-ion battery		3	CO
1	Define single electrode potential and explain its origin.		1	CO1
2	Generate Nernst equation for electrode potential.		1	CO5
3	Solve for the electrode potential of copper when it is in contact with 0.5 M CuSO4 solution at 298 K, given Eo value of copper as 0.34 V.		3	CO3
4	Solve for the standard electrode potential of Zn2+/Zn if the electrode potential at 25oC is -0.764 V, when [Zn2+] = 0.73 M.		3	CO3
5	Solve for the emf of a cell constructed by coupling a zinc electrode dipped in 0.5 M ZnSO4 and a nickel electrode dipped in 0.05M NiSO4. Write the cell representation and cell reaction, given the standard reduction potential of Zn and Ni as -0.76 V and -0.25 V respectively.		3	CO3
6	Solve for the emf of the following cell at 298 K; Ni/ Ni2+ (0.01M) // Cu2+ (0.5M) / Cu. The standard reduction potentials of Ni and Cu are -0.25 V and 0.34V respectively. Write the electrode reaction.		3	CO3
7	Classify the six different types of electrodes with examples for each.		1	CO2
8	Define reference electrodes and mention their applications. Explain the construction and working of Ag/AgCl electrode.		1	CO1
9	Describe the construction of calomel electrode with a neat diagram giving the electrode reaction.		1	CO1
10	Summarise the demerits of standard hydrogen electrode.		1or 5	CO2

11	Determine the standard electrode potential of copper using a reference calomel electrode.		2	CO4
12	Describe the construction and working of glass electrode with a neat diagram.		1	CO2
13	Describe the determination of pH of a solution using glass electrode.		1	CO2
14	Define: (a) ion selective electrode (b) concentration cell		1	CO1
15	Explain the concept of electrolyte concentration cell.		2	CO1
16	A concentration cell is constructed by immersing two iron electrodes in 0.01M and 0.1M $FeSO_4$ solutions. Represent the cell and solve for the emf of the cell at 298 K.		3	CO3
17	The emf of the cell Ag / $AgNO_3$(0.0093 M) // $AgNO_3$(X) / Ag is 0.086 V at 25 °C. Solve for the value of X.		3	CO3
18	Solve for the emf of the following concentration cell: Zn /Zn^{2+}(0.025 M) // Zn^{2+}(0.15 M) /Zn at 298 K.		3	CO3
19	Emf of the cell Ag / $AgNO_3$(C1) // $AgNO_3$(C2 = 0.2 M) / Ag is 0.8 V. Solve for C1.		3	CO3
20	Classify the three different types of batteries with description.		2	CO2
21	Analyze the following characteristics of a battery: (a) cell potential (b) capacity (c) energy density.		4	CO1
22	Analyze the following characteristics of a battery: (a) current (b) power density (c) energy efficiency (d) cycle life and (e) shelf life.		4	CO2
23	Describe the construction, working and applications of Zn-air battery.		1	CO1
24	Analyze the criteria for selection of lithium as anode.		4	CO2
25	Appraise the construction, working and applications of Li ion battery.		6	CO2
26	Define fuels cells. Formulate the construction and working of hydrogen-oxygen fuel cell.		1	CO2