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QUESTION PAPER

Name of the Examination: WIN 2022-2023 - FAT

Course Code: CHY1009 Course Title: Chemistry and Environmental Studies

Set number: 1 Date of Exam: 16/06/2023 (FN) (A1)

Duration: 120 min Total Marks: 60

Instructions:

$R = 8.314\ J.K^{-1}.mol^{-1}$ and $F = 96500\ C$

Q1. (a) A charge equal to 48250 coulombs (C) was transferred through magnesium chloride while it was being electrolyzed. Find out how much magnesium was deposited at the cathode during this electrolysis process. (Atomic weight of Mg = 24.3 g mol^{-1}). (5 M)

(b) Determine the E_{cell} of the following cell at 25 °C with the help of Nernst equation by finding the net reaction.

$Mg|Mg^{2+}(0.1M)||Cu^{2+}(0.01M)|Cu$ ($E^{\circ}_{Mg^{2+}|Mg} = -2.364$ V and $E^{\circ}_{Cu^{2+}|Cu} = 0.334$ V) (5 M)

Q2. (a) What are High density and low density polyethylene polymers? Discuss their characteristics and applications. (5 M)

(b) How are the polymers categorised according to their thermal properties? explain with the suitable examples. (5 M)

Q3. (a) Explain the energy and matter flow in the ecosystem through various trophic levels. (5 M)

(b) How is an ecosystem's gross primary productivity (GPP) and net primary productivity (NPP) expressed? Explain. (5 M)

Q4. (a) Write various processes involved in carbon cycle and explain the effects of any two human activities on carbon cycle. (5 M)

(b) In an ecosystem, what are the types of interactions possible between species? Discuss any one type of interaction. (5 M)

Q5. (a) Discuss the efforts that are being carried out to restore the biodiversity adopting in-situ conservation methods. (5 M)

(b) What are the nuclear hazards? Write the sources and effects of nuclear hazards on environment and health. (5 M)

Q6. (a) Write the natural and human activities that contribute to the outdoor air pollution. (5 M)

(b) Write a note on "the impacts of acid deposition on crops and lakes". (5 M)

QP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	3	1				10
Q2	4	2				10
Q3	5	3				10
Q4	5	3				10
Q5	5,7	3				10
Q6	6	4				

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QUESTION PAPER

Name of the Examination: WINTER 2022-23 FRESHERS – FAT

Course Code: CHY1009 **Course Title: Chemistry and Environmental Studies**

Set number: 3 **Date of Exam:** 17/06/2023 (FN) (B_1)

Duration: 120 minutes **Total Marks: 60**

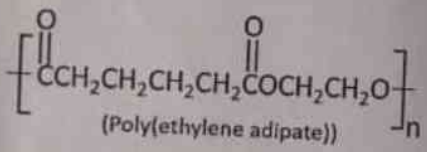
Instructions: • Answer all the questions

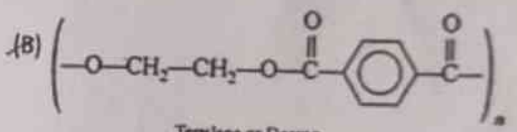
- Each question carries 10 marks [5 + 5 = 10]
- R (Universal gas constant) = 8.314 J K^{-1} mol^{-1}; Faraday's constant = 96500 C mol^{-1}; T(K) = T(°C) + 273 ; 1 calorie = 4.184 Joules; Charge (q) on electron = 1.602×10^{-19} C

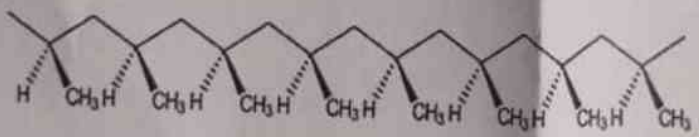
1. (a) Write anode and cathode reactions involved in the electrolysis of molten $BaCl_2$. How many amps of current needed to produce 35.6 g of Ba in 2.5 hours? atomic mass of Ba is 137.3 g/mol

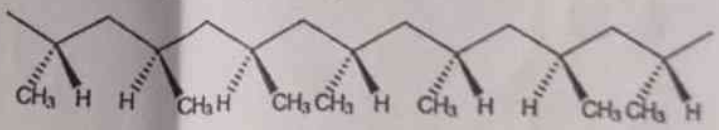
   (b) Comment on the spontaneity of the following electrochemical cell **without** calculating standard Gibbs free energy change. $Cu(s)|Cu^{2+}(aq)\|Al^{3+}(aq)|Al(s)$ $E^0_{Al+3/Al} = -1.66$ V and $E^0_{Cu+2/Cu} = 0.34$ V [10 marks]

2. There are four polymers given below [10 marks]

(A) 

(B) 

(C) 

(D) 

(a) When polymers A and B are compared, which polymer shows higher glass transition temperature? Justify your answer

(b) When polymers C and D are compared, which polymer is more crystalline? Justify your answer. [10 marks]

3. (a) Give the names of four greenhouse gases. Explain how these gases warm our atmosphere.

   (b) Give three examples of abiotic component of a terrestrial ecosystem. Explain the importance of your examples in terrestrial ecosystem function. [10 marks]

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QUESTION PAPER

Name of the Examination: WIN (2022-2023) Freshers - FAT

Course Code: CHY1009 **Course Title: Chemistry and Environmental Studies**

Set number: 12 **Date of Exam:** 17/06/2023 (FN) (B2)

Duration: 120 min **Total Marks: 60**

Instructions:

Faraday Constant (F): 96500 C/mol; Gas Constant (R): 8.314 $J.mol^{-1}.K^{-1}$; Planck's Constant (h): 6.625 X 10^{-34} J.s; Light Velocity: 2 X 10^{8} m/s

Q1. (a) Find out the cell potential (E_{cell}) for the following voltaic cell. **(5 M)**

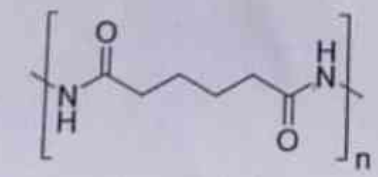
$$Pt_{(s)}|Fe^{2+}_{(0.1M)}, Fe^{3+}_{(0.2M)}||Ag^{+}_{(0.1M)}|Ag_{(s)}$$

0.0521

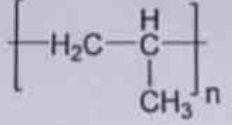
($E^{\circ}_{(Ag^{+}/Ag)}$ = 0.8 V; $E^{\circ}_{(Fe^{3+}/Fe^{2+})}$ = 0.771 V)

(b) What is the cell potential of a galvanic cell composed of two Ag/Ag^{+} half cells, one with a silver ion concentration of 0.02 M and the other with a silver ion concentration of 1M? **(5 M)**

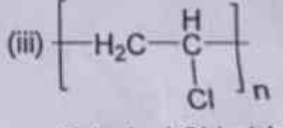
Q2. (a) Arrange the following polymers in ascending order based on their glass transition temperature (Tg) and justify your answer using Intermolecular Force concept. **(5 M)**

(i) 

Polyamide

(ii) 

Polypropylene

(iii) 

Polyvinyl Chloride

(b) List out any four differences between Thermoplastics and Thermosetting **(5 M)**

Q3. (a) Based on trophic level, describe the components present in an ecosystem with suitable Examples **(5 M)**

(b) Write the differences between the Gross primary productivity and Net primary productivity. Explain why tropical rain forests have a very high net primary productivity **(5 M)**

Q4. (a) Describe the process involved in Nitrogen cycle and write its significance **(5 M)**

(b) Discuss the importance of the Biodiversity **(5 M)**

Q5. (a) Give an account on the *in-situ* conservation of biodiversity **(5 M)**

(b) What is industrial smog and explain its formation? **(5 M)**

Q6. (a) Explain Point and Nonpoint sources of water pollution with suitable examples **(5 M)**

(b) Illustrate the causes for Ozone layer depletion and comment its consequences on the environment **(5 M)**

4. (a) When nutrients in the form of fertilizers supplied to agriculture land, which nutrient cycles get affected? Explain the effect of above activity on the nutrient cycles.
(b) What is mass extinction? Explain how humans are causing mass extinction.
[10 marks]

5. (a) What is ecological niche? Explain how niche helps to understand interspecific competition.
(b) Classify the following compounds into primary and secondary pollutants. Justify your answer. (i) O_3 (ii) CH_4 (iii) N_2O (iv) SO_3 (v) NO_2 (Vi) Peroxyacyl nitrates.
[10 marks]

6. (a) Explain why lakes and reservoirs are vulnerable to water pollution compared to streams.
(b) Give the names of three major types of toxic chemicals (agents)? Explain any two toxic agents.
[10 marks]

QP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	3	CO1	PO1, PO2	-	-	10
Q2	4	CO2	PO6, PO11	-	-	10
Q3	5	CO3	PO2	-	-	10
Q4	5	CO3	PO2	-	-	10
Q5	5, 6	CO4	PO6, PO7	-	-	10
Q6	6,7	CO4	PO6, PO7			10

Q5. (a) What is gross primary productivity? Which of the following two ecosystems will have higher value of net primary productivity: Thar desert and tropical forests in western ghats. Justify your answer. (5M)

(b) Name any two major ocean water pollutants and describe their impact on ocean water pollution briefly. (5M)

Q6. (a) Discuss the harmful impacts of the chemical hazards: carcinogens, mutagens, and teratogens, on human health. (5M)

(b) Describe the effects of carbon monoxide and carbon dioxide as air pollutant. (5M)

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	3	1	1, 2			10
Q2	4	2	6, 11			10
Q3	5	3	2			10
Q4	5	3	2			10
Q5	5, 6	3, 4	2, 6, 7			10
Q6	7, 6	4	6, 7			10

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QUESTION PAPER

Name of the Examination: WIN SEM 2022-2023 - FAT

Course Code: CHY1009 Course Title: Chemistry and Environmental Studies

Set number: 5 Date of Exam: 20/06/2023

Duration: 120 min Total Marks: 60 (FN) (D1)

Instructions:

1. Assume data wherever necessary.
2. Any assumptions made should be clearly stated.
3. Use scientific calculator wherever necessary.
4. Draw the diagram wherever necessary.
5. T(K) = T(°C)+273, R (Universal gas constant) = 8.314 J K^{-1} mol^{-1} ; F (Faraday's constant) = 96500 C mol^{-1}; 1 cal = 4.185 J; h (Planck's constant) = 6.626 X 10^{-34} J s; c (Velocity of light) = 3 X 10^{8} ms^{-1}; N (Avogadro number) = 6.023 X 10^{23}

Q1. (a) Lead can displace silver from solution as given below:

$$Pb_{(s)} + 2Ag^{+}_{(aq)} \longrightarrow Pb^{2+}_{(aq)} + 2Ag_{(s)}$$

E° values for Ag^{+}/Ag and Pb^{2+}/Pb are 0.8 V and –0.13 V, respectively.

As a consequence, silver is a valuable by-product in the industrial extraction of lead from its ore. Calculate the (i) equilibrium constant (K) and (ii) ΔG° at 298 K for this reaction. **(5M)**

(b) Construct a galvanic cell using Zinc and Copper with a neat labelled diagram. List out the important components / materials required for its construction. Write the anodic and cathodic reactions involved. **(5M)**

Q2. (a) Compare plastics and elastomers with suitable examples. **(5M)**

(b) What are thermoplastics and thermosetting polymers? Explain briefly with suitable examples. **(5M)**

Q3. (a) Explain briefly the four mutually interacting spheres of earth's life-support systems. (5M)

(b) What is an ecosystem? Discuss briefly the major components of an ecosystem. (5M)

Q4. (a) Discuss about the Sulphur nutrient cycle. (5M)

(b) Explain briefly about any five significant threats to Biodiversity. (5M)

Q5. (a) Write briefly about the Endemic species and Endangered species. (5M)

(b) Write any two natural causes for the Acid Rain. (5M)

Q6. (a) What is water pollution? Write the sources and causes for water pollution. (5M)

(b) List three main categories of environmental hazards. Why infectious diseases are still major health threats? Give reason with example. (5M)

QP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	3	1	1, 2	--	--	10
Q2	4	2	6, 11	--	--	10
Q3	5	3	2	--	--	10
Q4	5	4	6, 7	--	--	10
Q5	5, 6	3,4	2, 6, 7	--	--	10
Q6	6, 7	4	6, 7	--	--	10