#26783 - FALLFR2122CAT1_VL2021220106496_BCHY101L_OCT21_BADAL KUMAR MANDAL

Instructions

Basic Instructions

1. You can freely navigate between different questions forward and backward using **Next** and **Previous** buttons
2. **Finish** button will be enabled only towards the end of the exam.

Instructions for DESCRIPTIVE questions requiring SCAN & UPLOAD

1. Make sure to upload your **scans immediately after you answer** every question. Do NOT wait till the end to **avoid panic at the end**.
2. The exam time is inclusive of time for scanning & uploading answers.
3. If using **laptop + mobile** for the exam, click on **Open Test** on laptop and click on **Scan & Upload** on mobile.
4. If using **laptop + mobile** for the exam, when scanning and uploading from mobile, ensure that the correct question is open on the laptop.
5. When clicking on Camera button on a smart phone for scanning and uploading, you have 2 camera applications available to scan the answer: your phone's **native camera** and an alternative Low Memory Camera. Click on the **Low Memory Camera** in case your browser shows an error due to low memory.

1. Module 1

10 marks per question | **1** display questions | **1** maximum answerable

Q1 (213744) Scan and/or Upload **10** marks Hard CO1

a) Discuss the entropy change in reversible and irreversible processes.
b) Calculate ΔH, ΔS, and ΔG when 1 mole of water is vaporized at 100°C and 1 atm pressure. The latent heat of vaporisation of water is 540 cal/g.

Q2 (213745) Scan and/or Upload **10** marks Hard CO2

a) Comment on the statement "Entropy of the universe is always increasing".
b) The heat of formation of methane at constant pressure and 25°C is -74.85KJ/mol. What will be the heat of formation at constant volume? Given: R = 8.314J/K/mol

Q3 (213746) Scan and/or Upload **10** marks Hard CO1

a) Discuss the criteria for a chemical reaction to be spontaneous.
b) The free energy change (ΔG) accompanying a given process is -85.77KJ at 25°C and -83.68 KJ at 35°C. Calculate the change in enthalpy (ΔH) for the process at 30°C.

Q4 (213747) Scan and/or Upload **10** marks Hard CO1

a) State the thermodynamic criteria for the spontaneous taking place in an isolated system, system at constant temperature and system at constant pressure.
b) ΔG for a reaction at 300K is 16kcal, ΔH for the reaction is -10kcal. What is the entropy of the reaction? What will be its ΔG at 330 K?

2. Module 2

10 marks per question | 1 display questions | 1 maximum answerable

Q1 (213754) Scan and/or Upload **10** marks Hard CO2

a) Show that in the case of a "first-order" reaction, the time requires for 99.9% of the reaction to take place is about ten times that requires for half of the reaction.
b) Explain the structure and bonding of haemoglobin with a neat sketch.

Q2 (213755) Scan and/or Upload **10** marks Hard CO2

a) The decomposition of $N_2O_5(g)$ is a first-order reaction. If the initial concentration of $N_2O_5(g)$ is 0.03 mol/L, what will be its concentration after 30 min having rate constant of the reaction as 1.35×10^{-4}/s.
b) Magnesium is essential in chlorophyll. Mention its role in the activity and stability of chlorophylls.

Q3 (213756) Scan and/or Upload **10** marks Hard CO2

a) A certain substance A is mixed with an equal mole of a substance B. At the end of one hour, A is 75% reacted. How much will A and B be left unreacted at the end of two hours, if the reaction is 1^{st} order with respect to A and independent of B.
b) Write the functions of haemoglobin in humans with the relevant mechanism.

Q4 (213757) Scan and/or Upload **10** marks Hard CO2

a) The rate constant for the decomposition of nitrous oxide is 5.16×10^4 at 1125 K and 3.76×10^3 at 1085 K. Calculate activation energy for the reaction.
b) Explain the structure of chlorophylls and their properties.

3. Module 1 and 2

10 marks per question | 1 display questions | 1 maximum answerable

Q1 (213772) Scan and/or Upload **10** marks Hard CO1

a) Explain dsp^2 and sp^3d^2 hybridization with examples.
b) Summarise the factors that influence the stability of organometallics.

Q2 (213773) Scan and/or Upload **10** marks Hard CO1

a) Explain how are square planar and octahedral geometry formed.
b) Explain the structure and bonding of ferrocene with a neat sketch.

Q3 (213774) Scan and/or Upload **10** marks Hard CO1

a) Apply your coordination chemistry knowledge to soften hard water samples with all relevant structures and equations.
b) Outline oxidative addition reaction with the help of a chemical reaction.

Q4 (213775) Scan and/or Upload **10** marks Hard CO1

a) How do you apply your chelation chemistry knowledge in industrial quality control? Explain with an example.
b) Outline migratory insertion reaction with the help of a chemical reaction.