RAMAIAH UNIVERSITY OF APPLIED SCIENCES

Faculty of Engineering and Technology			
Ramaiah University of Applied Sciences			
Department	Chemistry	Programme	Bachelor of CSE / CE / EEE
Semester / Batch	01/2017		
Course Code	BSC105B	Course Title	Engineering Chemistry
Course Leader(s)	Dr. T. Niranjana Prabhu, Dr. Sheetal R Batakurki, Dr. Y.C. Sunil Kumar, Dr. Jyotsna Kumar, Dr. Manikanda Prabu, Dr. Jineesh A.G. Dr. Vishnuvardhan T.K., Mr. Anathatramaiah		

Assignment - 02			
Register No		Name of Student	

Sections		Marking Scheme	Max Marks	First Examiner Marks	Second Examiner Marks
Part-A	A1	Comparison of the petrol and diesel emission norms of BSIV and BSIII	4		
	A2	Purchase cost of vehicles affecting common people.	4		
	A3	Justification of the stance.	2		
		Part-A Max Marks	10		
Part B.1	B1.1	Discussion the factors responsible for corrosion	4		
	B1.2	Recommendation of the remedial measures to control corrosion	6		
		Part-B 1 Max Marks	10		
Part B.2	B2.1	Deducing the rate law for the reaction and determining the rate order w.r.t. each reactant	5		
	B2.2	Calculation of the rate constant and the reaction rate	5		
			10		
Part B.3	B3.1	Calculation of activation energy and half-life at 25 °C	5		
	B3.2	Estimation of the time required for decomposition of 75% of propylene oxide	5		
		Part-B 3 Max Marks	10		
Part B.4	B4.1	Plating bath composition for chromium plating with anodic and cathodic reactions and identify any six reasons for the formation of blisters on the surface of the gear parts	6		
	B4.2	Health hazards associated with chrome plating and suggest any two alternatives of chrome plating	4		
		Part-B 4 Max Marks	10		
		Total Assignment Marks	50		

Course Marks Tabulation				
Component – 1 (B) Assignment	First Examiner	Remarks	Moderator	Remarks
A				

B.1				
B.2				
B.3				
B.4				
Marks (Max 50)				
Marks (out of 25)				
Signature of First Examiner			Signature of Moderator	

Please note:

1. Documental evidence for all the components/parts of the assessment such as the reports, photographs, laboratory exam / tool tests are required to be attached to the assignment report in a proper order.
2. The First Examiner is required to mark the comments in RED ink and the Second Examiner's comments should be in GREEN ink.
3. The marks for all the questions of the assignment have to be written only in the **Component – 1 (B): Assignment** table.
4. If the variation between the marks awarded by the first examiner and the moderator lies within +/- 3 marks, then the marks allotted by the first examiner is considered to be final. If the variation is more than +/- 3 marks then both the examiners should resolve the issue in consultation with the Chairman BoE.

Assignment

Term - 1

Instructions to students:

1. The assignment consists of 5 questions: Part A – 1 Question, Part B- 4 Questions.
2. Maximum marks is 50.
3. The assignment has to be neatly word processed as per the prescribed format.
4. The maximum number of pages should be restricted to 20.
5. Restrict your report for Part-A to 3 pages only.
6. Restrict your report for Part-B to a maximum of 17 pages.
7. The printed assignment must be submitted to the course leader.
8. **Submission Date**: **, 2017**
9. **Submission after the due date is not permitted**.
10. **IMPORTANT**: It is essential that all the sources used in preparation of the assignment must be suitably referenced in the text.
11. Marks will be awarded only to the sections and subsections clearly indicated as per the problem statement/exercise/question

Introduction to the Course:

This course aims at enhancing the basic understanding of chemistry with reference to engineering systems. This course deals with topics on electrochemistry, fuels, metallurgy, air pollution and its control, corrosion science, metal finishing, polymers and nanomaterials.

PART A **(4+4+2=10 marks)**

Vehicle emissions are one of the major sources for environmental pollution. In the past, vehide manufacturers were not concerned about the pollutants coming out of the exhaust of the automobiles. However, with the onset of atmospheric studies showing a rise in the number of pollutants in the air, legislative bodies across the world have taken stringent precautions and put forward few rules on vehicle emissions. Bharat stage emission standards' by the Government of India is introduced to normalize the productivity of air pollutants from internal combustion engine and the norms are based on European regulations. Government of India notified March 31, 2017 as the last date for manufacturing of BS III vehicles such as two-wheeler, three-wheeler and commercial vehides. BS IV emission norms came into effect from April 1, 2017 and most passenger vehicle makers have shifted to produce BS IV-compliant vehicles.

Debate on the statement **"Decision of changing the emission standard BSIII to BSIV is good one, considering the vehicle densities in Indian cities".**

Your debate should emphasize on

A1 Comparison of the petrol and diesel emission norms of BS IV and BSIII.

A2 Purchase cost of vehicles affecting common people.

A3. Justification of your stance.

PART – B

B.1 **(4+6 = 10 Marks)**

Three years back Sneha had moved to Rochester, New York. She enjoyed the snow fall at Rochester. However the clearing of the roads from snow was a huge task, where local bodies were using salt to clear off the ice piled on the roads. Meanwhile Sneha found that few parts of her car had been affected with corrosion (Figure 1 and 2). She registered an online complaint with the company stating that her car is damaged due to corrosion while she had used the same car model in India for more than 6 years without any corrosion.

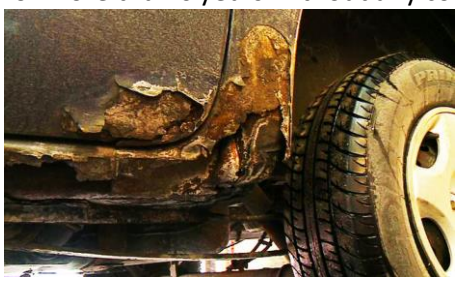


Figure 1

Figure 2

B1.1 As an engineer discuss the factors responsible for corrosion.

B1.2 Recommend the remedial measures to control corrosion.

B.2 **(5+5 = 10 Marks)**

Preamble:

Consider the following kinetic data for the reaction:

$S_2O_8^{2-}(aq) + 3I^-(aq) \rightarrow 2SO_4^{2-}(aq) + I_3^-(aq)$ (1)

Table 1 Kinetic data for the reaction (1)

Expt #	$[S_2O_8^{2-}]$ (mol/L)	$[I^-]$ (mol/L)	Initial Rate, (mol/(L.s)
1	0.038	0.060	1.5×10^{-5}
2	0.076	0.060	2.8×10^{-5}
3	0.038	0.120	2.9×10^{-5}

B2.1 Deduce the rate law for this reaction and determine the rate order w.r.t. each reactant using the data given in the table 1.

B2.2 Calculate the rate constant and the reaction rate when the concentration of both reactants is 0.050 mol/L.

B.3 **(5+5 = 10 Marks)**

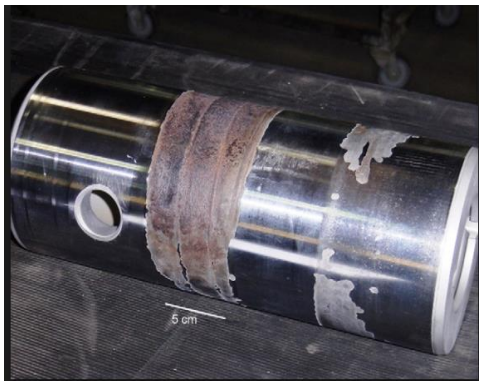
B3.1 The specific rate constant for the second order neutralization of nitropropane by a base is given by $logk = 11.899 - \frac{3169}{T}$

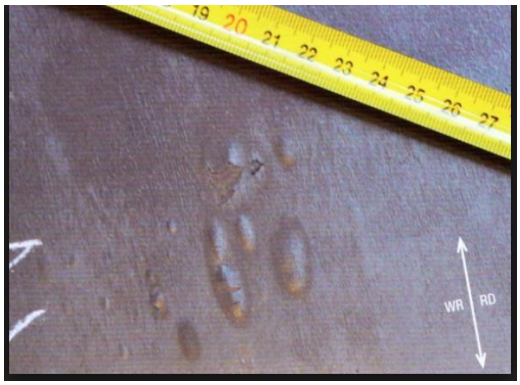
Where concentration is in moles litre^{-1} and time in minutes. k is rate constant and T is temperature in Kelvin. Initial concentration of both reactant is 0.01M. Calculate activation energy and half-life at 25 °C.

B3.2 At 400 °C, the half-life period for the first order thermal decomposition of propylene oxide is 320 min and the energy of activation of the reaction is 217570 J/mole. From these data estimate the time required for propylene oxide to be 75% decomposed at 500 °C

B.4 **(6+4=10 Marks)**

Under the scheme of startup India a young entrepreneur got the order for chrome plating of landing gear components of aircrafts. Even after following all the preventive measures, out of 50 landing gears 20 landing gears were not smoothly plated. There surface was unevenly chrome plated and blisters were present on them (Fig 1 and 2).





B4.1 Give plating bath composition for chromium plating with anodic and cathodic reactions and identify any six reasons for the formation of blisters on the surface of the gear parts.

B4.2 Discuss health hazards associated with chrome plating and suggest any two alternatives of chrome plating.

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