

**BITS PILANI, DUBAI CAMPUS**  
**II YEAR FIRST SEMESTER, 2012-2013**  
**COMPREHENSIVE EXAMINATION-CLOSED BOOK**

Course Title: Engineering Chemistry  
Time: 3Hrs.

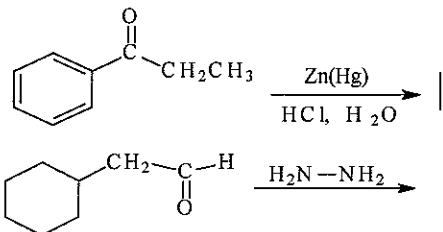
Course No: CHE F214  
Total Marks: 80

Date: 08.01.2013  
Weightage : 40%

**Answer All Questions (Question paper contains 2 pages)**

1. (a) Write the reaction product of the following reactions

(3+3M)



(b) Write the product of the reaction between 1,3 butadiene and ethylene at 200°C under pressure

(4M)

2. (a) Define permanent hardness. Write the experimental procedure to estimate permanent hardness.

(4M)

(c) What are the raw materials needed for the manufacture of portland cement. Write the stages involved in the manufacture of cement.

(4M)

(c) List the different varieties of iron? How do they differ from each other.

(4M)

3. (a) How will you classify fuels based on their physical state? Give examples for each class.

(4M)

(b) What are lubricants? Can solid materials be used as lubricants? if so give examples.

(4M)

(c) Give an account of classification of refractory's with suitable example for each class.

(4M)

4. (a) What are abrasives? Write any four chemical substances that are used as abrasives.

(4M)

(b) What is the chemical constituent of gypsum? Write different types of gypsum plasters with their applications.

(4M)

(c) Define the term catalytic poison with suitable example

(4M)

5. (a) With a suitable block diagram explain the working of Ultra Violet Spectrophotometer.

(8M)

(b) Write the different sources of infra red radiation used in IR spectrophotometer. Give an account of different type of vibrations that are possible in organic molecules.

(4M)

→ go to page 2

6.a) Define the term "Chemical shift" in NMR. What are the scales used to express chemical shift and show the relationship among them. (4M)

b) Draw the phase diagram of a typical one component system – mark triple point and critical point in it. (4M)

c) Write the environmental factors that are responsible for corrosion (4M)

7. a) Define enthalpy of fusion and enthalpy of vaporization with one example (4M)

(b) Explain addition polymerization and Condensation polymerization processes with at least one example. (6M)

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**BITS PILANI, DUBAI CAMPUS**  
**II YEAR FIRST SEMESTER, 2012-2013**

**Test-II-OPEN BOOK**

**Course Title: Engineering Chemistry**  
**Time: 50 Min.**

**Course No: CHE F214**  
**Total Marks: 40**

**Date: 13.12.2012**  
**Weightage: 20%**

**Answer All Questions**

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1. (a) Assume in a given chemical process you are getting 0.025 g of a product. Suggest the most suitable method among TLC and Column chromatography with details of the purification process. (4M)
- (b) Write the frequencies at which the infra red spectrum of ethyl benzene will give absorption peaks. (3M)
- (c) What are the different transitions that are possible in electronic spectroscopy and arrange them in the order of increasing energy. (3M)
- (d) What is meant by the term vacuum UV region? Write its significance in UV spectroscopy. (3M)
2. (a) Discuss the methods of improving the characteristics of Thermoset polymers (3M)
- (b) List out various factors responsible for improving the mechanical properties of a polymer and discuss their effect. (4M)
3. (a) Define Caustic embrittlement and discuss the methods of prevention. (4M)
- (b) Discuss the importance of desalination process. Explain any one of the standard desalination process that is application to industry. (3M)
- (c) Emphasize the importance of removal of microorganism from water. Discuss the details of chlorination method adapted for removal of microorganism. (3M)
4. (a) Identify from the following combinations the worst and the best combination of metals with reference to galvanic corrosion in sea water.- Justify your answer. (4M)
- (i) Copper –Aluminium (ii) Brass-titanium (iii) Cast iron-Nickel (iv) Cadmium - Platinum
- (b) What do you mean by the term graphitization? What are the problems associated with it? (3M)
- (c.) Give an account of any three surface treatment methods employed for corrosion control. (3M)

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**BITS PILANI, DUBAI CAMPUS**  
**II YEAR FIRST SEMESTER, 2012-2013**

**Test-I-CLOSED BOOK**

Course Title: Engineering Chemistry Course No: CHE F214

Date: 21.10.2012

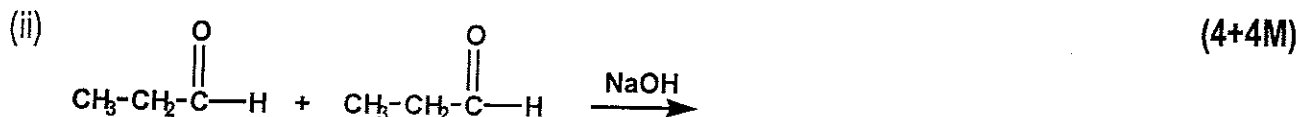
Total Marks: 50 Weightage: 25%

Time: 50 Min

Answer All questions sequentially

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1. Write the product of the following reactions



2. Write the mechanism for

(i) the conversion of an amide into an amine with suitable example

(ii) the formation of an amide from an oxime with a suitable example (4+5M)

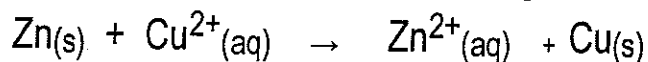
3. State Phase rule and define the terms in it. Give suitable example for non variant, univariant, Bivariant and trivariant systems having degree of freedom 0, 1, 2 and 3. (5M)

4. Draw a phase diagram showing significant points such as triple point, normal boiling point, normal freezing point and critical point and discuss the salient features of it. (5M)

5. Draw the phase diagram of CO<sub>2</sub> in three different phases indicating the pressure and temperature corresponding to various points such as triple point, normal boiling point, normal freezing point and critical point. (6M)

6. Write the balanced chemical equation for the redox reaction between Fe<sub>2</sub>SO<sub>4</sub> and K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> (5M)

7. For the net electrochemical reaction of a galvanic cell



Draw a sketch of the galvanic cell giving anodic and cathodic chemical reactions and the cell notation (6M)

8. What is the standard emf of an electrochemical cell made of a Cd electrode in a 1.0 M Cd(NO<sub>3</sub>)<sub>2</sub> solution and a Cr electrode in a 1.0 M Cr(NO<sub>3</sub>)<sub>3</sub> solution? (6M)

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**BITS PILANI, DUBAI CAMPUS**  
**II YEAR FIRST SEMESTER, 2012-2013**

**A**

**Quiz-II-CLOSED BOOK**

**Course Title: Engineering Chemistry**

**Course No: CHE F214**

**Date: 22.11.2012**

**Time: 20 Min. Total Marks: 14**

**Weightage: 7%**

**Name:**

**I.D. No.**

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1. Write any four classes of catalyst coming under classification based on catalyst action

2. Write the basic assumption of Langmuir adsorption isotherm

3. Write the equation for Freundlich adsorption isotherm and define the terms in it

4. Define catalytic promoter with one example

5. What is a catalytic poison? Give one example

6. How many mL of concentrated  $\text{HNO}_3$  (density = 1.42 g/mL, 71.0%) are needed to make 500.0 mL 0.350 M  $\text{HNO}_3$ ? FW  $\text{HNO}_3$  = 63.013

7. What is the concentration of HCl if 30.0 mL of 0.10 M NaOH neutralizes 50.0 mL HCl?

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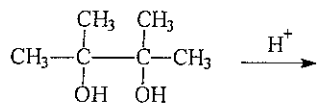
Quiz-I-CLOSED BOOK

Course Title: Engineering Chemistry Course No: CHE F214  
 Total Marks: 16 Weightage: 8%

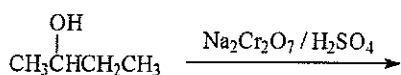
Date: 04.10.2012  
 Time: 20 Min

Name:..... I.D.No.....

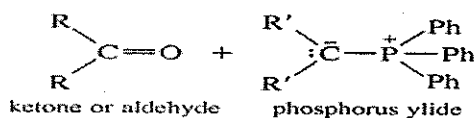
1. Write the name and structure of the product obtained from 2,3-dimethyl-2,3-butanediol during dehydration with sulfuric acid



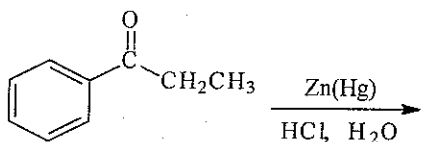
2. Write the product of the reaction



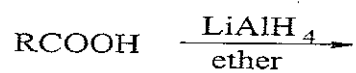
3. Write the product of the Wittig reaction



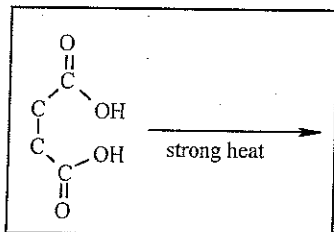
4. Write the product of the following Clemmensen reduction



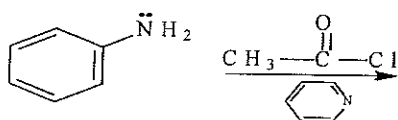
5. Write the product of the reaction



6. Give the product of the following reaction



7. Predict the product



8. Write the name of the test used to distinguish between p-, s-, t-amines.