

TCY-101

276

Printed Pages : 6

Paper Code & Roll No. to be filled in your Answer Book

Roll No.

--	--	--	--	--	--	--	--	--	--

Odd Semester Examination-2016

B. Tech (Semester-I)**ENGINEERING CHEMISTRY**

[Time : 3 Hours]

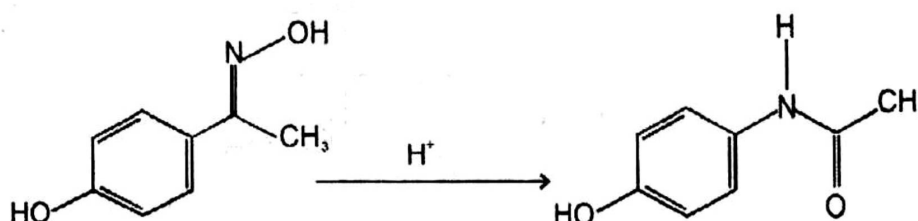
[Maximum Marks :100]

Note: Attempt all questions. The marks assigned to each question are indicated at question itself.

1. Attempt any four questions : [5x4=20]

(a) Draw the molecular orbital diagram for O_2 molecules. Predict the electronic configuration, bond order and magnetic character for O_2 and O_2^+ .

(b) For the following reaction write all the mechanistic steps involved in the formation of product:

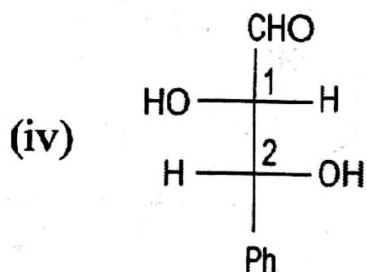
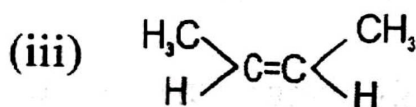
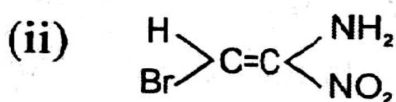


TCY-101/2620

(1)

[P.T.O.]

- (c) What is Bragg's law? Derive Bragg's equation for diffraction of X-rays by crystals. At what glancing angle would the first-order diffraction occur when copper radiation ($\lambda = 1.54 \text{ \AA}$) interacts with the first order lattice planes with inter-planer spacing of 1.54 \AA ?
- (d) Differentiate between intra and intermolecular hydrogen bonding. Explain why H_2O is liquid and H_2S is a gas at room temperature?
- (e) Assign cis-/trans-, E/Z and R/S configuration for the following :



- (ii) Describe the method of preparation, properties and applications of phenol-formaldehyde resins.
- (b) Write the structures, two properties and two uses of:
- (i) PMMA
 - (ii) PP
 - (iii) Nylon-6 and
 - (iv) Buna-S.
- (c) (i) Write a short note on refractories.
- (ii) Explain organometallics and their applications.
4. Attempt any two questions : [10x2=20]
- (a) (i) Write the relationship between high and low calorific values. If HCV of a coal sample is 7500 cal/g and % H is 5 then calculate the low calorific value of the fuel. (Given that latent heat of condensation of steam is 580 cal/g.)

- (ii) How is the calorific value of a fuel determined by bomb calorimeter? Explain with the help of a diagram.
- (b) (i) Define the importance of transesterification in fuel science and give its mechanism.
- (ii) Write a note on biomass and biogas.
- (c) What are lubricants? Discuss the mechanism of thin film and thick film lubrication.

5. Attempt any two questions : [10 x 2 = 20]

- (a) What is the principle of EDTA titration? How the permanent hardness of water is determined using EDTA method?
- (b) Differentiate with suitable examples :
 - (i) Chromophore and Auxochromes
 - (ii) Base peak and molecular ion peak
- (c) (i) How ethanol and diethyl ether will be distinguished with the help of ^1H NMR spectroscopy? Give the splitting pattern as well.

- (ii) Explain different type of electronic transitions that occur in electronic spectroscopy.

----- X -----