Eastern University, Sri Lanka

First Year Second Semester Examination in Science-2010/2011

(April/May 2012)

CH 104 Chemical Kinetics & Organic Reaction Mechanism

(Proper and Repeat)

Time Allowed: One hour

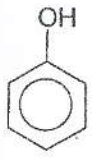
Answer all questions

01(a)(i) Arrange the following carbonium ions in the order of increasing stability and explain your answer.

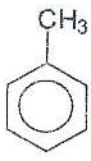
$(CH_3)_2CH^+$ (I) $CH_3CH_2^+$ (II) $CH_2{=}CHCH_2^+$ (III) $(CH_3)_3C^+$ (IV)

(20 Marks)

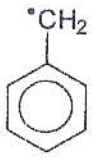
(ii) Draw the resonance structures for the following compounds



I



II



III

(30 Marks)

(b)(i) Suggest a mechanism involved in the following first order reaction.

$(CH_3)_3\text{-}CCl + OH^- \longrightarrow (CH_3)_3\text{-}COH + Cl^-$

(10 Marks)

(ii) Explain how the polar solvent affects the reactivity of SN^1 and SN^2 reactions?

(10 Marks)

(c)(i) What are the theories used to explain acidity and basicity of molecules?

(06 Marks)

(ii) Explain the pKa values CH_3COOH and CH_3OH are 4.76 and 14 respectively and pKb values of NH_3 and CH_3NH_2 are 4.75 and 3.36 respectively.

(24 Marks)

Contd...

02) (a) Suggest the possible mechanism for the nitration of Benzene

(20 M

(b)(i) State the rate law for a chemical reaction.

(10 M

(ii) Define the term "order" of a chemical reaction.

(10 M

(iii) Derive the integrated form of the first order rate equation for the follo reaction and show the half life of the first order reaction is independent o initial Concentration.

$$A \rightarrow \text{Product}$$

(20 Ma

(c) The Concentration of I_2 found experimentally every 10 seconds. The results of su an experimental are listed below,

Concentration of I_2 (mol/dm^3) :	0.100	0.067	0.050	0.040	0
Time (seconds):	0	10	20	30	

Show that the reaction is slowing down with time.

(20 Ma

(d) Show that the half life period of a second order reaction is depend upon the initial concentration of the reactant.

(20 Ma