

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

FIRST YEAR

B.A./B.SC. SECOND SEMESTER (January – June) 2013

Mid-Semester Examination, March 2013

Date : 06/03/2013

CHEMISTRY (General)

Time : 12 noon – 1 pm

Paper : II

Full Marks : 25

[Attempt all questions]

1. a) From MO theory explain the relative stability, bond dissociation energies and bond lengths of O_2 , O_2^+ , O_2^- and O_2^{2-} species. [2+2+2]
b) Explain the following acid base reaction in terms of Lux-Flood definition. [1½×2]
i) $CaO + SiO_2 \rightarrow CaSiO_3$
ii) $PbO + SO_3 \rightarrow PbSO_4$

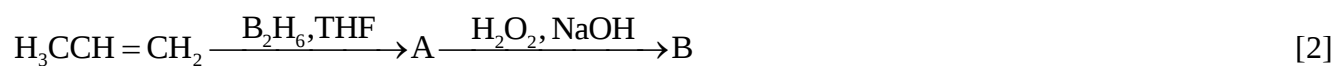
Or

2. a) Define with example, i) Formal potential
ii) Standard Electrode potential
Mention the differences between standard electrode potential and formal potential. [2+2]
b) What are the limitations of Lewis acid-base concept? [2]
c) Determine the bond order of the species H_2^+ , H_2 and H_2^- and hence explain their stability. [2]
d) Ne_2 does not exist, explain. [1]
3. a) Starting with the mathematical definition of the first law of thermodynamics prove that—
i) the energy of the universe is constant.
ii) Work done under adiabatic condition is independent of path. [2×2]
b) What do you mean by macroscopic equilibrium? [1]
c) What is half life? Show that half-life of a 1st order reaction does not depend on concentration of reactant. [Start with differential rate equation] [1+2]

Or

4. a) Explain whether the followings are intensive or extensive property—
i) internal energy
ii) density [1×2]
b) (P_1V_1) and (P_2V_2) represents two arbitrary equilibrium states. They are brought in contact to each other through a wall.
As a consequence both (P_1, V_1) and (P_2, V_2) start changing and finally settle to new sets of values (P'_1, V'_1) and (P'_2, V'_2) . What was the nature of the wall, adiabatic or non-adiabatic? [1]
c) Show that in case of a 1st order reaction, the time required for completion of 99.9% is about 10 times than the time required for 50% completion of the reaction. [3]
d) Define steady state approximation for reaction $A \rightarrow X \rightarrow P$ where 'X' is intermediate, of short life. [2]
5. a) Synthesize—
i) 2-methylpentane from $CH_3CH=CH(CH_3)_2$
ii) $(CH_3)_2CHCH(CH_3)_2$ from propane [1+2]
b) Give the structural formulas for the alkenes formed on dehydrohalogenation of the following alkyl bromides and underline the principal product in each reaction
(i) $BrH_2CCH_2CH_2CH_3$ (ii) $H_3C-CH(Br)-CH_2CH_3$ [1+2]

- c) Give the structural formulas of A and B.



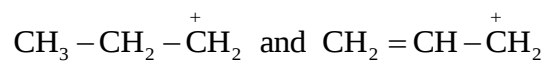
Or

6. a) Define with an example— [2×2]

i) Plane of symmetry

ii) Centre of Symmetry

- b) Which one of the following carbocations is more stable and why? [2]



- c) Write notes on : Steric inhibition of resonance. [2]

