

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

FIRST YEAR [BATCH 2017-20]

B.A./B.Sc. SECOND SEMESTER (January – June) 2018

Mid-Semester Examination, March 2018

Date : 15/03/2018

CHEMISTRY (General)

Time : 11 am – 12 noon

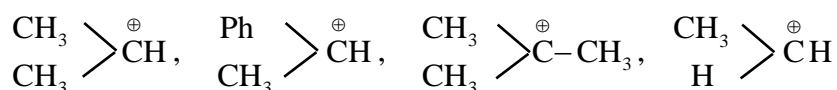
Paper : II

Full Marks : 25

Answer any five questions :

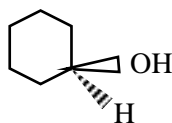
[5×5]

1. a) Arrange the following carbocation in their increasing order of stability with proper explanation. [2]



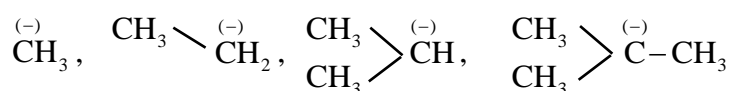
- b) Define Centre of symmetry (i) and plane of symmetry (σ) with one example each. [2]

- c) Write down the mirror image of the following compound [mirror is present in the plane of the paper]. [1]



2. a) Define alternating axis of symmetry (S_n) with proper example. [2]

- b) Arrange the following anions in their increasing order of stability with proper explanation. [2]



- c) Show E and Z isomer with one example each. [1]

3. a) Formation of divalent cation and anion are endothermic yet MgO is a stable ionic solid, comment. [2]

- b) Comment on the thermal stability of BeCO_3 , MgCO_3 , CaCO_3 , SrCO_3 , BaCO_3 . [2]

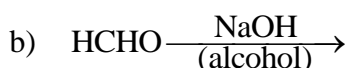
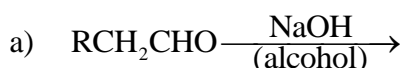
- c) Between NaClO_4 and KClO_4 which one is more soluble in water and why? [1]

4. a) Explain the solubility trends : $\text{MgSO}_4 > \text{CaSO}_4 > \text{BaSO}_4$, in water. [2]

- b) Predict the shapes and indicate the state of hybridisation of the central atom for the following :



5. Write down the major products of the following reactions and also give the outline of plausible mechanism for each of them. [5]



6. The reaction $(\text{CH}_3)_3\text{C}-\text{I} \xrightarrow{\text{OH}^-/\text{H}_2\text{O}} (\text{CH}_3)_3\text{C}-\text{OH}$ can occur via an $\text{S}_\text{N}1$. [5]

- a) Give the outline of the pathways.

- b) Explain why $\text{S}_\text{N}1$ is preferred here over $\text{S}_\text{N}2$.

7. a) What does bond order mean? From the molecular orbital diagram of N_2 , calculate its bond order. [1+2]

- b) He_2 does not exist but He_2^+ exist. Justify. [2]

8. a) From the molecular orbital diagram of O_2 , explain its paramagnetic behaviour. [3]
b) In the light of band theory, distinguish a semiconductor from an insulator. [2]

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