

Roll No.

41256

B. Sc. (Hons.) Mathematics 4th Semester Examination – May, 2019

CHEMISTRY-IV

Paper : BHM-245 Opt.-ii

Time : Three hours | Maximum Marks : 60

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting not more than two questions from each Section.

SECTION – I

- 1. (a) Define auto-ionisation. Write self ionization reaction of : H2O, NH3, SO2. 4
(b) Explain the nature of SOCl2, Na2SO3 as acid /base in liquid SO2 as a solvent. 4
(c) Write down the general characteristics of Lanthanides. 4
2. (a) Give points of similarities between lanthanides and actinides. 5

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- (b) Explain Bronsted-Lowry Acid & Base concept with example. 5
(c) Why Actinides have more tendency to form complexes than actinides. 2
3. (a) Define Lewis acid and Lewis base with an example. 3
(b) Select following as acid and base with reason : AlCl3, H2O, NH3, HCl. 4
(c) Explain Hard & Soft Acid & Base concept with example. 3
(d) Name the Lanthanide which is radioactive. 1
(e) Define Transuranic elements with example. 1

SECTION – II

- 4. (a) Explain 3rd law of thermodynamics along with their application. 3
(b) Derive Clausius-Claypeyron equation. 5
(c) Write a note on : 4
(i) Weston standard cell
(ii) Standard Hydrogen Electrode
5. (a) Explain the spontaneity of the process in terms of : 6
(i) Free energy
(ii) Enthalpy
(iii) Entropy
(b) Define : 2
(i) Standard electrode potential
(ii) Activity

(2)

(c) Give differences between Electrolytic and Electrochemical cell.

6. (a) Prove that :

(i) $dG = VdP - SdT$

(ii) $dA = -PdV - SdT$

(iii) $\Delta S = C_p \ln \frac{T_2}{T_1} + R \ln \frac{P_1}{P_2}$

(b) Derive thermodynamically the Law of chemical equilibrium.

SECTION - III

7. (a) How can you differentiate in between following using IR spectra :

(i) Methanal and propan-2-one

(ii) Cis-1, 2-dichloroethene and trans-1, 2-dichloroethene

(iii) Acetic acid and acetate anion

(iv) Benzoic acid and Ethanol

(b) Define :

(i) Finger print region

(ii) Bathochromic shift

(iii) Fundamental vibration

(iv) Hooke's law

8. (a) What is the structure of :

2

(i) Formalin

(ii) Acetophenone

(b) Explain reactivity order among aldehydes and ketones towards nucleophilic addition reaction on the basis of : 4

(i) Inductive effect

(ii) Steric effect.

(c) Explain the mechanism of following reaction : 6

(i) Aldol condensation

(ii) Wittig reaction

(a) Write the following reactions : 8

(i) Gabriel Phthalimide reaction

(ii) Hofmann bromamide reaction

(iii) Benzoin condensation

(iv) Diazotisation reaction

(b) Do the following conversions : 4

(i) Aniline into Acetanilide

(ii) Ethanamine into Ethyl-isocyanide

(iii) Ethanal into Acetone

(iv) Propanone into Iodoform