Bachelor of Science (B.Sc.) Semester–VI (C.B.S.) Examination

ICH–601 : INDUSTRIAL CHEMISTRY

Paper—1

Time : Three Hours] [Maximum Marks : 50

N.B. :— (1) All **FIVE** questions are compulsory and carry equal marks.

(2) Draw diagram wherever necessary.

1. (A) Give the principle of solvent extraction. What are the applications of solvent extraction in industry ? 5

(B) Define distillation :

Explain the following terms :

(i) Simple distillation

(ii) Fractional distillation

(iii) Vacuum distillation. 5

OR

(C) Explain the crystallization method for the purification of compound with suitable example. 2½

(D) What is ion-chromatography ? Draw schematic diagram of this technique. 2½

(E) Explain the terms :

(i) Purification

(ii) Separation. 2½

(F) What is the principle of HPLC ? Discuss stationary phase (packing) used in HPLC. 2½

2. (A) Discuss the principle and instrumentation of atomic absorption spectroscopy. 5

(B) Why is TMS used as an internal standard in NMR spectroscopy ? Predict the number of signals and their relative intensities in low resolution NMR spectrum of ethyl alcohol. Discuss spin-spin coupling of these peak. 5

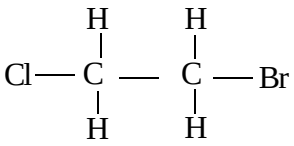
OR

(C) Discuss the principle of IR spectroscopy. 2½

(D) A compound has molecular formula C_4H_8O and double bond equivalent is one. The UV spectrum has λ_{max} 295 nm with $\in$ = 19. IR spectrum shows a very strong band at 1715 cm^{-1} and also shows absorption bands at 2900 and 2700 cm^{-1}. Assign the structural formula to the compound. 2½

(E) Explain the hyperfine splitting in ESR spectrophotometer. 2½

(F) In the following compound, which proton would be expected to have the largest δ value and why ?



2½

3. (A) Discuss the construction and working of polarimeter. Give the limitations of DME. 5

(B) Explain the differential thermal analysis curves (DTA). Write its applications. 5

OR

(C) Discuss the potentiometric titration curve with respect to strong acid and strong base. 2½

(D) In the TGA analysis of 0.250 g of $Ca(OH)_2$, the loss in weight at different temperatures was :

(i) 0.018 g at 373 – 423 K (loss of hygroscopic water)

(ii) 0.038 g at 773 – 833 K (dehydration)

(iii) 0.038 g at 1173 – 1223 K (dissociation).

Determine the composition of various decomposition stages. 2½

(E) State quantitative evaluation by voltametry. 2½

(F) Draw the schematic diagram of a Dupoint differential thermal analyser. 2½

4. (A) Describe the construction and working of flame photometer with the help of schematic diagram. 5

(B) What is spectrophotometer ? Discuss the spectrophotometric applications with suitable examples. 5

OR

(C) Discuss the principle of flame photometer and give its application. 2½

(D) Draw a well labelled diagram of single beam photoelectric colorimeter. 2½

(E) Why the technique of AAS is only limited to metals ? 2½

(F) Draw the schematic diagram of Beckmann DV–2 spectrophotometer. 2½

5. Attempt any **ten** of the following :

(i) Write the name of cation exchange resin.

(ii) What is the condition of solvent selection for extraction ?

(iii) What is mobile phase in HPLC ?

(iv) Give the range of UV-Visible Spectra.

(v) How many bands would be expected in the IR spectrum of water ?

(vi) How many NMR signals are obtained in n-propyl alcohol ?

(vii) Which reference electrode is used in polarography ?

(viii) Write the name of instrument generally used in DSC.

(ix) What is absorbance ?

(x) Why a flame is not preferred in atomiser ?

(xi) Give the name of element which is used as ionization suppressor in flame photometer.

(xii) Which radiation source is used in spectrophotometer ? 1×10=10