Exam. Code: 0002
Sub. Code: 0183

1058

B.A./B.Sc.(General)-2nd Semester

Industrial Chemistry

Paper-B: Material and Energy Balance

Time allowed: 3 Hours | Max. Marks: 75

NOTE: *Attempt five questions in all, including Question No. IX (Unit-V) which is compulsory and selecting one question each from Unit I-IV.*

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UNIT – I

I. (a) Glycerin (Propan-1,2,3-triol) weighing 600mg is dissolved in pure water to make a solution of one litre. Find the total amount of C present per litre of solution. What is the amount of oxygen required for complete combustion of the given glycerin? (6)

(b) A sample of wine contains 20% alcohol on volume basis. Find the mass % alcohol in wine. Density of alcohol is 0.79Kg/L and water is 1.0Kg/L. (4)

(c) (i) Find the moles of oxygen in 500g of it.
(ii) How many grams of carbon is present in 600g $CaCO_3$?
(iii) Find molar mass of $KMnO_4$. (2+2+1)

II. (a) Explain the concept of material balance for both batch & semi-batch process, citing examples. (5)

(b) What are steady and unsteady state systems? Give examples. (5)

(c) Explain the terms limiting reagents and % yield taking a suitable example. (5)

UNIT – II

III. (a) Make a well labeled diagram of a plate column for distillation. Briefly discuss its working.

(b) How are azeotropes distilled for purification? Give a detailed account. (8+7)

IV. (a) Discuss the working of mechanically agitated contractors used for absorption.

(b) Draw a well diagram of spray column. Discuss its construction and working. (7+8)

UNIT – III

V. (a) Explain the term evaporation. Discuss the principle and working of climbing film evaporators.

(b) Discuss the construction and working of plate and frame filter press. (8+7)

VI. (a) What is an extraction process? How is the solvent selected for an extraction process?

P.T.O.

(b) Explain the concept of drying. Name atleast three types of dryers and their respective applications. (8+7)

UNIT – IV

VII. (a) Write a note on various types of fuels used in Chemical Industry.

(b) Give a detailed account of advantages and disadvantages of fuels. (5+10)

VIII. (a) What are various specifications for use of water for industrial use?

(b) What do you understand by desalination? Explain the process. (5+10)

UNIT-V

IX. Attempt the following: -

(a) Define gross calorific value of fuel.

(b) What is hardness of water due to?

(c) Calculate the equivalent weight of Sulphate $\left(SO_4^{-2}\right)$ ion.

(d) How many grams of sulphur are present in 3 moles of H_2SO_4 ?

(e) Distinguish between drying and evaporation.

(f) Name all the components of a standard distillation unit.

(g) Give an example of azeotropic solution.

(h) What are applications of evaporation process?

(i) Give two specifications for quality of air in Industry.

(j) Write the expression for standard enthalpy change for manufacture of ammonia in Haber's process. (10×1½)

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