Exam.Code:0434
Sub. Code: 2970

1056

M.Sc. (Applied Chemistry/Pharmaceutical) Fourth Semester
Paper-402: Chemical Process Development

Time allowed: 3 Hours Max. Marks: 60

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

x-x-x

I. Attempt the following:-

a) Explain the procedure in detail for solving material balance calculations.

b) Differentiate between purge and recycle stream.

c) Differentiate between elementary reactions and non - elementary reactions.

d) Define an ideal - plug flow reactor.

e) What is viscosity? Write its CGS and SI units.

f) Name any two pressure measuring devices. (2x6)

UNIT – I

II. a) Name some chemical process industries. Discuss the importance of utilities in chemical process industries.

b) Discuss importance of following in chemical engineering : Thermodynamics and Instrumentation and process control. (6,6)

III. a) Discuss the effect of temperature and pressure on heat of reaction.

b) Write the general energy balance for a flow process and explain all the energy terms involved. (6,6)

UNIT – II

IV. a) Differentiate between the following : Molecularity and order of the reaction, reaction rate constant and equilibrium constant, Space time and mean residence time, Homogeneous catalysis and Auto catalysis.

b) An aqeous solution of ethyl acetate is to be saponified with sodium hydroxide. The initial concentration of ethyl acetate is 5 g/lt. And that of caustic is 0.1 normal. The values of second order rate constant at 0° C and 20° C are 0.235 and 0.924 (lt/mol) min^{-1} respectively. Calculate the time required to saponify 95% of ester at40°C. (6,6)

P.T.O.

V. a) Write a note on Integral method of analysis.

b) On doubling the concentration of reactant, the rate of reaction triples. Find the reaction order. (6,6)

UNIT – III

VI. a) Derive the design equation for constant density for ideal Plug Flow reactor.

b) The homogeneous gas phase reaction A → 3R follows second order kinetics. For a feed rate of 4 m^3/hr of pure A at 350°C, 5 atm an experimental reactor. (25 mm ID pipe * 2m length) gives 60% conversion of A. A commercial plant is to handle 320 m^3/hr of feed containing 50 mol% A, 50 mol% inerts at 350°C, 25 atm for obtaining 80% conversion of A. How many 2 m lengths of 25 mm ID pipe are needed for 80% conversion? Should these pipes be arranged in parallel or series? (6,6)

VII. Discuss the factors to be considered in the selection of materials for pharmaceutical plant construction. (12)

UNIT – IV

VIII. a) Explain with a neat sketch the working of a rotating concentric cylinder viscometer.

b) Explain construction and working of Bimetallic thermometer. (6,6)

IX. a) Name any two pressure measurement devices and explain the working of any one.

b) Write a note on inclined manometer, (6,6)

x-x-x