



* R H - 7 1 8 7 / 1 0 0 *

RM-7187

B. E. - III (Sem. VI) (T.P.) Examination

May / June - 2010

Chemical Engg. & Rxn. Kinetics

Time : 3 Hours]

[Total Marks : 100

Instructions :

(1)

नीचे दशांशिक निशानीवाणी विगतो उत्तरवडी पर अवश्य लपवी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
B. E. - 3 (Sem. 6) (T.P.)	<input type="text"/>
Name of the Subject :	<input type="text"/>
Chemical Engg. & Rxn. Kinetics	<input type="text"/>
Subject Code No. : <input type="text"/> 7 <input type="text"/> 1 <input type="text"/> 8 <input type="text"/> 7	<input type="text"/>
Section No. (1, 2,.....): <input type="text"/> 1&2	
Student's Signature	

- (2) Answers to each section must be written in **separate** answer book.
- (3) Figures to the right indicate full marks.
- (4) All notations carry their usual meaning.
- (5) Make suitable assumptions wherever necessary and mention them clearly.

SECTION - I

- 1 (a) Answer the following : 10
- (i) What is Elementary Reaction? 1
 - (ii) Define chain reaction. 2
 - (iii) The equilibrium constant of chemical reactions 1
_____ in the presence of catalyst.
 - (a) increases
 - (b) decreases
 - (c) remains unaffected.
 - (iv) The kinetic data obtained by differential method 1
of analysis is used for testing complicated mechanisms. (True/False)

- (v) With increase in temperature, the rate constant obeying Arrhenius equation_____ 1
 (a) Increases
 (b) Decreases
- (vi) Rate of chemical reaction is independent of the concentration of the reactants for a _____ order reaction. 1
- (vii) Define molecularity of a reaction. 1
- (viii) Define rate of reaction. 2
- (b) Write a short note on ternary diagram and explain Binodal solubility curve. 8

2 Answer any **two** of the following : **8×2=16**

- (i) Show that the decomposition of N_2O_5 at $65^\circ C$ is a first order reaction. Calculate the value of rate constant.

Time, min.	0	1	2	3	4
$C_{N_2O_5}$, mol/lit.	0.16	0.113	0.08	0.056	0.040

- (ii) Discuss the temperature dependency from the collision theory for bimolecular collision.
- (iii) Enlist the properties of a solvent to be used for liquid liquid extraction.

3 Answer any **two** of the following : **8×2=16**

- (i) At 500 K, the rate of biomolecular reaction is ten times the rate of 400 K. Find the activation energy of this reaction using Arrhenius Law.
- (ii) Explain the Integral Method of analysis for irreversible unimolecular type first order reactions.
- (iii) A first order reactions is 50% completed in 55 minutes. Calculate the value of the rate constant for the same. Also determine the time required to complete 80% reaction.

SECTION - II

- 4 (a) Attempt the following : 10
- (i) The conversion of kinetic energy to pressure energy is more efficient with _____
 - (a) Volute type casing
 - (b) Diffuser type casing
 - (ii) State at least two means of fluid transport.
 - (iii) In case of _____ meter pressure drop over it is constant.
 - (iv) Define equivalent length of pipe.
 - (v) Reynold No. is ratio of which two forces?
 - (vi) Give SI unit of Viscosity.
 - (vii) Manometer is simple device used for measuring _____ differences.
 - (viii) For handling foaming liquids _____ tower is used and for handling liquids which requires frequent cleaning _____ tower is used.
 - (ix) What is down spalt?
 - (x) What is reflux and reflux ratio?
- (b) (i) Differentiate tray tower and packed tower in g-l contact operations. 6
- (ii) Discuss shear stress Vs shear rate curve for fluid. 4
- 5 Attempt the following : (any two) 8×2=16
- (a) Sulphuric acid of sp. gr. 1.3 is flowing through a pipe 5 cm i.d. A thin tipped orifice of 1 cm diameter is fitted in the pipe and the differential pressure shown by mercury manometer is 10 cm. Assuming that the leads to the manometer are filled with acid, calculate the weight of acid flowing per hour. Assume the value of C_o as 0.61.

- (b) (i) Water of density 1000 kg/m^3 and viscosity $0.0008 \text{ (N-S/m}^2)$ is pumped at $1000 \text{ (m}^3/\text{sec)}$ through a 25 mm i.d. pipe. Calculate the value of Reynold No.
- (ii) The U-tube manometer is used to measure pressure drop across an orifice meter. The manometric fluid is mercury (sp. gr. 13.6) and fluid flowing through pipeline and filling manometric leads is brine (sp.gr. 1.26); when the pressure at taps are equal, the level of mercury in manometer is one meter below the taps. In operating conditions, the pressure at the upstream tap is 115.324 kN/m^2 absolute and that at the downstream tap is 33.864 kN/m^2 below atmospheric. What is the reading of manometer in centimeters ?
- (c) Write principle construction and working of reciprocating pump in detail with neat sketch.

6 Attempt the following : (any two)

7×2=14

- (a) Differentiate
- (i) Variable head meter and variable area meter
- (ii) M flux and J flux
- (b) Write short note : Pitot tube
- (c) Write a note : Choice of separation methods.
-