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Question Paper Code: 57903

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Seventh Semester

Chemical Engineering

15UCH703- CHEMICAL REACTION ENGINEERING-II

(Regulation 2015)

Duration: One hour

Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. Pores with diameter less than 2nm (20 \AA) are called CO1- R
(a) mesopores (b) micropores (c) macropores (d) millipore
2. Pore size distribution of a catalyst is affected by CO1- R
(a) preparation condition (b) amount of loading of active component
(c) both (a) and (b) (d) none of the above
3. Adsorption data are frequently reported by CO2-U
(a) Adsorption isotherms (b) Catalyst deactivation
(c) Sigmoidal curve (d) none of the above
4. Under operating condition $k_g \gg k''$ then overall rate reduces to CO2- U
(a) $-r_A'' = k'' C_{Ag}$ (b) $r_A'' = k_g C_{Ag}$
(c) Both (a) and (b) (d) none of the above
5. When a the catalyst increases rate of a chemical reaction ,the value of CO3- R
the rate constant
(a) Remains constant (b) increases (c) decreases (d) become infinite
6. For large value of thiele modulus ($L/\sqrt{k/D}$) of a solid catalyzed first CO3- U
order reaction,the effectiveness factor , the effectiveness factor (λ) is
given by
(a) $\lambda = 1$ (b) $\lambda = L/\sqrt{k/D}$ (c) $\lambda = 2$ (d) $\lambda = 1/L\sqrt{k/D}$

7. Give the expression for the time required for conversion if chemical reaction controls CO4- R
- (a) $\tau = \rho_B R / bkC_{Ag}$ (b) $\tau = \rho_B R^2 / 6bDC_{Ag}$ (c) both (a) and (b) (d) none of the above
8. Identify a reactor which works in semi batch operation in a non-catalytic fluid solid reaction CO4- R
- (a) Ion exchange column (b) Blast furnace (c) Rotary dryer (d) All of the above
9. SO₂ can be absorbed in absorbers using -----as solvent. CO5- R
- (a) Dimethyl aniline (b) NaOH (c) Na₂CO₃ (d) K₂CO₃
10. CO₂ can be absorbed in absorbers using _____solvent. CO5- U
- (a) Ethanol amines (b) NaOH & H₂SO₄ (c) Copper Ammonium salts (d) H₂SO₄

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. Discuss in detail about catalyst and catalyst components. CO1- U (8)
12. In slurry reactors pure reactant gas is bubbled through liquid containing suspended catalyst particles. To reach the surface of solid the reactant must diffuse through the liquid film into the main body of liquid and then through the film surrounding the catalyst particle. At the surface of the catalyst particle gives product according to first order kinetics. Develop an expression for the rate of reaction in terms of resistances. CO2- App (8)
13. Demonstrate expressions for internal diffusion that takes place in a single cylindrical pore with first order reactions. CO3- U (8)
14. Discuss in detail on Shrinking core model and derive expression for diffusion through gas film CO4-U (8)
15. Explain in detail about film theory, penetration theory and surface renewal theories. CO5- U (8)