Code: R7312302

R07

III B. Tech I Semester (R07) Supplementary Examinations, May 2012

BIOCHEMICAL REACTION ENGINEERING - I

(Biotechnology)

Time: 3 hours Max Marks: 80

Answer any FIVE questions
All questions carry equal marks
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1 (a) Explain the concept of order and molecularity of a reaction.
(b) Discuss about Arrhenius law.
(c) The pyrolysis of ethane proceeds with an activation energy of about 300kJ/mol. How much faster is the decomposition at 700 ^{0}C than at 500 ^{0}C?

2 Discuss about the death kinetics involved in batch and continuous sterilization.

3 The growth of an organism on hexadecane can be described by the following stoichiometric equation:
$C_{16}\ H_{34} + 12.4\ D_2 + 2.09\ NH_3 \rightarrow 2.42\ (C_{4.4}\ H_{7.3}\ N_{0.86}\ 0_{1.2}) + eH_2O + 5.33\ CO_2$.
Calculate the following:
(a) Coefficient e.
(b) The respiratory coefficient.
(c) Yield coefficient $y_{x/s}$ and $y_{x/0_2}$

4 Liquid reactant A decomposes as follows, with $C_{AO} = 2$,
$A \rightarrow Rr_R = 1$
$A \rightarrow Sr_S = 2C_A$
$A \rightarrow Tr_T = C_A^2$
Find the maximum expected Cs for isothermal operations in: (a) a mixed flow reactor and (b) a plug flow reactor.

5 Discuss briefly about:
(a) Substrate activation and inhibition.
(b) Multiple substrates reacting on a single enzyme.

6 (a) Write about the kinetics involved in single substrate enzymatic reactions.
(b) Describe the estimation of Michaelis – Menten parameters by various methods.

7 Write in detail about chemical and physical techniques of enzyme immobilization. Mention the advantages and disadvantages of each.

8 Give a brief analysis of film and pore diffusion effects on kinetics of immobilized enzymes.

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