Code :R7312302

R7

III B.Tech I Semester(R07) Supplementary Examinations, May 2011
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 reaction.

    (b) The pyrolysis of ethane proceeds with an activation energy of about 300 kJ/mol. How much faster is the decompostion at 650^0C than at 500^0C.

    (c) A certain reaction has a rate given by $-r_A = 0.005C_A^2 mol/cm^3$ min. If the concentration is to be expressed in mol/liter and time in hours, what would be the value and units of the rate constant?

2. Give a detailed account of batch and continuous sterilization.

3. (a) Discuss about substrate limited growth kinetics.

    (b) Give an account of models for inhibition kinetics.

4. Aerobic degradation of benzoic acid by a mixed culture of microorganisms can be represented by the following reaction.
    $C_6H_5COOH + aO_2 + bNH_3 \rightarrow cC_5H_7NO_2 + dH_2O + eCO_2$

    (a) Determine a,b,c,d and e if RQ=0.9

    (b) Determine the yield coefficients $Y_{x/s}$ and Y_{x/O_2}

    (c) Determine the degrees of reduction for the substrate and bacteria.

5. Consider the parallel decomposition of A, $C_{A0}=2$,
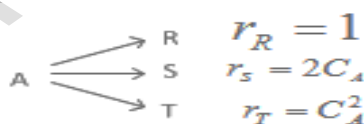
    Find the maximum expected C_S for isothermal operations

    (a) In a mixed flow reactor.

    (b) In a plug flow reactor.

6. (a) Derive the Michaelis Menten equation by using the quasi-steady-state approximation for simple enzyme kinetics with single substrate.

    (b) Give an account of the various methods of estimation of Michaelis Menten parameters.

7. Write about the various application of immobilized enzyme system.

8. Write short notes on:

    (a) Analysis of intraparticle diffusion and reaction.

    (b) Effects of external mass transfer resistance both with regard to immobilized enzyme kinetics.

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