

BBL331 (Bioprocess Engineering) MAJOR EXAMINATION

Date 19.11.2017(8-10 AM) LH 308

Max. Marks – 40

Please attempt all the questions-

1. How can the maximum specific growth rate (μ_m) of an organism determined from batch culture experiments?
(a) μ_m = the slope of a plot of \ln [Biomass] against time (b) μ_m = the slope of a plot of \ln [Biomass] against time for exponential phase data only (c) μ_m = the slope of a plot of [Biomass] against time (d) μ_m = the slope of a plot of [Biomass] against time for exponential phase data only. [1]
2. Distinguish between dynamic yield and overall yield in batch cultivation. [2]
3. Briefly describe how you can establish the growth associated and non growth associated product formation in a microbial cultivation. [2]
4. Mathematically demonstrate that productivity of continuous cultivation is more than a batch cultivation. [2]
5. Describe the reasons for lag phase & on-set of deceleration phase in a batch cultivation. [1]
6. Describe one method of control of the dissolved oxygen [2]
7. Describe Arrhenius equation. What is its utility in the batch media sterilization? Name the microorganism used for the design of batch sterilization cycle [2]
8. Define Peclet no. ? What are its units ? What does it signifies mainly ? [2]
9. Why is it necessary to sterilize the air? Briefly describe the steps involved in the calculation of length of an air sterilizer. [4]
10. Answer "yes" or "no" to the following questions.
a) Froude number is a measure of centre of gravity of the liquid above its static position & can be neglected except when vortex is produced. b) Diameter of impeller is usually one third of the tank diameter c) Diameter of baffle is usually 0.2 times the tank diameter [3]
11. Derive an expression for μ for continuous cultivation with cell recycle & demonstrate that $D > \mu_{max}$ can be maintained in such a reactor. [4]
12. What could be the consequence(s) (name at least two of them) of using P/V as the scale up criteria? What could be done under such scenario? [3]
13. Explain the key steps involved in oxygen transfer from gas bubble to bacterial cell suspended in aqueous fermentation broth [4]
14. Describe principle of dissolved oxygen (DO) measurement by DO probe normally used in bioreactor cultivations. List out the key factors affecting the measurement of DO. [3]
15. Describe the principle of measurement of O_2 in the gaseous phase. How this sensor could be useful in assessment of culture metabolic activities? [2]
16. Describe Simplex method for design of suitable fermentation media recipe. [3]