

八十八學年度 生命科學系 生物技術所 0804 系(所) 乙 組碩士班研究生招生考試

科目 生化工程 科號 1104 共 1 頁第 1 頁 *請在試卷【答案卷】內作答

1. You are working for company A with a project on developing immobilized enzyme techniques.
 - (a) There are physical and chemical methods used for enzyme immobilization. Please describe the differences (10%)
 - (b) Explain how we use effectiveness factor and Thiele's modulus to determine the appropriate size for immobilized enzyme particles. (10%)
 - (c) If mammalian cells are chosen for immobilization, what are the important considerations different from enzyme or bacteria/fungi immobilization? (10%)
2. Please briefly describe the graphical methods of estimating the residence time for
 - (a) batch or plug flow fermenter (10%)
 - (b) continuous stirred tank fermenter (10%)
3. Company Y has developed a fed-batch culture for L-lysine production from *B. flavum*.
 - (a) What are the advantages of using fed-batch culture compared to batch culture? (10%)
 - (b) The strategy of the feed-batch lysine fermentation is to maintain the reducing sugar concentration. However, there is no "on-line" sensor to detect the sugar concentration. Please describe other possible methods to conduct the fed-batch culture. (10%)
4. The downstream processing for recombinant Hepatitis B virus vaccine produced from yeast cells includes the following steps:

Yeast cell disruption → antigen extraction → centrifugation/ultrafiltration → silica adsorption → hydrophobic interaction chromatography → size exclusion chromatography → diafiltration → sterile filtration → formalin treatment → alum adsorption → preservative addition → liquid fill

Please briefly describe the meanings of (a) ultrafiltration (b) size exclusion chromatography (c) hydrophobic interaction chromatography (d) diafiltration (e) alum adsorption (20%)
5. Please describe the method(s) of measuring $k_L a$ value of oxygen transfer in bioreactors? (10%)