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TEST -3 EXAMINATION- May 2018

B.Tech VIth Semester

COURSE CODE: 16B11BT611 MAX. MARKS: 35

COURSE NAME: Downstream Processing

COURSE CREDITS: 04 MAX. TIME: 2 Hrs

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Do all set of a question at a single place.

[CO1, CO2]

1. a) Why non-ionic detergents over ionic detergents are preferred for cell disruption in bioprocessing? **[1]**

b) Why nucleic acid removal from the cell lysate is important before further processing? **[1]**

c) How the number of unit operations of DSP and the quality of products increase the cost of final products? **[2]**

d) Explain the difference between the procedure of purification of extracellular and intracellular proteins from a bacterial cell. **[2]**

[CO3]

2. a) What do you understand by Azeotropic distillation? Give an example. **[2]**

b) What are the major problems caused by the compressed filter cake during filtration? How the filter aid helps in dealing with these problems? **[2]**

c) How will you differentiate between Liquid-liquid extraction and Adsorption? **[2]**

[CO4, CO5]

3. Cell-free fermentation liquor contains 8×10^{-5} mol l^{-1} immunoglobulin G. It is proposed to recover at least 90% of this antibody by adsorption on synthetic, non-polar resin. Experimental equilibrium data are correlated as follows:

$$C^*_{AS} = 5.5 \times 10^{-5} C^*_A{}^{0.35}$$

Where C^*_{AS} is mol solute adsorbed per cm^3 adsorbent and C^*_A is liquid-phase solute concentration in mol l^{-1}. What minimum quantity of resin is required to treat 2 m^3 fermentation liquor in a single-stage mixed tank? **[3]**

4. a) A pilot-scale gel-chromatography column packed with Sephacryl resin is used to separate two hormones A and B. The column is 5 cm in diameter and 0.3 m high; the void volume is 1.9×10^{-4} m^3. The water regain value of the gel is 3×10^{-3} m^3 kg^{-1} dry Sephacryl; the density of wet

gel is 1.25 x 10^3 kg m^{-3}. The partition coefficient for hormone A is 0.38; the partition coefficient for hormone B is 0.15. If the eluant flow rate is 0.7 1 h^{-1}, what is the retention time for each hormone? **[3]**

b) Which hormone has higher molecular weight and why? **[1]**

5. If you wish to purify two different proteins A and B having pI 8.0 and 6.0 respectively and the protein A is found to be unstable at acidic conditions. How will you purify both the proteins using ion exchange chromatography? Also draw the chromatogram for the purification. **[2]**

6. List the four criteria on the basis of which will you select a suitable solvent for extracting a component from a liquid mixture? Also explain the effect of each criteria how it will affect the extraction of a component. **[4]**

[CO6]

7. a) List the name of two organisms besides *Saccharomyces cerevisiae* which are being used for alcohol production. **[1]**

b) Write down the metabolic reactions along with the enzymes involved in gluconic acid production. **[1]**

c) How clavulanic acid, an antibiotic, helps in killing pathogens? **[1]**

d) How can the excretion of citrate be guaranteed when isocitrate is necessary for citrate synthesis? Write the possible reactions. **[2]**

8. How will you recover the following after completion of fermentation? Explain through a self explanatory flow diagram for each. **[5]**

a) Gluconic acid

b) Citric Acid