JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- APRIL-2023

COURSE CODE(CREDITS): 04 (18 BT 611) MAX. MARKS: 25

COURSE NAME: Downstream Processing

COURSE INSTRUCTORS: Dr. Saurabh Bansal MAX. TIME: 1 Hour 30 Minutes

---

Note: *All questions are compulsory. Marks are indicated against each question in square brackets.*

[CO 2]

1. **a)** Why industries prefer microbial species which produces products extracellularly over those synthesizes products intracellularly? **[1]**

   b) List those steps which are only carrying out in the case of intracellular products recovery. **[1]**

[CO 3]

2. Which one of the following is a batch filter unit: Rotory Vaccum Filter and Filter press? **[1]**

3. **a)** What do you understand by salting out? **[1]**

   b) What are the advantages of carrying out salt-induced precipitation at low temperature? **[1]**

4. **a)** After extraction, which fraction is known as raffinate and extract phase? **[1]**

   b) In adsorption, what are adsorbate and adsorbent? Draw a suitable diagram representing adsorbate and adsorbent. **[2]**

   c) Differentiate between Liquid-Liquid extraction and Adsorption? **[3]**

5. What is electrodialysis? Explain its methodology with suitable diagram. **[2]**

[CO 4]

6. **a)** Is there any benefit of using nanofiltration after ultrafiltration? Justify your answer with appropriate diagram. **[2]**

   b) Why concentration polarization should be a concern during ultrafiltration? Which of the filtration methods (Dead-end or cross flow filtration) can resolve the issue of concentration polarization up to a limit? Justify your answer with suitable diagram. **[3]**

7. It takes 30 minutes to filter a slurry of 1 m^3 using a filter of 1 m^2 area. How long will it take to filter 20 m^3 of same slurry with a filter of area 20 m^2. Assume incompressible cake, resistance offered by cloth is zero and same pressure. [2]

8. Aqueous two-phase extraction method is used to extract an enzyme. The partition coefficient is 2. Calculate the maximum possible enzyme recovery when the volume ration of upper to lower phase is 2. [2]

[CO 5]

9. 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]