Dr. Saurabh Bansal

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

End SEMESTER EXAMINATION-2015

B.Tech VIth Semester

COURSE CODE: 10B11BT614 **MAX. MARKS:** 45

COURSE NAME: Fermentation Technology & Downstream Processing

COURSE CREDITS: 04 **MAX. TIME:** 3 HRS

Note: All questions are compulsory.

Section A **(Marks: 10)**

1. List the two important application of Lactic acid.
2. What is Clavulanic acid?
3. What do you understand by salting out?
4. What are the characteristics of secondary metabolites?
5. Why the production of citric acid should not be carried out in iron vessels?
6. What are the physical conditions required for the animal cell culture?
7. Why the productivity in chemostat is higher than that of in batch culture?
8. Write down the principle of distillation.
9. When the feed and solvent are fully miscible, is extraction still possible? Justify your answer.
10. Why formulation of the biomolecules is important?

Section B **(Marks: 15)**

1. **a)** Small food particles with diameter 10^{-2} mm and density 1.03 g cm^{-3} are suspended in liquid of density 1.00 g cm^{-3}.The viscosity of the liquid is 1.25 mPa s. A tubular-bowl centrifuge of length 70 cm and radius 11.5 cm is used to separate the particles. If the centrifuge is operated at 10,000 rpm, estimate the feed flow rate at which the food particles are just removed from the suspension. **[3]**

   b) Why DNA removal is important while intracellular protein recovery/purification? **[2]**

2. Cells of the fall armyworm *Spodoptera frugiperda* are cultured in a fermenter to produce viral particles for insecticide. Viral particles are released into the culture broth after lysis of the host cells. The initial culture volume is 5 litres. An aqueous two-phase polymer solution of volume 2 litres is added to this liquid; the volume of the bottom phase is 1 litre. The virus partition coefficient is 10^{-2}.

   a) What is the yield of virus at equilibrium? **[2]**

   b) Derive an equation for the concentration factor in terms of liquid volumes and the partition coefficient only. **[3]**

3. **a)** What are the different properties need to be improved in a strain for the ethanol production and why? **[2]**

   b) What are the different advantages of using *Zymomonas mobilis* for the ethanol production claimed by different research groups? **[3]**

Section C **(Marks: 20)**

1. Explain the downstream processing of following with a suitable flowchart: **[3+3]**

   a) Penicillin **b)** Citric Acid

2. Differentiate between following in tabulated format: **[3+3]**

   a) Hydophobhic interaction and Ion exchange chromatography

   b) HPLC and FPLC

3. Explain following each phenomena affecting membrane performance during membrane filtration. Also explain how will you sort out the problems raised due to each phenomenon? **[2+3+3]**

   a) Membrane compaction **b)** Concentration polarization **c)** Fouling

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