7th Semester B.Tech. Biotechnology

NBT701: Bioseperation & Down Stream Process

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UNIT I - INTRODUCTION TO BIOSEPARATION PROCESS (8)

Role and importance of bioseparation in biotechnological processes: RIPP scheme, Problems and requirements of bioproducts purification - Properties of Biomolecules - Characteristics of fermentation broth - Biological activity, Analysis of purity-Process economics: Capital and operating cost analysis.

UNIT II - REMOVAL OF INSOUBLES (8)

Cell disruption methods for intracellular products: Physical, chemical and mechanical - Removal of insolubles: Biomass and particulate debris separation techniques - flocculation - sedimentation - centrifugation and filtration methods.

UNIT III - ISOLATION OF PRODUCTS (8)

Adsorption: Principles - Langumir - Freundlich isotherms - Extraction: Basics- Batch and continuous, aqueous two-phase extraction - supercritical extraction - *in situ* product removal - Precipitation: Methods of precipitation with salts - organic solvents and polymers - Membrane based separations: Micro and ultra filtration - theory - design and configuration of membrane separation equipments and its applications.

UNIT IV - PURIFICATION OF BIOPRODUCT (8)

Basic principles of Chromatographic separations: GC-HPLC - gel permeation - ion-exchange -affinity - reverse phase and hydrophobic interaction chromatography - Electrophoretic separation techniques: capillary - isoelectric focusing-2D gel electrophoresis - Hybrid separation technologies: GC-MS and LC-MS.

UNIT V - PRODUCT POLISHING (8)

Crystallization: Principles-Nucleation-Crystal growth-Kinetics-Batch crystallizers: Scale-up and design, Drying: Principles-Water in biological solids- Heat and mass transfer-Drying equipments: description and operation-Vacuum shelf - rotary dryer-Freeze dryer-Spray dryer.

Biomolecules of Commercial importance Ethanol, citric acid, lysine, steroids, penicillin, dextran, trehalose, subtilisin, chymosin, vitamin B12, hepatitis B vaccine, insulin, erythropoietin, monoclonal antibodies.