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Total Duration: 2 Weeks

Theory: 1 hr day

Practicles: 3 hrs /day

Topics

1. Introduction to Bioreactors / bioreactor engineering.

Total description, dismantling and assembly of a typical reactor which makes students/researchers familiar with bioreactors of any type.

2 pH theory

To calibrate a pH meter

To calibrate a pH meter w.r.t to a bioreactor

3 Oxygen solubility and Galvanic oxygen analysis

Calibration of galvanic and polarographic DO electrodes

Control dynamics of a DO in a bioreactor, cascade controls

Temperature effect on DO kinetics

4 Importance of temperature in biological growth control.

Measurement techniques and their importance

Temperature control/ implementation in a reactor

External temperature control and internal temperature control

5 Heat Transfer

Concept of heat transfer and calculations pertaining to efficiency of heat transfer in jacketed and bare vessels

Determination of temperature control function with jacketed and bare reactors

6 Types of Bioreactors

Theory and design aspects of different types of bioreactors....

The aspect ratio in a Bioreactor

Renolds no / mixing characteristics

Baffle design in stir tank reactor

Sprayzing

7 Air Lift reactors

What is shear

Shear sensitivity

Bubble / Bubble size / growth

Internal separation circulation

External circulation

Instrumentation in Air Lift Bioreactors.

Practical experiments for pH, DO and flow circulation w.r.t temperature control

8 Solid State Bioreactors

Mushroom culture

Monitoring O₂ in a bioreactor by analyzing O₂ and CO₂ content using discrete analyzers

Application of SSR in paper pulp industry and biofertilizers, breakdown of lignin by SSR

Plant tissue culture / root growth reactor (experiment of root growth study)

9 Packed Bed Reactors

Description and construction details and control engineering

Packing density, to run the columns, control parameters, external temperature maintenance, instue probe for temperature, external circulation, upward flow/ downward flow etc

Immobilization techniques

Immobilization of bacteria, enzymes etc

10 Fluid Bed reactors

Equations for fluidity, density, pack density aeration, fluidization etc.

Fluid bed reactors as a means to conduct bioreactions.

11 USE A BIOREACTOR FOR MANUFACTURE OF ETHANOL USING BAKERS YEAST

A comprehensive lab work manual covering all the topics listed will be given to the students

Lab work will be done at our site at the above mentioned address

Compiling of project reports will not be entertained at our office