

Welcome back students.

In this lecture we are doing the 15th module fed batch

fermentation. The outline for this lecture is.

Fed batch fermentation, its advantages and disadvantages

and applications the learning outcomes are you will be able

to explain all the aspects of Fed batch fermentation.

Before moving to Fed batch fermentation we will re collect

what we have learned in batch fermentation in a batch

fermenter. Substrate is added and the fermentation proceeds

and after fermentation has taken place the product is recovered

so the fermentation takes place

in batches. Fed batch fermentation is a modification

of batch cultivation.

Feed is continuously added until maximum liquid fermenter volume

is reached. Feed is added but effluent is not removed. The

speed. Thus fed batch fermenters are used to maintain

cells under low substrate or nutritional conditions without

washout occurring. So in this type of fermentation, substrate

is added little by little.

And the product is not removed.

This is usually used for yeast cultivation when we need to

cultivate yeast, we usually supply it with sugar or mild if too much of sugar is given to the yeast, it will grow excessively and cause an anaerobic condition in the fermenter. This anaerobic condition will lead to the production of ethanol which we do not want. Here we're trying to cultivate yeast. That is why sugar is added little by little as the yeast grows more sugar is added to the.

For example, if substrate is added so fed batch fermentation is a semi closed system wherein substrate is added but the product is not recovered. That's why it's called a semi closed system.

Now we will see the advantages of this Fed batch fermentation.

It has a higher yield resulting from a well defined cultivation period during which no cells are added or removed. So you have a higher yield in that period where no cells are added or removed. Increased opportunity for optimizing environmental conditions of the microorganisms in regard to the phase of growth or production. An age of the culture. So you can optimize the environmental conditions for this.

But the cultures during the process nearly stationary

operation. Important with slightly mutating microorganisms and those at risk of contamination. So when you're carrying out fermentation processes where there is a high risk of contamination or mutation of the cells which you are using for the production, this fermentation process is used as it has a stationary operation.

Now we will see the disadvantages. It has a lower productivity level due to time for filling, heating, sterilization, cooling, emptying and cleaning the reactors.

How in batch fermentation we had to heat sterilize it, clean it here also the same thing is done after every process.

Higher cost in labor or dynamic process control. Further process you have higher cost in this fermentation, so these are the advantages and disadvantages of batch fermentation.

Now we will see the applications of Fed batch fermentation.

We know that fed batch fermentation can maintain low nutrient and substrate concentrations thus utilized in producing products such as so now we will see which are the products which are produced using Fed batch fermentation.

Production of vinegar, citric acid analogs as high substrate level can inhibit or have adverse effects on the cells. So in this production of vinegar/citric acid analogs we have to use less substrate at the beginning. For example, vinegar is made from ethanol, and if we add too much of alcohol with an all in the fermenter, first only the organisms will die. That is why little amount of substrate has to be added. The culture has to be grown, and then most substrate can be added.

The next production we fed batch fermentation is used. Our production of baker's yeast and antibiotics products or biomass yield are high at low concentrations. We have already seen that Fed batch fermentation is used for because yeast cultivation.

It requires specific nutrient ratios for product formation. Example carbon is to nitrogen in those processes where we have nutrient ratios that carbon is to nitrogen has to be at that amount only. We can use fed batch fermentation. Oxygen uptake rate is restricted by maintaining low substrate concentration, which can be done only in Fed batch fermentation.

Now I have a question for y'all.

In the third batch method, the critical elements of the nutrient solution are added in which amount of concentrations at the beginning of the fermentation. Small, large, very large or little, and the answer is small.

Another question, Fed batch culture is not used for substrate inhibition through a force.

It is false. Fed Batch culture is used for substrate inhibition. So in today's video we learned about Fed batch fermentation. How it is used and what is its?

Characteristics we have learned that the substrate is added little by little, and then after the fermentation is complete, the product is recovered.