Quadrant II – Transcript and Related Materials

Programme : Bachelor of Science (Third Year)

Subject : Microbiology (HONS.)
Paper Code : MIC106
Paper Title : Industrial Microbiology
Title of Unit : Types of fermentation processes, bioreactors and measurement of fermentation parameters
Module Name : Monitoring and control of fermentation parameters: foam
Module Number : 25
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Notes

2 types of foam : True foam and Fluid foam.

True foam has gaseous dispersion i.e. has thin film of liquid surrounding air, whereas in fluid foam the proportion of liquid is more.

In fungal fermentation the foam is evenly suspended in broth whereas in bacterial fermentation there is a clear demarcation between foam and underlying fluid.

Causes of foam- During fermentation, foam will be formed as a result of agitation and aeration.

Materials which yield foam forming are aqueous solutions such as proteins, peptides, synthetic detergents, soaps, and natural products such as saponin, lower the surface tension of the solution and permit foam formation. You can compare it to a rubber balloon. The thinner the sheet the easier it is to blow balloons.

Implications of foam.

Foam is undesirable because -

1. Loss of mos
2. Pressure build up
3. Impedes aeration and mixing eg mixer blade
4. Delay in nutrient addition and pH control
5. Seepage into ancillary attachments
6. Contamination , due to touching lid
7. Autocatalytic

Detection of foam can be with the help of an electrically activated system which consists of a probe, attached to a detector , a timer, a reservoir tank and a pump. When foam touches the probe, the detector sends a signal to the antifoam reservoir tank to pump a timed release of antifoam agent.

Another method is the wick defoamer, in which antifoam is released when foam makes contact with a wick.

Addition of antifoams may be manual as per requirement when foam is observed. But it would require a human operator to keep a close watch and may result in over use of foam due to human error causing the whole operation to be more expensive.

Automatic antifoam additions are now very common and antifoam is added as described when it touches a probe or a wicking system. Disadvantage is that there may be wastage of foam due to splashing of media on probe. Problem is sorted by a delay mechanism fitted in the circuit which keeps a 1 min delay before next addition.

Other systems which have been used include antifoam introduction via the sparging of air on foam surface , or continuous drip-feeding of antifoam on a rotating disc fitted to a stirrer shaft.

Foam breakers are of 2 types : Chemical and mechanical. Chemical can be crude or inert. Which are further classified as antifoams (prevent) and defoamers (destroy foam)

Inert antifoams- more expensive, not utilized by mos, non toxic,can be used for research like pure polysiloxanes and aqueous emulsion of 10% silicone and polyglycols

Crude antifoams- utilized as C source. Eg Plant origin: Soyabean oil, linseed oil, cotton seed oil, castor oil, corn oil.

Animal origin: Lard oil.

And alcohols

Inert antifoam agents require a carrier. Inert with respect to antifoam agent only serves to carry and slowly release it.

Mechanical foam breakers can be internal or external.

Mechanical devices may not be effective by themselves, so may require to be supplemented simultaneously with low concentrations of chemical anti foam agents.

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