FERMENTATION: PRINCIPLES & TECHNOLOGY

FERMENTATION TECHNOLOGY

- "fermentation" Latin verb *fervere*, to boil

- carbon dioxide bubbles produced by the anaerobic catabolism of the sugars

- biochemical meaning - relates to the generation of energy by the catabolism of organic compounds

- its meaning in industrial microbiology tends to be much broader.

Microbiologists definition of *Fermentation*

- Any process involving the mass culture of microorganisms, either aerobic or anaerobic.
- Any biological process that occurs in the absence of O_2.
- Food spoilage
- The production of alcoholic beverages.
- Use of an organic substrate as the electron donor and acceptor.
- Use of an organic substrate as a reductant, and of the same partially degraded organic substrate as an oxidant.
- Growth dependant on substrate-level phosphorylation.

The Range Of Fermentation Processes

five major groups of commercially important fermentations:

- Those that produce microbial cells (or **biomass**) as the product.
- Those that produce microbial **enzymes**.
- Those that produce microbial **metabolites**.
- Those that produce **recombinant proteins**.
- Those that **modify** a compound which is added to the fermentation-the **transformation** process.

The Component Parts of A Fermentation Process

SIX basic component parts:

- The **chemical environment** of the organism
  - **Media** formulation: culturing the process organism
    - during the development of the inoculum
    - in the production fermenter.

- The culture should be maintained in a pure state throughout the fermentation therefore **sterilization** of the medium, fermenters and ancillary equipment is required.

- **production** of an active, **pure culture** in sufficient quantity to inoculate the production vessel.
- **growth** of the organism in the production fermenter under optimum conditions for **product formation**.
- **extraction** of the product and its purification.
- **disposal of effluents** produced by the process.