

Bioprocess Engineering

Bioprocess engineering, also biochemical engineering, is a specialization of Biological Engineering.

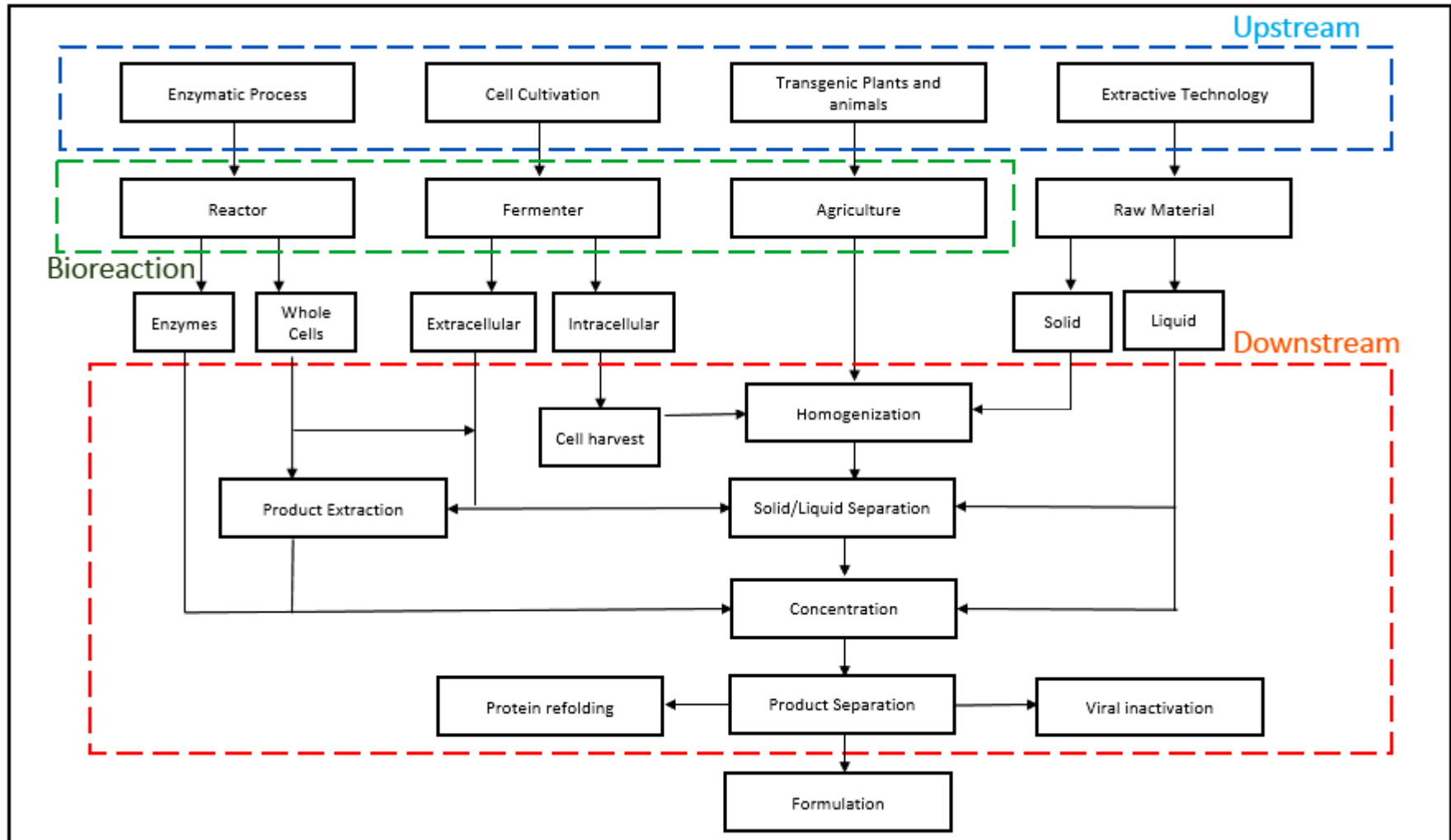
It deals with the design and development of equipment and processes for the manufacturing of products such as Agriculture, Food, Paper from biological materials & treatment of waste water.

Bioprocess engineering is a conglomerate of mathematics, biology and industrial design, and consists of various spectrums like designing of bioreactors study of fermentors (mode of operations etc.).

It also deals with studying various biotechnological processes used in industries for large scale production of biological product for optimization of yield in the end product and the quality of end product.

Bioprocess engineering may include the work of mechanical, electrical, and industrial engineers to apply principles of their disciplines to processes based on using living cells or sub component of such cells.

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CURRENT BIOPROCESS TECHNOLOGY & PRODUCTS

Products and services that depend on bioprocessing can be grouped broadly into-

- **Biopharmaceuticals:** Mainly includes therapeutic proteins, antibiotics, antibodies, polysaccharides, hormones, vaccines, and diagnostic agents. The success of biotechnology is seen in the impact of new products and processes.
- **Industrial chemicals and Energy:** Mainly includes alcohols, organic acids, fuels, several chemicals and fiber from renewable resources. It is an essential component for rapid transition of bioproducts from the laboratory to a manufacturing scale able to provide the benefits of biotechnology on a large scale at a reasonable cost.
- **Food Industries:** Mainly includes alcoholic beverages and dairy products, several novel foods (soya sause) and mushrooms (starch and vitamins) and food additives (anti-oxidants) and value added products. Bioprocess engineering has been used in food industries for long time ago.
- **Agriculture:** Mainly includes single cell protein, veterinary vaccine and antibiotics, use of nitrogen fixing bacteria, to produce transgenic plants and genetic modification of foods.
- **Environmental-management:** Bioprocessing products and services used to control or remediate toxic wastes. Mainly includes municipal wastewater treatment plants to provide clean and safe drinking water, bio composting methods for waste management. The recent attention to the environment has focused some bioprocessing technology on the transformation of hazardous wastes and the use of biological processes that produce desired products but little or no waste byproduct.

OPPORTUNITIES (AREA) IN BIOPROCESSING

Bioprocess engineering is the established and applied field of biology and has a lot of opportunities or applications are present. Some of them are given below-

- Bioprocess engineering enables transition of biotechnology into products that benefit society
- Applications of bioprocessing to higher value products obtained through recombinant-DNA and cell culture technology
- It also gives opportunity to production of biofuels and other types of biological energy source.
- It can also contribute in design and operation of fermentations systems.
- Also used in the development of food processing systems.
- It can contribute in application and testing of product separation technologies.
- It can be used for designing of instrumentation to monitor and control biological processes.

The demand for bioprocess engineers continues to grow. They provide a bridge between the research lab and the economic large scale implementations of biotechnologies and food production systems.