

airlift bioreactor for biological cell suspension culture

Airlift bioreactor can reduce the damage of air bubbles to cells and the negative effect of high shear force of stirring paddles on cells faced by traditional reactors through mass transfer principle under the demand of large volume production.

Airlift Bioreactor Overview

Airlift bioreactors are effective in accomplishing high density cell cultures even at low fluid shear rates.

Working Principle

The airlift bioreactor utilizes a non-bubbling interfacial oxygen transfer mechanism for gas-liquid mixing through the recirculation of airflow. This mechanism not only provides high oxygen transfer efficiency, but also avoids cell damage caused by bubble surface tension and the high shear force of stirring paddles in common bioreactors. The gas flow through the inverted truncated conical tank creates a stable gas-liquid interface that ensures homogeneous mixing of the fluids. Its shear rate is usually less than 20 per second, which is suitable for use in shear-sensitive cells, such as animal cells or plant cell culture.



Main Features

- Non-Bubbling Interfacial Oxygen Transfer Mechanism: It improves the oxygen transfer efficiency, ensures that the cells in the reactor can get sufficient oxygen supply, and reduces the damage to the cells caused by the air bubbles in the traditional bubbling reactor.
- Low shear: due to the absence of stirring paddles and bottom pass-through tubes, the shear force generated by mechanical stirring is reduced, avoiding physical damage to the cells, which is very suitable for high-density culture.
- Inverted truncated conical tank: The design provides a larger gas-liquid junction area, optimizing gas transmission and fluid flow, making the flow field of the reactor more stable.
- Fluder number Fr amplification: It has excellent process amplification characteristics, which can ensure the reactor performance remains consistent during the amplification process and ensure the stability of large-scale production.
- High-density cell culture: through optimized mass transfer and mixing methods, it can achieve high-density and high viability cell culture, suitable for demanding biopharmaceutical and cell therapy applications.
- Intelligent control system: Equipped with intelligent operation interface, it supports local on-line monitoring of key data such as pH, DO, temperature and rotational speed, as well as data report and curve generation.
- Remote monitoring and control: supports remote parameter monitoring and process adjustment, meets the requirements of FDA 21CFR part 11 electronic records and electronic signatures, and satisfies the strict quality management standards of the modern pharmaceutical industry.

- Customized services: can be customized according to user needs piping, accessories and membrane materials to ensure the performance of the equipment in a particular application.

Application Areas

- Biopharmaceutical industry: widely used in large-scale biological drug production, suitable for vaccines, recombinant proteins, antibodies and other cell culture production.
- Cell culture and cell therapy: suitable for high-density, high-activity cell culture, such as stem cells, tumor cells and other cell lines, to ensure high cell survival and functional expression in the culture process.
- Cell factories and bioreaction engineering: can be used for the culture of cell factories produced through genetic engineering, for example, for the manufacture of drug ingredients or other high-value compounds.
- Large-scale industrial fermentation: In large-scale fermentation processes, airlift bioreactors are able to meet the demand for efficient oxygen transfer while avoiding harm to microorganisms or cells, and are widely used in a variety of microbial fermentation production.
- Bioenergy production: It is applied in the process of preparing bioenergy through cell culture or microbial fermentation, such as ethanol, biodiesel and other bioenergy production.