airlift glass fermenter with off-site sterilization

Airlift glass fermenter is a kind of non-mechanical stirring fermentation device relying on gas flow to drive liquid circulation and realize mixing and mass transfer, which is suitable for microorganism or cell culture process sensitive to shear force.

Airlift Glass Fermenter Overview

The main structure of airlift glass fermenter is composed of high transparent silicon boron glass tank and 316L stainless steel fittings, which is widely used in scientific research institutes, pilot development, biopharmaceuticals, food fermentation and environmental engineering and other fields.

Airlift glass fermenter takes gas as the power source, forms gas-liquid two-phase flow through the bottom aeration system, and realizes upward circulation under the action of guide cylinder to achieve the purpose of uniform mixing and full oxygen supply. Gas-ascending glass fermenter is simple in structure, easy to be cleaned and sterilized, suitable for large-scale shear-sensitive cell culture, such as fungi, microalgae, plant cells and animal cells.

Features

- Highly transparent visualization tank: made of pressure and temperature resistant silicone boron glass material, matched with 316L stainless steel cover and receiver system, with good corrosion resistance and chemical stability, convenient for operators to observe the fermentation liquid status in real time.
- No mechanical mixing design: the use of air-driven liquid circulation mixing mode, relying on the bottom of the air through the formation of rising bubbles flow, the use of gas to drive the liquid inside and outside the infusion cylinder to form a circulating flow field, to achieve uniform mixing.
- Scientific design of guide cylinder: the built-in guide cylinder enhances the gas-liquid separation efficiency, optimizes the circulation path and improves the oxygen transfer efficiency. The mixing perturbation formed by the gas lift method is mild, effectively avoiding cell shear damage.
- Small shear force, strong adaptability: suitable for microorganisms or cells sensitive to mechanical force, such as actinomycetes, filamentous fungi, microalgae, plant cell lines and so on.
- High gas utilization, excellent oxygen transfer efficiency: gas-liquid contact is sufficient, high oxygen utilization. With the microporous aerator can further improve the KLa value (overall oxygen transfer coefficient), suitable for high oxygen demand microbial culture.
- Flexible volume: the specification range covers 10L to 100L and other models, to meet the different scales of applications from laboratory to pilot level, the liquid filling ratio is as high as 75%-90%, saving space and improving efficiency.

Working Principle

The work of airlift glass fermenter relies on the introduction of air from the bottom aeration device, which drives the fermentation liquid to rise along the guide cylinder under the action of gas buoyancy, and then fall outside the cylinder to form a continuous cycle. This pneumatic circulation flow field enhances mixing, increases mass transfer rates, and effectively maintains homogeneity of the culture environment.

Since there are no rotating parts in the pneumatic ascending method, it does not generate high-speed shear force, which provides good protection for fragile cells and is suitable for suspension culture of plant cells or animal cells, etc. The system also realizes good online monitoring and control of temperature, pH, DO, and has expandable function modules such as automatic replenishment and defoaming.

Application Areas

- Microalgae culture and bioenergy development: suitable for cultivation of photosynthetic microalgae such as Spirulina, Rhodococcus aurantium, Chlorella, etc., used for the extraction of algal proteins, chlorophylls, carotenoids and other biologically active substances, and widely used in the fields of health food, cosmetic and biodiesel.
- Plant cell and tissue culture: widely used in many kinds of plant cell, suspension cell, hairy root culture, for the production of medicinal plant secondary metabolites, such as paclitaxel, ginseng saponin, etc., which is suitable for GMP level production requirements.

- Filamentous fungi and actinomycetes culture: such as Penicillium, Streptomyces and other species, these microorganisms are complex, easy to entangle, the traditional mechanical mixing easily lead to mycelium breakage, and the air-lift tank to effectively avoid this problem.
- Animal cell culture: due to low shear force, it can be used for mammalian cell culture such as CHO, HEK293, etc. It is suitable for the initial screening and process amplification of recombinant proteins, antibodies and other biopharmaceutical production.
- Fermentation process development and screening: as a tool for fermentation process research, process parameter optimization and pilot scale-up, it is suitable for rapid comparison test of different fermentation conditions.