

ABSTRACT

Bioreactor System and Application Thereof

5 The present application relates to a bioreactor system for culturing cells, especially cells
without cell walls; the bioreactor system includes: a container containing a hollow cylinder
with a diameter of $D1$ and a height of $H1$, and a hollow circular truncated cone with an upper
diameter of $D2$, a lower diameter of $D3$, and a height of $H2$, where the hollow cylinder is
connected to a top surface of the hollow circular truncated cone, and $D1 = D2$; an oscillator,
10 configured to cause the container to make an eccentric motion according to a certain
eccentricity and rotational speed; a ventilation device, configured to introduce an
oxygen-containing gas from an upper portion of the container to the inside of the container,
and a culture solution filled in the container, of which a top surface is exposed to the
oxygen-containing gas; where the oscillator is configured to maintain the eccentric motion of
15 the container, such that a ratio of the total liquid surface area to the volume (S/V) of the
culture solution when in a steady state of motion is 5.65 or more, the turbulence kinetic
energy is $2.73E-03 \text{ m}^2/\text{s}^2$ or more, and the flow field shear rate is 20.27/s or less, where the
total liquid surface area is the sum of the contact area between the culture solution and the
reactor wall surface and the contact area between the top surface and the gas.

20 (FIG. 1)