

Claims:

1. An apparatus intended for use in bioprocessing with a fluid, comprising:
 - a bag having a flexible wall at least partially forming an interior compartment capable of holding the fluid, and further comprising a flexible sleeve extending into the interior compartment;
 - a mixer rotatable about an axis of rotation to agitate the fluid, wherein the mixer comprises a mixing rod partly disposed in the flexible sleeve to agitate the fluid without exposing the mixing rod to the fluid;
 - a sparger for supplying a gas to the fluid, the sparger is coupled to the flexible sleeve;
 - an elongate flexible tube disposed within the interior compartment for supplying the gas to the sparger; and
 - a motive device for moving the sparger,whereby a mixing action in the fluid created by movement of the mixer combined with the movement of the sparger helps distribute bubbles from the sparger throughout the fluid to improve the concentration of dissolved gas.
2. A bioreactor intended for receiving a fluid, comprising:
 - a vessel having an interior compartment capable of receiving and holding the fluid, the vessel including an elongate flexible sleeve projecting within the interior compartment and coupled to the vessel by way of a static seal;
 - a mixer for insertion in the flexible sleeve that induces rotation in the flexible sleeve to agitate the fluid without exposing the mixer to the fluid and without causing the flexible sleeve to rotate about a longitudinal axis; and
 - a sparger for supplying a gas to the fluid in the vessel, the sparger being arranged for moving with the flexible sleeve;whereby a mixing action in the fluid created by movement of the mixer helps distribute bubbles from the sparger throughout the fluid to improve the concentration of dissolved gas.
3. The bioreactor of claim 2, further comprising a second mixer for agitating the fluid.
4. The bioreactor of claim 3, wherein the second mixer comprises an impeller.

5. The bioreactor of any one of claims -4, further comprising an elongate flexible tube positioned at least partially within the interior compartment for coupling with the sparger.
6. The bioreactor of any one of claims -5, wherein the vessel comprises a flexible bag.
7. A bioreactor intended for receiving a fluid useful in culturing cells, comprising:
 - a vessel having an interior compartment capable of receiving and holding the fluid, the vessel including a flexible sleeve extending into the interior compartment;
 - a mixer positioned in the flexible sleeve that induces rotation in the flexible sleeve to agitate the fluid without the mixer contacting the fluid; and
 - a sparger coupled to the mixer for supplying a gas to the fluid in the bag, whereby a mixing action in the fluid created by movement of the mixer helps distribute bubbles from the sparger throughout the fluid to improve the concentration of dissolved gas.
8. The bioreactor of claim 7, wherein the vessel comprises a flexible bag.
9. The bioreactor of claim 7 or 8, further comprising a flexible tube in communication at one end with a port in the vessel and at the other end with the sparger, the sparger comprises a porous material for forming the bubbles from the gas when supplied through the flexible tube.
10. The bioreactor of any one of claims 7-9, wherein the vessel includes a vent port.
11. The bioreactor of any one of claims -10, further comprising an impeller in the vessel.
12. The bioreactor of any one of claims 7-11, further comprising rigid blades carried by the flexible sleeve.

Claims

1. An apparatus for bioprocessing with a fluid, comprising:
a vessel (10) having an interior compartment capable of holding the fluid;
a mixer (14) rotatable about an axis of rotation to agitate the fluid;
a sparger (20) for supplying a gas to the fluid; and
a motive device for moving the sparger about the axis of rotation,
whereby the mixer (14) creates a mixing action in the fluid and the
movement of the sparger (20) about the axis of rotation helps distribute
the sparger throughout the fluid to improve the concentration of dissolved
gas; characterised in that the vessel is a bag (11) including a flexible
sleeve (12) projecting within the interior compartment, and in that the
mixer (14) is positioned within the sleeve.
2. The apparatus of claim 1, wherein the mixer comprises a mixing
rod (14) for insertion in the flexible sleeve (12) that induces rotation in
the sleeve (12) to agitate the fluid without exposing the mixing rod (14)
to the fluid.
3. The apparatus of claim 1, wherein the sleeve (12) carries rigid
blades (40a).
4. The apparatus of claim 1, further including a second mixer for
agitating the fluid.
5. The apparatus of claim 1, wherein the sparger (20) includes a tube
(26) in communication at one end with a port in the vessel (10) and at the

other end with a porous material for forming the bubbles from the gas supplied through the tube (26).

6. The apparatus of claim 1, wherein the motive device comprises a motor for mechanically coupling to the mixing rod (14).

5 7. The apparatus of claim 1, wherein the sparger (20) comprises a porous material connected to the distal end of the sleeve.

8. The apparatus of claim 1, wherein the porous material is connected to the sleeve (12) by a band (24).

10 9. The apparatus of claim 5, wherein the tube (26) is coupled to the sleeve (12).

10. The apparatus of claim 12, further including an exhaust port (32) in the bag (11).

15 11. The apparatus of claim 10, wherein a filter is associated with the exhaust port (32) for preventing the introduction of undesired contaminants.

12. The apparatus of claim 1, wherein the sparger (20) comprises an elongated flexible tube for delivering the gas to the fluid in the vessel by way of a porous material.

20 13. The apparatus of claim 1, further including a hermetic seal statically formed by a circumferential weld formed between an open end of the sleeve (12) and an opening or hole in the bag (11) so as to give the seal an annular shape.