# CONTAINER HAVING VORTEX BREAKER AND SYSTEM

## ~~CROSS-REFERENCED TO RELATED APPLICATIONS~~

~~This application claims the benefit of U.S. Provisional Patent Application No.: 61/130,349, filed on May 30, 2008, the entire contents of which are incorporated by reference herein.~~

## FIELD OF THE INVENTION

This invention relates to a disposable container having a vortex breaker at its outlet and to a system utilizing the container.

## BACKGROUND OF THE INVENTION

Prior to the present invention, fluids have been processed in systems that utilize stainless steel containers. These containers are sterilized after use so that they can be reused. The sterilization procedures are expensive and cumbersome as well as being ineffectual at times.

In order to provide greater flexibility in manufacturing and reduce the time needed to effect valid regeneration, manufacturers have begun to utilize disposable sterilized bags that are used with each product batch. An example of use of these disposable bags is in a system for producing proteins by biological processing wherein the protein is derived from growing cells and then recovered. A problem occurs at the bag outlet where the fluid is removed from the bag. When the fluid is removed, one or more conical shaped vortices are formed from a conical column of gas present in the bag. This is undesirable since a vortex will cause mixing of the fluid with gas which results in undesirable foaming. A vortex will also entrain air into the protein filled fluid. This is undesirable since air can denature protein. Air entrainment into the flow stream also causes problems with processing equipment such as gages, sensors, pumps and filters.

Accordingly, it would be desirable to provide a disposable container for fluids having means for minimizing or preventing foaming at the container outlet.

US 2001/051371 A discloses a biogeneration chamber with a substantially cylindrical side wall with an interior surface that is smoothly and continuously joined to a conical lower section having a chamber outlet port at its lower end. An inlet port is provided in a top of the chamber and an orifice element is posed adjacent to the chamber outlet port inside the conical section. The orifice element comprises a disk supported by legs over an outlet port and having a small diameter, centrally disposed aperture. This disk has a diameter greater that than of the outlet port and supports a vortex slightly above the outlet port, permitting fluid mixture to be drawn into the outlet port around and beneath the disk, where a smaller diameter vortex is created.

EP-A-0460804 discloses a vessel for mixing a liquid and solid and the vessel has an inlet for liquid at an upper end and an outlet at a lower end. A vortex breaker comprising a circular plate having several holes therethrough for liquid flow is arranged within the outlet port.

## SUMMARY OF THE INVENTION

A disposable container for a fluid comprising a volume formed of flexible walls, having an inlet and an outlet ~~is provided~~ and having a device for minimizing or preventing foaming of fluid at the outlet.

A system is also provided that utilizes the container with a unit operation down stream of the container such as a normal flow filtration (NFF) unit or the like whereby treated fluid is recovered. For example, the effluent from the container can be directed through clarification depth filters, pre-filters or microporous membrane filters. Examples of specific unit operations include clarification, buffer and media preparation and virus removal.

The outlet is provided with a vortex breaker comprising a solid surface that initially directs fluid away from the outlet. Openings are provided adjacent the solid surface which permits fluid to enter the outlet. The initial direction of fluid away from the outlet minimizes or prevents the formation of one or more vortices at the outlet.

## BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a schematic view of a system of this invention.

Figure 2 is a perspective view of a vortex breaker positioned adjacent an outlet of the container of this invention.

## DESCRIPTION OF SPECIFIC EMBODIMENTS

The disposable container of this invention is formed of monolayer or multilayer flexible walls formed of a polymeric composition such as polyethylene, including ultrahigh molecular weight polyethylene, linear low density polyethylene, low density or medium density polyethylene; polypropylene; ethylene vinyl acetate (EVOH); polyvinyl chloride (PVC); polyvinyl acetate (PVA); ethylene vinyl acetate copolymers (EVA copolymers); blends of various thermoplastics; coextrusions of different thermoplastics; multilayered laminates of different thermoplastics; or the like. By "different" it is meant to include different polymer types such as polyethylene layers with one or more layers of EVOH as well as the same polymer type but of different characteristics such as molecular weight linear or branched polymer of fillers and the like. Typically medical grade and

CLAIMS

~~What is claimed:~~

1. A disposable container (10) for a fluid (12) which comprises:

a ~~closed~~ volume formed of flexible walls,

an inlet (9) through one of said walls,

an outlet (11) through one of said walls,

and a vortex breaker (14) comprising a solid surface (32) secured to a base (34) by spaced apart solid supports (36), said base (34) secured to an inner surface (16) of said one of said walls adjacent said outlet (11), ~~positioned adjacent said outlet and secured to an inner surface of said walls~~, said vortex breaker (14) adapted to direct fluid initially away from said outlet (11) and then through said outlet (11), thereby minimizing or preventing the formation of vortices at said outlet (11).

~~2. A fluid processing system which comprises:~~

~~the container of Claims 1,~~

~~a unit operation downstream of the container and~~

~~one or more conduits to effect flow from said container to said unit operation.~~

~~3. The container of Claim 1 wherein said vortex breaker comprises a solid surface secured to a base by spaced apart solid supports.~~

~~4. The system of Claim 2 wherein said vortex breaker comprises a solid surface secured to a base by spaced apart solid supports.~~

2. The container (10) of claim 1 wherein said base (34) is sealed to the inner surface (16) of the wall.

3. The container (10) of claim 1 or 2 wherein said vortex breaker (14) is formed as part of the outlet (11).

4. The container (10) of claim 1, 2 or 3 wherein said vortex breaker (14) comprises spaces formed between the supports (36), through which the fluid is directed to the outlet (11).

5. A fluid processing system which comprises:

the container (10) of any one of claims 1 to 4, and a

unit operation (20) downstream of the container (10) and one or more conduits to effect flow from said container (10) to said unit operation (20).

6. The fluid processing system of claim 5, wherein the unit operation (20) is a normal flow filtration unit, preferably selected from clarification depth filters, pre-filters or microporous membrane filters.

7. Use of the fluid processing system of claim 5 for the production of proteins derived from growing cells which are lysed to release cellular protein.