CLAIMS:

1. A filter unit for a mixing apparatus comprising:
a hydrophilic filter comprising an inlet and a first outlet at a first end, and a second outlet at a second end, opposite the first end;
wherein the first inlet is coupled to an outlet of the mixing apparatus to receive a fluid including liquid and gas from the mixing apparatus,
wherein the hydrophilic filter includes a hydrophilic filter element to sterilize at least a portion of the liquid; and
a hydrophobic vent filter comprising an inlet in fluid communication with the second outlet of the hydrophilic filter to receive gas from the hydrophilic filter, and a vent;
wherein the hydrophobic vent filter includes a hydrophobic vent filter element having
a membrane configured to separate an interior of the filter unit from an exterior of the filter unit, the gas being vented from the filter unit by flowing across the membrane and out of the vent.

2. The filter unit of claim 1, wherein the inlet of the hydrophobic filter is in fluid communication with the second outlet of the hydrophilic filter to further receive some of the liquid from the hydrophilic filter.

3. The filter unit of claim 1, wherein the hydrophobic vent filter element is at least partially composed of at least one of polytetrafluoroethylene or polyvinylidene fluoride.

4. The filter unit of claim 1, wherein the hydrophilic filter element is at least partially composed of a polyethersulfone.

5. The filter unit of claim 1, wherein the hydrophobic vent filter element is a hollow cylindrical filter element disposed within a cylindrical filter capsule; and
wherein the hydrophobic vent filter element is coupled to the filter capsule such that gas is vented from the filter unit by flowing across the membrane into a hollow center of the filter element and out of the vent.

6. The filter unit of claim 1, wherein the hydrophilic filter element is a hollow cylindrical filter element disposed within a cylindrical filter capsule;

wherein the hydrophilic filter element comprises a second membrane configured to sterilize the liquid; and

wherein the hydrophilic filter element is coupled to the filter capsule such that the liquid is evacuated from the filter unit by flowing across the second membrane into a hollow center of the hydrophilic filter element and out of the first outlet.

7. A filter unit for a mixing apparatus comprising:

a hydrophilic filter comprising an inlet and a first outlet at a first end, and a second outlet at a second end, opposite the first end;

wherein the first inlet is coupled to an outlet of the mixing apparatus to receive a fluid including a liquid, gas, and foam comprised of the liquid containing trapped gas from the mixing apparatus,

wherein the hydrophilic filter includes a hydrophilic filter element to sterilize at least a portion of the liquid;

a defoaming device having an inlet coupled to the second outlet of the hydrophilic filter to receive the gas, the foam, and some of the liquid from the hydrophilic filter, the defoaming device configured to release at least some gas from the foam; and

a hydrophobic vent filter comprising an inlet in fluid communication with an outlet of the defoaming device to receive gas from the defoaming device, and a vent;

wherein the hydrophobic vent filter includes a hydrophobic vent filter element having a membrane configured to separate an interior of the filter unit from an exterior of the filter unit, the gas being vented from the filter unit by flowing across the membrane and out of the vent.

8. The filter unit of claim 7, wherein the inlet of the hydrophobic filter is in fluid communication with the outlet of the defoaming device to receive some of the liquid from the defoaming device.

9. The filter unit of claim 7, wherein the defoaming device contains a defoaming substance which causes at least some of the gas to be released from the foam.

10. The filter unit of claim 9, wherein the defoaming substance comprises at least one of stainless steel shavings or steel wool.

11. The filter unit of claim 7, wherein the hydrophobic vent filter element is at least partially composed of at least one of polytetrafluoroethylene or polyvinylidene fluoride.

12. The filter unit of claim 7, wherein the hydrophilic filter element is at least partially composed of a polyethersulfone.

13. The filter unit of claim 7, wherein the hydrophobic vent filter element is a hollow cylindrical filter element disposed within a cylindrical filter capsule; and

wherein the hydrophobic vent filter element is coupled to the filter capsule such that gas is vented from the filter unit by flowing across the membrane into a hollow center of the filter element and out of the vent.

14. The filter unit of claim 7, wherein the hydrophilic filter element is a hollow cylindrical filter element disposed within a cylindrical filter capsule;

wherein the hydrophilic filter element comprises a second membrane configured to sterilize the liquid; and

wherein the hydrophilic filter element is coupled to the filter capsule such that the liquid is evacuated from the filter unit by flowing across the second membrane into a hollow center of the hydrophilic filter element and out of the first outlet.

15. A method of filtering a solution comprising:

receiving, at a filter unit comprised of a hydrophilic filter, a defoaming device, and a hydrophobic vent filter, a fluid including a liquid, gas, and foam comprised of the liquid containing trapped gas;

receiving the fluid at the hydrophilic filter comprising an inlet and a first outlet at a first end, and a second outlet at a second end, opposite the first end;

sterilizing at least a portion of the liquid by passing the portion of the liquid across a hydrophilic filter element in the hydrophilic filter, the hydrophilic filter element comprising a membrane to sterilize the portion of the liquid;

evacuating the sterilized portion of the liquid from the filter unit through the first outlet;

directing the gas and foam to the defoaming device through the second outlet of the hydrophilic filter, wherein the defoaming device is configured to release at least some of the gas from the foam through an outlet of the defoaming device;

receiving the gas at the hydrophobic vent filter through the outlet of the defoaming device, the hydrophic vent filter comprising a hydrophobic vent filter element having a membrane; and

venting the gas across the membrane and out of a vent of the hydrophobic vent filter, the membrane configured to separate an interior of the filter unit from an exterior of the filter unit.

16. The method of claim 15, further comprising receiving some of the liquid at the hydrophobic vent filter through the outlet of the defoaming device.

17. The method of claim 15, wherein the defoaming device contains a defoaming substance which causes at least some of the gas to be released from the foam.

18. The method of claim 15, wherein the hydrophobic vent filter element is at least partially composed of at least one of polytetrafluorethylene or polyvinylidene fluoride.

19. The method of claim 15, wherein the hydrophobic vent filter element is a hollow cylindrical filter element disposed within a cylindrical filter capsule; and

wherein venting the gas comprises venting the gas across the membrane into a hollow center of the filter element and out of the vent.

20. The method of claim 15, wherein the hydrophilic filter element is a hollow cylindrical filter element disposed within a cylindrical filter capsule; and

wherein sterilizing the liquid comprises flowing the liquid across the membrane into a hollow center of the hydrophilic filter element.