CLAIMS

1. A porous membrane, comprising a blend of a first powder of metal particles of a first average size and a second powder of metal particles of a second average size, the first powder and the second powder sintered together,

wherein the first average size is five to fifty times greater than the second average size, and

wherein the porous membrane comprises from 40% to 60% by weight of the first powder,

wherein the water bubble point of the porous membrane is from 4 to 8 psi.

2. The porous membrane of Claim 1, wherein a porosity of the porous membrane is from 37% by volume to 50% by volume.

3 The porous membrane of Claim 1, wherein a porosity of the porous membrane is from 42 % by volume to 48 % by volume.

4. The porous membrane of Claim 1, wherein the first average size is from about 40 microns to about 60 microns, and the second average size is not greater than about 2 microns.

5. The porous membrane of Claim 1, wherein the first average size is about 50 microns, and the second average size is about 2 microns.

6. The porous membrane of Claim 1, wherein the metal particles of the first powder and the metal particles of the second powder are each independently selected from nickel or stainless steel.

7. The porous membrane of Claim 1, wherein the metal particles of the first powder and the metal particles of the second powder are each selected from nickel.

8. The porous membrane of Claim 1, wherein the porous membrane has a Log Reduction Value (LRV) from 4 to 6 for 0.1 micron particles in a gas having velocity of 3 slpm/cm^2 measured on a 0.4 centimeter thick membrane.

9. The porous membrane of Claim 1, wherein the porous membrane has a Log Reduction Value (LRV) is 6 or more for 0.1 micron particles in a gas having velocity of 3 slpm/cm^2 measured on a 0.4 centimeter thick membrane.

10. A gas diffuser device comprising:

a housing having an inlet and an outlet; and

a porous membrane disposed within the housing in fluid communication with the inlet and the outlet,

wherein the porous membrane comprises a blend of a first powder of metal particles of a first average size and a second powder of metal particles of a second average size, the first powder and the second powder sintered together,

wherein the first average size is five to fifty times greater than the second average size, and

wherein the porous membrane comprises from 40% to 60% by weight of the first powder,

wherein the water bubble point of the porous membrane is from 4 to 8 psi.

11. The device of Claim 10, wherein a porosity of the porous membrane is from 37 % by volume to 50 % by volume.

12. The device of Claim 10, wherein a porosity of the porous membrane is from 42 % by volume to 48 % by volume.

13. The device of Claim 10, wherein the first average size is from about 40 microns to about 60 microns, and the second average size is not greater than about 2 microns.

14. The device of Claim 10, wherein the first average size is about 50 microns, and the second average size is about 2 microns.

15. The device of Claim 10, wherein the metal particles of the first powder and the metal particles of the second powder are each independently selected from nickel or stainless steel.

16. The device of Claim 10, wherein the metal particles of the first powder and the metal particles of the second powder are each selected from nickel.

17. The device of Claim 10, wherein the porous membrane has a Log Reduction Value (LRV) from 4 to 6 for 0.1 micron particles in a gas having velocity of 3 slpm/cm^2 measured on a 0.4 centimeter thick membrane.

18. The device of Claim 10, wherein the porous membrane has a Log Reduction Value (LRV) is 6 or more for 0.1 micron particles in a gas having velocity of 3 slpm/cm^2 measured on a 0.4 centimeter thick membrane.

19. The device of Claim 10, wherein the porous membrane is a flat sheet having a thickness of 0.1 inch or more.

20. The device of Claim 10, wherein the porous membrane is a flat sheet having a thickness from 0.2 cm to 0.5 cm, and further wherein the Log Reduction Value of the porous membrane is at least 6 in a gas for 0.1 micron particles and velocity of 3 slpm/cm^2.

21. The device of Claim 20, wherein the porous membrane has a burst pressure of at least 300 pounds per square inch.

22. The device of Claim 20, wherein the porous membrane has a burst pressure of greater than 350 pounds per square inch.

23. A method of purifying a gas stream, comprising:

directing a gas stream through a porous membrane, said porous membrane comprising a blend of a first powder of metal particles of a first average size and a second powder of metal particles of a second average size, the first powder and the second powder sintered together,

wherein the first average size is five to fifty times greater than the second average size, and

wherein the porous membrane comprises from 40% to 60% by weight of the first powder,

thereby purifying the gas stream,

wherein the water bubble point of the porous membrane is from 4 to 8 psi.

24. The method of Claim 23, wherein a porosity of the porous membrane is from 37 % by volume to 50 % by volume.

25. The method of Claim 23, wherein a porosity of the porous membrane is from 42 % by volume to 48 % by volume.

26. The method of Claim 23, wherein the first average size is from about 40 microns to about 60 microns, and the second average size is not greater than about 2 microns.

27. The method of Claim 23, wherein the first average size is about 50 microns, and the second average size is about 2 microns.

28. The method of Claim 23, wherein the metal particles of the first powder and the metal particles of the second powder are each independently selected from nickel or stainless steel.

29. The method of Claim 23, wherein the metal particles of the first powder and the metal particles of the second powder are each selected from nickel.

30. The method of Claim 23, wherein the porous membrane has a Log Reduction Value (LRV) from 4 to 6 for 0.1 micron particles in a gas at having velocity of 3 slpm/cm^2 measured on a 0.4 centimeter thick membrane.

31. The method of Claim 23, wherein the porous membrane has a Log Reduction Value (LRV) is 6 or more for 0.1 micron particles in a gas at having velocity of 3 slpm/cm^2 measured on a 0.4 centimeter thick membrane.

32. The method of Claim 23, wherein the porous membrane is a flat sheet having a thickness of 0.1 inch or more.

33. The method of Claim 23, wherein the porous membrane is a flat sheet having a thickness from 0.2 cm to 0.5 cm, and further wherein the Log Reduction Value of the porous membrane is at least 6 in a gas for 0.1 micron particles and velocity of 3 slpm/cm^2.

34. The method of Claim 33, wherein the porous membrane has a burst pressure of at least 300 pounds per square inch.

35. The method of Claim 33, wherein the porous membrane has a burst pressure of greater than 350 pounds per square inch.

36. A gas diffuser device comprising:

a housing having an inlet and an outlet; and

a porous membrane disposed within the housing in fluid communication with the inlet and the outlet,

wherein the porous membrane is a flat sheet having a thickness from 0.2 cm to 0.5 cm, having Log Reduction Value of at least 6 in a gas for 0.1 micron particles and velocity of 3 slpm/cm^2, and a burst pressure of at least 300 pounds per square inch,

wherein the porous membrane comprises a blend of a first powder of metal particles of a first average size and a second powder of metal particles of a second average size, the first powder and the second powder sintered together, wherein the first

average size is five to fifty times greater than the second average size, and the porous membrane comprises from 40% to 60% by weight of the first powder,

wherein the water bubble point of the porous membrane is from 4 to 8 psi.

CLAIMS

1. A porous membrane, comprising a blend of a first powder of metal particles of a first average size and a second powder of metal particles of a second average size, the first powder and the second powder sintered together,

wherein the first average size is five to fifty times greater than the second average size, and

wherein the porous membrane comprises from 40% to 60% by weight of the first powder,

wherein the water bubble point of the porous membrane is from 4 to 8 psi,

wherein the porous membrane has a Log Reduction Value (LRV) equal to or greater than 4 for 0.1 micron particles in a gas having velocity of 3 slpm/cm^2 measured on a 0.4 centimeter thick membrane,

wherein a porosity of the porous membrane is from 37% by volume to 50% by volume.

2. The porous membrane of Claim 1, wherein a porosity of the porous membrane is from 42 % by volume to 48 % by volume.

3. The porous membrane of Claim 1, wherein the first average size is from about 40 microns to about 60 microns, and the second average size is not greater than about 2 microns.

4. The porous membrane of Claim 1, wherein the first average size is about 50 microns, and the second average size is about 2 microns.

5. The porous membrane of Claim 1, wherein the metal particles of the first powder and the metal particles of the second powder are each independently selected from nickel or stainless steel.

6. The porous membrane of Claim 1, wherein the metal particles of the first powder and the metal particles of the second powder are each selected from nickel.

7. A gas diffuser device comprising:

a housing having an inlet and an outlet; and

a porous membrane disposed within the housing in fluid communication with the inlet and the outlet,

wherein the porous membrane comprises a blend of a first powder of metal particles of a first average size and a second powder of metal particles of a second average size, the first powder and the second powder sintered together,

wherein the first average size is five to fifty times greater than the second average size, and

wherein the porous membrane comprises from 40% to 60% by weight of the first powder,

wherein the water bubble point of the porous membrane is from 4 to 8 psi,

wherein the porous membrane has a Log Reduction Value (LRV) equal to or greater than 4 for 0.1 micron particles in a gas having velocity of 3 slpm/cm^2 measured on a 0.4 centimeter thick membrane,

wherein a porosity of the porous membrane is from 37 % by volume to 50 % by volume.

8. The device of Claim 7, wherein a porosity of the porous membrane is from 42 % by volume to 48 % by volume.

9. The device of Claim 7, wherein the first average size is from about 40 microns to about 60 microns, and the second average size is not greater than about 2 microns.

10. The device of Claim 7, wherein the first average size is about 50 microns, and the second average size is about 2 microns.

11. The device of Claim 7, wherein the metal particles of the first powder and the metal particles of the second powder are each independently selected from nickel or stainless steel.

12. The device of Claim 7, wherein the metal particles of the first powder and the metal particles of the second powder are each selected from nickel.

13. The device of Claim 7, wherein the porous membrane is a flat sheet having a thickness of 0.1 inch or more.

14. The device of Claim 7, wherein the porous membrane is a flat sheet having a thickness from 0.2 cm to 0.5 cm, and further wherein the Log Reduction Value of the porous membrane is at least 6 in a gas for 0.1 micron particles and velocity of 3 slpm/cm^2.

15. The device of Claim 14, wherein the porous membrane has a burst pressure of at least 300 pounds per square inch.

16. The device of Claim 14, wherein the porous membrane has a burst pressure of greater than 350 pounds per square inch.

17. A method of purifying a gas stream, comprising:

directing a gas stream through a porous membrane, said porous membrane comprising a blend of a first powder of metal particles of a first average size and a second powder of metal particles of a second average size, the first powder and the second powder sintered together,

wherein the first average size is five to fifty times greater than the second average size, and

wherein the porous membrane comprises from 40% to 60% by weight of the first powder,

thereby purifying the gas stream,

wherein the water bubble point of the porous membrane is from 4 to 8 psi,

wherein the porous membrane has a Log Reduction Value (LRV) equal to or greater than 4 for 0.1 micron particles in a gas having velocity of 3 slpm/cm^2 measured on a 0.4 centimeter thick membrane,

wherein a porosity of the porous membrane is from 37 % by volume to 50 % by volume.

18. The method of Claim 17, wherein a porosity of the porous membrane is from 42 % by volume to 48 % by volume.

19. The method of Claim 17, wherein the first average size is from about 40 microns to about 60 microns, and the second average size is not greater than about 2 microns.

20. The method of Claim 17, wherein the first average size is about 50 microns, and the second average size is about 2 microns.

21. The method of Claim 17, wherein the metal particles of the first powder and the metal particles of the second powder are each independently selected from nickel or stainless steel.

22. The method of Claim 17, wherein the metal particles of the first powder and the metal particles of the second powder are each selected from nickel.

23. The method of Claim 17, wherein the porous membrane is a flat sheet having a thickness of 0.1 inch or more.

24. The method of Claim 17, wherein the porous membrane is a flat sheet having a thickness from 0.2 cm to 0.5 cm, and further wherein the Log Reduction Value of the porous membrane is at least 6 in a gas for 0.1 micron particles and velocity of 3 slpm/cm^2.

25. The method of Claim 24, wherein the porous membrane has a burst pressure of at least 300 pounds per square inch.

26. The method of Claim 24, wherein the porous membrane has a burst pressure of greater than 350 pounds per square inch.

27. A gas diffuser device comprising:

a housing having an inlet and an outlet; and

a porous membrane disposed within the housing in fluid communication with the inlet and the outlet,

wherein the porous membrane is a flat sheet having a thickness from 0.2 cm to 0.5 cm, having Log Reduction Value of at least 6 in a gas for 0.1 micron particles and velocity of 3 slpm/cm^2, and a burst pressure of at least 300 pounds per square inch,

wherein the porous membrane comprises a blend of a first powder of metal particles of a first average size and a second powder of metal particles of a second average size, the first powder and the second powder sintered together, wherein the first average size is five to fifty times greater than the second average size, and the porous membrane comprises from 40% to 60% by weight of the first powder,

wherein the water bubble point of the porous membrane is from 4 to 8 psi,

wherein the porous membrane has a Log Reduction Value (LRV) equal to or greater than 4 for 0.1 micron particles in a gas having velocity of 3 slpm/cm^2 measured on a 0.4 centimeter thick membrane, wherein a porosity of the porous membrane is from 37% by volume to 50% by volume.