CLAIMS

I/We claim:

1. A treatment module, comprising:

a housing having an input port and an output port;

a plurality of treatment members, each treatment member having a skeleton and a loosely-fitting mesh material provided over the skeleton to allow the loosely-fitting mesh material to flutter during backwashing, the mesh material being joined to the skeleton at one or more portions of the skeleton; and

a layer of adsorbent particles formed over a first side of the mesh material, the layer having pores of sufficient size to enable a fluid to flow through the layer.

2. The treatment module of claim 1, wherein the skeleton extends along a first direction, and the mesh material is flexible,

wherein the skeleton is configured to prevent the mesh material from collapsing entirely inward when a force is applied inward to the mesh material, and

wherein each of the treatment members further has a rod disposed within the skeleton to provide a structural support for the skeleton.

3. The treatment module of claim 1, wherein the mesh material is joined to the skeleton at first and second ends of the skeleton.

4. The treatment module of claim 3, further comprising:

a first end piece joining the mesh material to the first end of the skeleton; and

a second end piece joining the mesh material to the second end of the skeleton.

5. The treatment module of claim 2, wherein the skeleton has an elongated shape along the first direction, and the mesh material has a tubular shape covering the skeleton.

6. The treatment module of claim 2,

wherein the skeleton includes a plurality of longitudinal members, a plurality of rings, and a plurality of prongs, therings being attached to the longitudinal members, each of the prongs extending inwardly from an inner surface of a corresponding one of the rings.

7. The treatment module of claim 6, wherein the prongs have lengths sufficient to hold the rod in place.

8. The treatment module of claim 1, wherein the mesh material is formed as a flat sheet over the skeleton.

9. The treatment module of claim 1, wherein each of the treatment members is configured to be removable from the housing.

10. The treatment module of claim 1, wherein the treatment members are bonded together at least on one end by potting.

11. A treatment member, comprising:

a skeleton extending along a first direction; and

a loosely-fitting mesh tube provided around the skeleton and configured to flutter during backwashing when forces are applied to the mesh tube.

12. The treatment member of claim 11, further comprising a stiffening rod disposed within the skeleton to provide a structural rigidity for the skeleton along the first direction,

wherein the mesh tube is joined to the skeleton at first and second ends of the skeleton, and

wherein the skeleton includes a plurality of longitudinal members and a plurality of rings, the rings being attached to the longitudinal members.

13. The treatment member of claim 12, wherein the skeleton has an elongated shape along the first direction, and wherein the skeleton further includes a plurality of prongs, each of the prongs extending inwardly from an inner surface of a corresponding one of the rings.

14. The treatment member of claim 13, wherein the prongs have lengths sufficient to hold the rod in place.

15. A method for operating a treatment module, wherein the treatment module includes a plurality of treatment members, each of the treatment members including a skeleton and a loosely-fitting mesh material, the method comprising:

depositing adsorbent particles on an interior surface of the mesh material;

causing feed water to enter interior of the mesh material such that target constituents are removed by the deposed adsorbent particles;

flowing a first fluid of a first type through the treatment members; and

flowing a second fluid of a second type through the treatment members, the first and second types being different fluid types,

wherein the loosely-fitting mesh material is provided over the skeleton, such that the loosely-fitting mesh material flutters during backwashing by forcing the first fluid and the second fluid through the mesh material to release the deposited particles and the removed target constituents from the mesh tube.

16. The method of claim 15, wherein the method relates to cleaning the treatment module, and

wherein each of the treatment members further has a rod disposed within the skeleton to provide a structural support for the skeleton.

17. The method of claim 16, further comprising:

flowing a third fluid of the first type through the treatment members; and

flowing a fourth fluid of the second type through the treatment members,

wherein the fluids of the first type are gas, and the fluids of the second type are liquid.

18. The method of claim 17, wherein the first and second fluids are flowed through the treatment members in a first direction, and the third and fourth fluids are flowed through the treatment members in a second direction that is substantially orthogonal to the first direction.

19. The method of claim 16, wherein the skeleton includes a plurality of longitudinal members, a plurality of rings, and a plurality of prongs, the rings being attached to the longitudinal members, each of the prongs extending inwardly from an inner surface of a corresponding one of the rings and having a length sufficient to hold the rod in place, and

wherein the mesh material covers the skeleton and has a tubular shape.