CLAIMS

1. A process for treating a wastewater stream comprising:

delivering the wastewater stream to an attached growth reactor to provide an amount of activated carbon and an attached growth support media having active biological material thereon within the attached growth reactor;

aerating the growth reactor to mix the activated carbon and the attached growth support media, the activated carbon impacting the attached growth support media to remove excess biological growth from the attached growth support media; and

contacting the wastewater stream with attached growth support media and the activated carbon with the attached growth reactor to reduce an amount of biodegradable and adsorbable contaminants in the wastewater stream, wherein a ratio of activated carbon to biological material is from 0.5:1 to 25:1 by weight.

2. The process of claim 1, wherein an amount of powdered activated carbon is combined with the wastewater upstream from the attached growth reactor, and wherein a feed comprising the activated carbon and the wastewater stream is delivered to the attached growth reactor.

3. The process of claim 1, further comprising delivering an effluent from the attached growth reactor to a liquid/solid separator for separating the effluent into a liquid portion and a solids portion, wherein the solids portion comprises an amount of spent carbon and biological material.

4. The process of claim 3, wherein the liquid/solid separator comprises at least one of a membrane unit comprising a plurality of membranes and activated carbon therein, a clarifier, or a dissolved gas flotation unit.

5. The process of claim 1, further comprising regenerating spent carbon and delivering the regenerated spent carbon to the attached growth bioreactor or the wastewater stream.

6. The process of claim 1, wherein the attached growth reactor is selected from the group consisting of a submerged attached growth reactor (SAGR), a moving media attached growth reactor (MMAGR), a stationary media attached growth reactor (SMAGR), a moving bed biofilm reactor (MBBR), or a submerged fixed bed biofilm reactor (SFBBR) as are known in the art.

7. A treatment system comprising:

a source of the wastewater stream comprising a wastewater stream comprising an amount of biodegradable and adsorbable contaminants;

an attached growth reactor in fluid communication with the source, the attached growth reactor comprising an amount of activated carbon and an attached growth support media having active biological material thereon, wherein a ratio of activated carbon to biological material is from 0.5:1 to 25:1 by weight; and

an aeration system operable to mix the activated carbon and the attached growth support media within the attached growth reactor, the activated carbon periodically impacting the attached growth support media to remove excess biological growth from the attached growth support media.

8. The system of claim 7, further comprising a source of activated carbon in fluid communication with a fluid line between the wastewater source and the attached growth reactor.

9. The system of claim 7, further comprising a liquid/solid separator disposed downstream of the attached growth reactor for separating an effluent from the attached growth reactor into a liquid portion and a solids portion.

10. The system of claim 9, wherein the liquid/solid separator comprises a membrane unit comprising a plurality of membranes and an amount of powdered activated carbon therein.

11. The system of claim 10, further comprising a wet air oxidation unit in fluid communication with the membrane unit.

12. The system of claim 7, wherein the attached growth reactor is selected from the group consisting of a submerged attached growth reactor (SAGR), a moving media attached growth reactor (MMAGR), a stationary media attached growth reactor (SMAGR), a moving bed biofilm reactor (MBBR), or a submerged fixed bed biofilm reactor (SFBBR) as are known in the art.