CLAIMS

1. A system for liquid-phase oxidation of an aromatic feedstock containing at least one oxidizable aromatic compound, the system comprising:

an oxidation reactor;

a separation apparatus in fluidic communication with the oxidation reactor;

a solids treatment unit in fluidic communication with the separation apparatus and the oxidation reactor; and

an alkali stream in fluidic communication with the solids treatment unit; and

a product recovery unit in fluidic communication with the separation apparatus,

wherein:

the oxidation reactor is adapted to conduct liquid-phase oxidation of the at least one oxidizable aromatic compound in the aromatic feedstock to a carboxylate in the presence of a manganate salt in an alkaline medium to form a slurry comprising a liquid component containing the carboxylate and a solid component containing manganese dioxide;

the separation apparatus accepts the slurry from the oxidation reactor and separates the liquid component from the solid component;

the product recovery unit accepts the liquid component from the separation apparatus;

the solids treatment unit accepts the solid component from the separation apparatus, treats the solid component with a basic liquid from the alkali stream to oxidize the manganese dioxide in the solid component and form a regenerated manganate salt, and sends at least a portion of the regenerated manganate salt back to the oxidation reactor.

2. The system of claim 1, further comprising a supplemental manganate source in fluidic communication with the solids treatment unit and the oxidation reactor, the supplemental manganate source providing supplemental manganate salt to the portion of the regenerated manganate salt being sent back to the oxidation reactor.

3. The system of claim 1, further comprising a supplemental manganese dioxide source in fluidic communication with the solids treatment unit, the supplemental manganese dioxide source providing supplemental manganese dioxide to the manganese dioxide being oxidized to increase an amount of manganate salt to be sent back to the oxidation reactor.

4. The system of any one of claims 1-3, wherein the separation apparatus is a filtration apparatus.

5. The system of any one of claims 1-4, wherein the product recovery unit is in fluidic communication with an acid stream that is combined with the carboxylate to form a carboxylic acid from the carboxylate.

6. The system of any one of claims 1-5, wherein the at least one oxidizable aromatic compound is chosen from monomethylbenzenes, dimethylbenzenes, trimethylbenzenes, monomethylnaphthalenes, and dimethylnaphthalenes, preferably wherein the at least one oxidizable aromatic compound is chosen from *p*-xylene, *m*-xylene, *o*-xylene, and combinations thereof, or more preferably wherein the at least one oxidizable aromatic compound comprises *p*-xylene and the carboxylate comprises a benzene-1,4-dicarboxylate.

7. A method for oxidizing an aromatic feedstock containing at least one oxidizable aromatic compound, the method comprising:

oxidizing the at least one oxidizable aromatic compound of the aromatic feedstock in an oxidation reactor in an oxidation medium comprising a manganate salt in an alkaline medium to form a slurry comprising a liquid component containing a carboxylate and a solid component containing manganese dioxide;

separating the slurry in a separation apparatus that is in fluidic communication with a solids treatment unit and a product recovery unit;

transferring the liquid component to the product recovery unit;

transferring the solid component to the solids treatment unit;

contacting the solid component in the solids treatment unit with a basic liquid to oxidize the manganese dioxide in the solid component and form a regenerated manganate salt; and

recycling at least a portion of the regenerated manganate salt from the solids treatment unit back to the oxidation reactor.

8. The method of claim 7, further comprising:

adding supplemental manganate salt to the portion of the regenerated manganate salt being sent back to the oxidation reactor.

9. The method of claim 7 or 8, further comprising:

adding supplemental manganese dioxide to the manganese dioxide being oxidized in the solids treatment unit to increase an amount of manganate salt to be sent back to the oxidation reactor.

10. The method of any one of claims 7-9, further comprising:

adding an acid to the carboxylate in the product recovery unit to form a carboxylic acid.

11. The method of any one of claims 7-10, wherein the manganate salt is potassium manganate and the alkaline medium comprises potassium hydroxide.

12. The method of any one of claims 7-11, wherein oxidizing the at least one aromatic compound is performed at atmospheric pressure and a reaction temperature of from about 60 °C to about 80 °C.

13. The method of any one of claims 7-12, wherein the basic liquid comprises potassium hydroxide.

14. The method of any one of claims 7-13, wherein the at least one oxidizable aromatic compound is chosen from monomethylbenzenes, dimethylbenzenes, trimethylbenzenes, monomethylnaphthalenes, and dimethylnaphthalenes, preferably

wherein the at least one oxidizable aromatic compound is chosen from *p*-xylene, *m*-xylene, *o*-xylene, pseudocumene, 2,6-dimethylnaphthalene, 1,5-dimethylnaphthalene, 2,7-dimethylnaphthalene, more preferably wherein the at least one oxidizable aromatic compound is chosen from *p*-xylene, *m*-xylene, *o*-xylene, *p*-toluic acid, *m*-toluic acid, *o*-toluic acid, and combinations thereof, or most preferably wherein the at least one oxidizable aromatic compound is chosen from *p*-xylene, *m*-xylene, o-xylene, and combinations thereof.

15. The method of any one of claims 7-14 wherein the at least one oxidizable aromatic compound comprises *p*-xylene and the carboxylate comprises a benzene-1,4-dicarboxylate.