

CLAIMS

What is claimed is:

1. A method for processing waste plastic, said method comprising:
introducing a reactor purge coproduct stream from a solvolysis facility
5 into at least one of the following: (i) a partial oxidation (POX) gasification facility;
(ii) a pyrolysis facility; (iii) a cracker facility; and (iv) an energy
generation/energy production facility.
2. The method of claim 1, further comprising introducing another
10 process stream into at least one (i) through (iv) and/or (v) a solidification facility.
3. The method of claim 2, wherein said reactor purge coproduct
stream and said another process stream are introduced into different ones of
15 (i) through (v).
4. The method of claim 2, wherein said another process stream
originates from one of facilities (ii) through (v).
5. The method of claim 2, wherein said another process stream
20 comprises a PO-enriched waste plastic stream.
6. The method of claim 1, reactor purge coproduct stream is
withdrawn from a solvolysis reactor in said solvolysis facility in a continuous
25 manner.
7. The method of claim 1, wherein at least a portion of said reactor
purge coproduct stream is introduced into a POX gasification facility.
8. The method of claim 7, wherein said POX gasification facility
30 includes a liquid-fed gasifier.

9. The method of claim 7, wherein said POX gasification facility includes a solid-fed gasifier.

5 10. The method of claim 1, wherein said reactor purge coproduct stream comprises at least 25 weight percent of dimethyl terephthalyl and at least 100 ppm and not more than 25 weight percent of one or more non-terephthalyl solids.

10 11. The method of claim 1, wherein said reactor purge coproduct stream has a viscosity of at least 0.01 poise (P) and not more than 10 P, measured using a Brookfield R/S rheometer with V80-40 vane spindle operating at a shear rate of 10 rad/s and a temperature of 250°C, and wherein said reactor purge coproduct stream comprises at least about 100 ppm and/or not more than 60,000 ppm of non-volatile catalyst compounds.

15 12. A method for processing waste plastic, said method comprising:
(a) withdrawing a reactor purge coproduct stream from a solvolysis facility used to process PET-containing waste plastic; and
(b) introducing at least a portion of said reactor purge coproduct stream
20 into at least one of the following: (i) a partial oxidation (POX) gasification facility; (ii) a pyrolysis facility; (iii) a cracker facility; and (iv) an energy generation/energy production facility.

25 13. The method of claim 12, wherein said withdrawing is performed in a continuous manner.

14. The method of claim 12, wherein said withdrawing is performed in a batch manner.

30 15. The method of claim 12, wherein said PET-containing waste plastic is at least partially derived from a feedstock comprising at least 10 weight percent textiles.

16. The method of claim 12, wherein said solvolysis facility produces a principal terephthalyl and a principal glycol and wherein said reactor purge coproduct stream has a mid-range boiling point higher than the boiling point of said principal terephthalyl.

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17. The method of claim 12, further comprising introducing another coproduct stream from said solvolysis facility into at least one of the following: (i) a partial oxidation (POX) facility; (ii) a pyrolysis facility; (iii) a solidification facility; (iv) a cracker facility; and (v) an energy generation/energy production facility.

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18. The method of claim 17, wherein said reactor purge coproduct stream and said another coproduct stream are introduced into different ones of (i) through (v).

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19. The method of claim 17, wherein said reactor purge coproduct stream and said another coproduct stream are combined to form a combined stream, and wherein said combined stream is introduced into at least one of (i) through (v).

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20. A method for processing waste plastic, said method comprising:

(a) separating a stream of mixed plastic waste (MPW) into a polyethylene terephthalate-enriched (PET-enriched) stream and a polyolefin-enriched stream (PO-enriched) stream;

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(b) subjecting at least a portion of said PET-enriched stream to solvolysis in a solvolysis facility to form a principal glycol product, a principal terephthalyl product, and at least one coproduct stream, wherein said coproduct stream comprises a reactor purge coproduct stream; and

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(c) introducing at least a portion of said coproduct stream from said solvolysis facility into at least one of the following: (i) a partial oxidation (POX) gasification facility; (ii) a pyrolysis facility; (iii) a solidification facility; (iv) a cracker facility; and (v) an energy generation/energy production facility.

21. The method of claim 20, wherein said PET-enriched stream comprises at least 60 weight percent PET and not more than 40 weight percent of polyolefins, based on the total weight of the PET-enriched stream, wherein said PO-enriched stream comprises at least 60 weight percent polyolefins and not more than 40 weight percent of PET, based on the total weight of the PO-enriched stream, and wherein said PET-enriched stream comprises not more than 10 weight percent of halogens, based on the total weight of the PET-enriched stream.

22. The method of claim 20, wherein said reactor purge coproduct stream has a temperature in the range of from 200 to 350°C when withdrawn from said solvolysis facility.

23. The method of claim 20, wherein said introducing is performed in a continuous manner.

24. The method of claim 20, wherein said introducing is performed in a batch manner.

25. The method of claim 20, wherein said stream of mixed plastic waste comprises at least 10 weight percent of textiles, based on the total weight of the stream.

26. The method of claim 20, wherein said solvolysis facility comprise a methanolysis facility.

27. The method of claim 20, further comprising introducing said reactor purge coproduct stream into at least two of facilities (i) through (v).

28. The method of any of claims 1-27, wherein said method is carried out as a continuous process.

29. The method of any of claims 1-27, wherein said method is carried out in a commercial-scale facility.

30. The method of any of claims 1-27, wherein said solvolysis facility is co-located with the at least one of the other facilities (i) through (v), and wherein at least one of the following statements (A) through (F) are true –

(A) the solvolysis facility and the other facility share at least one utility;
(B) the solvolysis facility and the other facility share at least one service group;

(C) the solvolysis facility and the other facility are owned and/or operated by parties that share at least one boundary;

(D) the solvolysis facility and the other facility are connected by at least one conduit;

(E) the solvolysis facility and the other facility share energy via an energy exchange zone; and

(F) the solvolysis facility and the other facility are within 50 miles from one another, measured from their geographical center.

31. A solvolysis coproduct composition formed within a solvolysis facility for processing polyester-containing waste plastic into a principal glycol and a principal terephthalyl using a principal solvent, said composition comprising:

at least 25 weight percent of said principal terephthalyl, based on the total weight of said composition; and

an amount of 100 ppm by weight to 25 percent by weight of one or more non-terephthalyl solids, based on the total weight of said composition.

32. The composition of claim 31, wherein said solvolysis coproduct composition is a non-Newtonian fluid.

33. The composition of claim 31, wherein said solvolysis coproduct composition comprises dimethyl terephthalate in an amount of at least 10 weight percent, based on the total weight of said composition.

5 34. The composition of claim 31, wherein said solvolysis coproduct composition has a viscosity of at least 0.01 poise (P), measured using a Brookfield R/S rheometer with V80-40 vane spindle operating at a shear rate of 10 rad/s and a temperature of 250°C, wherein said solvolysis coproduct composition comprises at least about 100 ppm and/or not more than 60,000
10 ppm of non-volatile catalyst compounds selected from the group consisting of titanium, zinc, methoxide, alkali metals, alkaline earth metals, tin, residual esterification catalysts, residual polycondensation catalysts, aluminum, and combinations thereof.

15 35. The composition of claim 31, wherein said solvolysis coproduct composition has a total solids content of at least about 100 weight percent and not more than about 25 weight percent.

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