

CLAIMS

What is claimed is –

1. A method for processing waste plastic in a solvolysis facility, said method comprising:

5 (a) combining a stream of waste plastic comprising polyethylene terephthalate (PET) and non-PET plastic with a solvent to form a predominantly liquid stream;

(b) passing at least a portion of the predominantly liquid stream through at least a first conduit at a first velocity (v_1);

10 (c) subsequent to said passing of step (b), passing said predominantly liquid stream through a decanter at second velocity (v_2) to form a two-phase stream, wherein said two-phase stream comprises a PET-enriched phase and a non-PET enriched phase; and

15 (d) removing a take-off stream comprising at least a portion of the non-PET enriched phase from said two-phase stream.

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

20 (a) introducing a waste plastic stream into a solvolysis facility, wherein said waste plastic stream comprises polyethylene terephthalate (PET) and non-PET plastic;

(b) forming a predominantly liquid stream from said waste plastic;

(c) separating said predominantly liquid stream into a two-phase stream in a disengagement zone of a decanter, wherein said separating is carried out substantially continuously over at least 12 hours; and

25 (d) removing a take-off stream from a separation zone of said decanter, wherein said take-off stream is enriched in said non-PET plastic.

3. The method of claim 2, wherein said predominantly liquid stream passes through a first conduit at a first velocity, v_1 , and through at least a portion of said decanter at a second velocity, v_2 .

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4. The method of claim 1 or 3, wherein v_2 is greater than 0 and less than v_1 .

5. The method of claim 1 or 3, wherein the ratio of v_1 to v_2 is at least 1.5:1 and not more than 10:1.

6. The method of claim 1 or 3, wherein v_2 at least 0.5 feet per second (ft/s) and not more than 5 ft/s and/or wherein v_1 is at least 2.5 ft/s and not more than about 8.5 ft/s.

7. The method of claim 1 or 3, wherein said predominantly liquid stream comprises a lighter phase and a heavier phase, wherein said first velocity (v_1) is high enough so that not more than 10 percent of said lighter phase separates out of said heavier phase and said second velocity (v_2) is low enough so that between 10 and 99 percent of the lighter phase separates out of said heavier phase, and wherein said lighter phase comprises said non-PET enriched phase.

8. The method of claim 1 or 3, wherein said decanter comprises a disengagement zone followed by a separation zone, wherein at least a portion of step (c) is performed in said disengagement zone, and further comprising, subsequent to step (c), passing said two-phase stream through at least a portion of said decanter at a third velocity (v_3), and wherein v_3 is greater than 0 and less than v_2 .

9. The method of claim 1, wherein at least a portion of said first conduit is oriented substantially horizontally so that at least a portion of said passing includes flowing said predominantly liquid stream through said conduit in a substantially horizontal direction.

10. The method of claim 1, wherein said passing of step (b) is carried out for at least 1 second and not more than 5 minutes and/or wherein said passing of step (c) is carried out for at least 5 seconds and not more than 10 minutes.

5 11. The method of claim 1, the first conduit has a first average diameter, D1, and the decanting zone has a second average diameter, D2 and wherein the ratio of D2 to D1 (D2:D1) is in the range of from 1.1:1 to 10:1 or wherein D2 is in the range of from 4 to 120 inches and D1 is in the range of from 2 to 24 inches.

10 12. The method of claim 1 or 2, wherein said decanter comprises a disengagement zone followed by a separation zone, wherein said take-off stream is removed from said decanter in said separation zone, wherein at least a portion of said disengagement zone is oriented substantially horizontally and
15 at least a portion of said separation zone is oriented substantially vertically.

 13. The method of claim 2, wherein said separating is performed continuously over a period of at least 30 days and wherein said removing of said take-off stream is performed in a batch or semi-batch manner.

20 14. The method of claim 1 or 2, further comprising introducing at least a portion of said take-off stream into at least one of the following downstream chemical processing facilities: (i) a pyrolysis facility; (ii) a partial oxidation (POX) gasification facility; (iii) an energy recovery facility; and (iv) a cracker facility;
25 and (v) a liquification facility.

 15. A system for processing waste plastic in a solvolysis facility, said system comprising:

 a blending vessel for combining waste plastic comprising PET and non-
30 PET with a solvent to form a predominantly liquid stream;

a decanter positioned downstream of said blending vessel for receiving and separating at least a portion of said predominantly liquid stream into a PET-enriched phase and a non-PET enriched phase;

a reactor for receiving at least a portion of said PET-enriched phase; and

5 at least one take-off conduit for removing at least a portion of said non-PET enriched stream from said decanter.

16. The system of claim 15, wherein said system further comprises a first conduit and a transition zone located between said first conduit and said
10 decanter, wherein said first conduit has a first diameter, D1, and said decanter has a second diameter, D2, wherein D2 is greater than D1, and wherein the ratio of D2 to D1 (D2:D1) is in the range of from 1.1:1 to 10:1 or wherein D1 is in the range of from 2 to 24 inches and D2 is in the range of from 4 to 120 inches.

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17. The system of claim 16, wherein said transition zone is concentric.

18. The system of claim 16, wherein said transition zone is lower eccentric or upper eccentric.

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19. The system of claim 16, wherein said transition zone is located where an outlet of said first conduit discharges into said decanter.

20. The system of claim 15 or 16, wherein said decanter comprises a
25 disengagement zone followed by a separation zone, wherein said disengagement zone of said decanter has a second diameter, D2, and said separation zone of said decanter has a third diameter, D3, and wherein D3 is greater than D2, wherein said separation zone of said decanter includes a first horizontally oriented segment and a first vertically oriented segment, wherein
30 said take-off conduit is located in said first vertically oriented segment. wherein

said take-off conduit is located downstream of said disengagement zone of said decanter.