CLAIMS

What is claimed is –

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

(a) combining a stream of waste plastic comprising polyethylene terephthalate (PET) and at least one non-PET plastic with a solvent in a solvolysis dissolving tank to provide a predominantly liquid stream;

(b) adding a catalyst to said predominantly liquid stream, wherein said catalyst comprises lithium, manganese, or combinations thereof; and

(c) depolymerizing at least a portion of said PET in a solvolysis reactor to form a principal terephthalyl, a principal glycol, and at least one coproduct stream,

wherein said non-PET plastic comprises polyolefin (PO) and/or polyvinyl chloride (PVC).

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

(a) combining a stream of waste plastic comprising polyethylene terephthalate (PET) and at least one non-PET plastic with a solvent in a solvolysis dissolving tank to provide a predominantly liquid stream;

(b) passing at least a portion of said predominantly liquid stream to a solvolysis reactor;

(c) adding a catalyst to at least one of said waste plastic, said solvent, or said predominantly liquid stream, wherein said catalyst comprises lithium, manganese, sodium, potassium, or combinations thereof; and

(d) depolymerizing at least a portion of said PET in a solvolysis reactor to form a principal terephthalyl, a principal glycol, and at least one coproduct stream,

wherein said non-PET plastic comprises polyolefin (PO) and/or polyvinyl chloride (PVC).

3. The method of claim 1 or 2, further comprising:

introducing at least a portion of said coproduct stream into at least one of the following: (i) a pyrolysis facility; (ii) a cracking facility; (iii) a partial

oxidation (POX) gasifier facility; (iv) an energy recovery facility; and (v) a liquification zone.

4. The method of claim 2, wherein step (c) comprises adding said catalyst with said waste plastic or wherein step (c) comprises adding said catalyst with said solvent or wherein step (c) comprises adding said catalyst to said predominantly liquid stream during at least a portion of said passing of step (b).

5. The method of any one of claims 1-4, wherein said catalyst is present in an amount in the range of from 25 to 1000 parts per million by weight (ppm), based on the total weight of the predominantly liquid stream.

6. The method of claim 5, wherein said base comprises sodium, potassium, or combinations thereof.

7. The method of any one of claims 1-4, wherein said catalyst comprises manganese.

8. The method of any one of claims 1-4, wherein said catalyst comprises manganese acetate in an amount of from 100 to 600 ppm by weight and sodium hydroxide in an amount of from 100 to 350 ppm by weight, based on the total weight of said predominantly liquid stream.

9. The method of any one of claims 1-4, wherein said catalyst comprises not more than 250 ppm by weight of zinc, tin, and titanium, based on the total weight of said predominantly liquid stream.

10. The method of any one of claims 1-4, wherein said non-PET plastic comprises polyolefin (PO) in an amount of from 10 to 80 weight percent, based on the total weight of said waste plastic, and/or wherein said non-PET plastic

comprises polyvinyl chloride (PVC) in an amount of from 0.01 to 10 weight percent, based on the total weight of said waste plastic.

11. The method of any one of claims 1-4, wherein said PET is present in said waste plastic in an amount of at least 25 weight percent, based on the total weight of said waste plastic.

12. The method of claim 3, wherein said solvolysis facility is co-located with at least one of (i) said partial oxidation (POX) gasification facility; (ii) said pyrolysis facility; (iii) said cracking facility; (iv) said energy recovery facility; and (v) said liquification zone.

13. The method any one of claims 1-4, wherein said solvolysis facility is operated in a continuous manner and has an average feed rate of at least 500 pounds per hour, averaged over one year.

14. A solvolysis process composition, said composition comprising:

polyethylene terephthalate (PET) and/or decomposition products thereof;

at least one type of non-PET plastic and/or decomposition products thereof;

a principal solvent; and

a catalyst comprising manganese and/or lithium,

wherein said non-PET plastic comprises polyolefin (PO) and/or polyvinyl chloride (PVC).

15. The composition of claim 14, wherein said catalyst comprises sodium or potassium.

16. The composition of claim 14 or 15, wherein said catalyst comprises manganese.

17. The composition of claim 14 or 15, wherein said catalyst comprises manganese acetate in an amount of from 100 to 600 ppm by weight and sodium hydroxide in an amount of from 100 to 350 ppm by weight, based on the total weight of said predominantly liquid stream.

18. The composition of claim 14 or 15, wherein said catalyst comprises not more than 250 ppm by weight of zinc, tin, and titanium, based on the total weight of said predominantly liquid stream.

19. The composition of claim 14 or 15, wherein said non-PET plastic comprises polyolefin in an amount in the range of 10 to 80 weight percent, based on the total weight of the composition or wherein said non-PET plastic comprises polyvinyl chloride in an amount in the range of from 0.01 to 10 weight percent, based on the total weight of the composition or wherein said PET is present in an amount in the range of from 5 to 95 weight percent, based on the total weight of the stream.