CLAIMS

What is claimed is –

1. A process for separating an olefin-containing stream to form one or more product streams, wherein said process comprises:

(a) introducing a column feed stream to in a propylene fractionator, wherein said column feed stream comprises a recycle content propylene composition (r-propylene);

(b) separating said column feed stream in said propylene fractionator into an overhead enriched in propylene and a bottoms stream depleted in propylene,

wherein the mole ratio of propylene to propane in said column feed stream is at least 0.1% higher than if said column feed stream did not include said r-propylene but had the same mass flow rate.

2. The process of claim 1, further comprising prior to the introducing, cracking a cracker feedstock comprising a recycle content pyrolysis oil (r-pyoil) in a cracker furnace to provide an olefin-containing effluent, wherein said column feed comprises at least a portion of said olefin-containing effluent.

3. A predominantly propylene composition comprising a recycle content propylene composition (r-propylene) formed by the process according to claim 1.

4. A process for separating an olefin-containing stream to form one or more product streams, wherein said process comprises:

(a) introducing a column feed stream to a propylene fractionator column, wherein said column feed stream comprises a recycle content propylene composition (r-propylene);

(b) separating said column feed stream in said propylene fractionator column into an overhead enriched in propylene and a bottoms stream depleted in propylene,

wherein the mass flow rate of propane in said overhead stream is at least 0.1% lower than if said column feed stream did not include said r-propylene but had the same mass flow rate.

5. The process of claim 4, further comprising prior to the introducing, cracking a cracker feedstock comprising a recycle content pyrolysis oil (r-pyoil) in a cracker furnace to provide an olefin-containing effluent, wherein said column feed comprises at least a portion of said olefin-containing effluent.

6. A process for separating an olefin-containing stream to form one or more product streams, wherein said process comprises:

(a) introducing a column feed stream to a propylene fractionator, wherein said column feed stream comprises a recycle content propylene composition (r-propylene); and

(b) separating said column feed stream in said propylene fractionator into an overhead enriched in propylene and a bottoms stream depleted in propylene, wherein separating includes introducing a reflux stream into the top portion of the propylene fractionator,

wherein the reflux ratio used during said separating is at least 0.1% lower than the reflux ratio used if said column feed stream did not include said r-propylene but had the same mass flow rate.

7. The process of claim 6, further comprising prior to the introducing, cracking a cracker feedstock comprising a recycle content pyrolysis oil (r-pyoil) in a cracker furnace to provide an olefin-containing effluent, wherein said column feed comprises at least a portion of said olefin-containing effluent.

8. A process for separating an olefin-containing stream to form one or more product streams, wherein said process comprises:

(a) introducing a column feed stream to a propylene fractionator, wherein said column feed stream comprises a recycle content propylene composition (r-propylene); and

(b) separating said column feed stream said propylene fractionator to form an overhead enriched in propylene and a bottoms stream depleted in propylene,

wherein the pressure differential across said propylene fractionator is at least 0.1% lower than the reflux ratio used if said column feed stream did not include said r-propylene but had the same mass flow rate.

9. The process of claim 8, further comprising prior to the introducing, cracking a cracker feedstock comprising a recycle content pyrolysis oil (r-pyoil) in a cracker furnace to provide an olefin-containing effluent, wherein said column feed comprises at least a portion of said olefin-containing effluent.

10. A process for separating an olefin-containing stream to form one or more product streams, wherein said process comprises:

(a) introducing a column feed stream to a propylene fractionator, wherein said column feed stream comprises a recycle content propylene composition (r-propylene); and

(b) separating said column feed stream said propylene fractionator to form an overhead enriched in propylene and a bottoms stream depleted in propylene,

wherein the mass or volumetric flow rate of liquid within the propylene fractionator is at least 0.1% lower than the mass or volumetric flow rate of liquid within the propylene fractionator if said column feed stream did not include said r-propylene but had the same mass flow rate.

11. The process of claim 10, further comprising prior to the introducing, cracking a cracker feedstock comprising a recycle content pyrolysis oil (r-pyoil) in a cracker furnace to provide an olefin-containing effluent, wherein said column feed comprises at least a portion of said olefin-containing effluent.

12. A process for making olefins, said process comprising:

(a) cracking a cracker feedstock comprising a recycle content pyrolysis oil composition (r-pyoil) and a stream comprising non-recycle content propane in a cracker furnace to provide an olefin-containing effluent comprising propylene;

(b) introducing a column feed stream comprising at least a portion of said olefin-containing effluent into a propylene fractionator; and

(c) separating said column feed stream into a propylene-enriched overhead and a propylene-depleted bottoms stream,

wherein the molar ratio of propylene to propane in said column feed stream is at least 0.1% higher than if said cracker feedstock did not include said r-pyoil but had the same mass flow rate.

13. The process of claim 12, wherein either:

(a) said cracker feed stream has not been hydrotreated; or

(b) said r-pyoil is present in said cracker feed stream in an amount of not more than about 25 weight percent, or

(c) said cracker feed stream composition comprises at least 60 weight percent of non-recycle C2 to C4 hydrocarbons.

14. A predominantly propylene composition comprising a recycle content propylene composition (r-propylene) formed by the process according to claim 13.

15. A process for making olefins, said process comprising:

(a) cracking a cracker feedstock comprising a recycle content pyrolysis oil composition (r-pyoil) and a stream comprising non-recycle content propane in a cracker furnace to provide an olefin-containing effluent comprising propylene;

(b) separating at least a portion of the olefin-containing effluent in a propylene fractionator into a propylene-enriched overhead stream and a propane-enriched bottoms stream; and

(c) recycling at least a portion of said propane-enriched bottoms stream to said cracker furnace, wherein said cracker feedstock comprises at least a portion of said propane-enriched bottoms stream,

wherein the ratio of the weight of non-recycle content propane in said cracker feedstock to the weight of propane in said propane-enriched stream is at least 0.1% lower than if said cracker feedstock did not include said r-pyoil but had the same mass flow rate.

16. The process of claim 15, wherein either:

(a) said cracker feed stream has not been hydrotreated; or

(b) said r-pyoil is present in said cracker feed stream in an amount of not more than about 25 weight percent, or

(c) said cracker feed stream composition comprises at least 60 weight percent of non-recycle C2 to C4 hydrocarbons.

17. A process for making olefins, said process comprising:

(a) cracking a cracker feedstock comprising a recycle content pyrolysis oil composition (r-pyoil) and a stream comprising non-recycle content propane in a cracker furnace to provide an olefin-containing effluent comprising propylene;

(b) introducing a column feed stream comprising at least a portion of said olefin-containing effluent into a propylene fractionator; and

(c) separating said column feed stream into a propylene-enriched overhead and a propylene-depleted bottoms stream,

wherein the mass flow rate of the column feed stream is at least 0.1% higher than if said cracker feedstock did not include said r-pyoil but had the same mass flow rate.

18. The process of claim 17, wherein either:

(a) said cracker feed stream has not been hydrotreated; or

(b) said r-pyoil is present in said cracker feed stream in an amount of not more than about 25 weight percent, or

(c) said cracker feed stream composition comprises at least 60 weight percent of non-recycle C2 to C4 hydrocarbons.

19. A process for making olefins, said process comprising:

cracking a cracker feedstock comprising a recycle content pyrolysis oil composition (r-pyoil) and a stream comprising non-recycle content propane in a cracker furnace to provide an olefin-containing effluent comprising propylene,

wherein the amount of propylene in said olefin-containing effluent is at least 0.1% higher than if said cracker feedstock did not include said r-pyoil, all other conditions being the same.

20. The process of claim 19, wherein either:

(a) said cracker feed stream has not been hydrotreated; or

(b) said r-pyoil is present in said cracker feed stream in an amount of not more than about 25 weight percent, or

(c) said cracker feed stream composition comprises at least 60 weight percent of non-recycle C2 to C4 hydrocarbons.