CLAIMS

What is claimed:

1. A process for the selective hydrogenation of acetylenes and dienes in a C5 hydrocarbon stream, comprising:

   feeding hydrogen and a C5-olefin containing stream comprising linear pentenes, dienes, acetylenes, and cyclopentene to a catalytic distillation reactor system;

   concurrently in the catalytic distillation reactor system:

   hydrogenating the acetylenes and dienes; and

   fractionating the C5-olefin containing stream;

   recovering an overheads fraction comprising the linear pentenes;

   recovering a side draw fraction comprising the cyclopentene; and

   recovering a bottoms fraction.

2. The process of claim 1, wherein the side draw is located intermediate a feed location of the C5-olefin containing stream and a bottoms draw location.
3. The process of claim ~~1~~2, wherein the side draw is located below the feed stage and proximate an elevation of maximum cylcopentene concentration determined as if the side draw were not present.
4. The process of claim 1, wherein a mole ratio of the side draw rate to the feed rate is in the range from ~~about~~ 0.001 to ~~about~~ 0.01.
5. The process of claim 1, wherein a mole ratio of the side draw rate to the feed rate is in the range from ~~about~~ 0.002 to ~~about~~ 0.005.
6. The process of claim 1, wherein the catalytic distillation reactor system comprises a hydrogenation reaction zone located above a feed location of the C5-olefin containing stream.
7. The process of claim 6, wherein the catalytic distillation reactor system further comprises a hydrogenation reaction zone located below a feed location of the C5-olefin containing stream and above or proximate an elevation of the side draw.
8. The process of claim 1, wherein the side draw is substantially free of acetylenes and dienes.
9. A process for the conversion of linear pentenes to propylene, comprising:

feeding hydrogen and a C5-olefin containing stream comprising linear pentenes, dienes, acetylenes, and cyclopentene to a catalytic distillation reactor system;

concurrently in the catalytic distillation reactor system:

hydrogenating the acetylenes and dienes; and

fractionating the C5-olefin containing stream;

recovering an overheads fraction comprising the linear pentenes;

recovering a side draw fraction comprising the cyclopentene;

recovering a bottoms fraction; and

feeding at least a portion of the overheads fraction to a metathesis reactor.

10. The process of claim 9, wherein the side draw is located intermediate a feed location of the C5-olefin containing stream and a bottoms draw location.

11. The process of claim ~~9~~10, wherein the side draw is located below the feed stage and proximate an elevation of maximum cylcopentene concentration determined as if the side draw were not present.

12. The process of claim 9, wherein a mole ratio of the side draw rate to the feed rate is in the range from ~~about~~ 0.001 to ~~about~~ 0.01.

13. The process of claim 9, wherein a mole ratio of the side draw rate to the feed rate is in the range from ~~about~~ 0.002 to ~~about~~ 0.005.

14. The process of claim 9, wherein the catalytic distillation reactor system comprises a hydrogenation reaction zone located above a feed location of the C5-olefin containing stream.

15. The process of claim 14, wherein the catalytic distillation reactor system further comprises a hydrogenation reaction zone located below a feed location of the C5-olefin containing stream and above or proximate an elevation of the side draw.

16. The process of claim 9, wherein the side draw is substantially free of acetylenes and dienes.

17. A system for the selective hydrogenation of acetylenes and dienes in a C5 hydrocarbon stream, comprising:

one or more flow lines for feeding hydrogen and a C5-olefin containing stream comprising linear pentenes, dienes, acetylenes, and cyclopentene to a catalytic distillation reactor system;

the catalytic distillation reactor system, for concurrently:

hydrogenating the acetylenes and dienes; and

fractionating the C5-olefin containing stream;

an overheads system fluidly connected to the catalytic distillation reactor system for recovering an overheads fraction comprising the linear pentenes;

a flow line for recovering a side draw fraction comprising the cyclopentene from the catalytic distillation reactor system; and

a bottoms system for recovering a bottoms fraction from the catalytic distillation reactor system.

18. The system of claim 17, wherein the side draw is located intermediate a feed location of the C5-olefin containing stream and a bottoms draw location.

19. The system of claim ~~17~~18, wherein the side draw is located below the feed stage and proximate an elevation of maximum cylcopentene concentration determined as if the side draw were not present.

20. The system of claim 17, wherein the catalytic distillation reactor system comprises a hydrogenation reaction zone located above a feed location of the C5-olefin containing stream.

21. The system of claim 20, wherein the catalytic distillation reactor system further comprises a hydrogenation reaction zone located below a feed location of the C5-olefin containing stream and above or proximate an elevation of the side draw.