CLAIMS

What is claimed is:

1. A method of selectively hydrogenating a highly unsaturated hydrocarbon to an unsaturated hydrocarbon comprising contacting in a reaction zone under hydrogenation conditions a feedstream comprising the highly unsaturated hydrocarbon with a selective hydrogenation catalyst composition having palladium and a chlorided catalyst support wherein the palladium has a skin thickness of from about 1 micron to about 3000 microns and, wherein a fouling rate of the selective hydrogenation catalyst is at least about 25 percent less than the fouling rate of an otherwise similar selective hydrogenation catalyst having a non-chlorided catalyst support under like hydrogenation conditions.

2. The method of claim 1, wherein the selective hydrogenation catalyst is produced by a process comprising: contacting an inorganic catalyst support with a chlorine-containing compound to form the chlorided catalyst support; subsequently removing at least some of the chlorine-containing compound from the chlorided catalyst support to form a clean chlorided catalyst support; and subsequently adding palladium to the clean chlorided catalyst support to form a supported-palladium composition.

~~3. The method of claim 2 wherein the clean chlorided catalyst support comprises from about 5 ppm to about 2000 ppm chlorine.~~

~~4.~~ The method of claim 1, wherein the feedstream is a product of a hydrocarbon cracking or pyrolysis process.

~~5.~~ The method of claim 1, wherein the highly unsaturated hydrocarbon comprises acetylene, methylacetylene, propadiene, or combinations thereof.

~~6.~~ The method of claim 1, wherein the feedstream further comprises carbon monoxide.

~~7.~~ The method of claim ~~6~~, wherein the carbon monoxide is present in the feedstream in an amount of less than about 0.15 mole % based on the total moles of a fluid in the feedstream.

~~8.~~ The method of claim 1, wherein the reaction zone has a temperature in the range of from about 5° C. to about 300° C.

~~9.~~ The method of claim 1, wherein the reaction zone has a pressure in the range of from about 15 psig to about 2000 psig.

~~10.~~ The method of claim 1, wherein the reaction zone is a component of a backend acetylene removal unit and the feedstream comprises hydrogen and acetylene.

~~11.~~ The method of claim ~~10~~, wherein a mole ratio of hydrogen to acetylene is in the range of from about 0.1 to about 10.

~~12.~~ The method of claim 1, wherein the reaction zone is a component of a frontend deethanizer acetylene removal unit, a frontend depropanizer acetylene removal unit, or a raw gas acetylene removal unit and the feedstream comprises hydrogen and acetylene.

~~13.~~ The method of claim ~~12~~, wherein the mole ratio of hydrogen to acetylene is in the range of from about 10 to about 3000.

~~14.~~ The method of claim 1, wherein the reaction zone is a component of a frontend depropanizer acetylene removal unit or raw gas acetylene removal unit and the feedstream comprises hydrogen and methylacetylene.

~~15.~~ The method of claim ~~14~~, wherein the mole ratio of hydrogen to methylacetylene is in the range of from about 3 to about 3000.

~~16~~. The method of claim 1, wherein the reaction zone is component of a frontend depropanizer acetylene removal unit or raw gas acetylene removal unit and the feedstream comprises hydrogen and propadiene.

~~17~~. The method of claim ~~16~~, wherein the mole ratio of hydrogen to propadiene is in the range of from about 3 to about 3000.

~~18~~. The method of claim 1, further comprising recovering an effluent stream comprising ethylene and less than about 5 ppm of the highly unsaturated hydrocarbon.

~~19~~. The method of claim 1, further comprising recovering an effluent stream having about 90% less acetylene when compared to the amount of acetylene in the feedstream.

~~20~~. The method of claim 1, further comprising regenerating the selective hydrogenation catalyst.

~~21~~. The method of claim ~~20~~, wherein the selective hydrogenation catalyst is regenerated by a calcination in the presence of a gas comprising oxygen.

~~22~~. The method of claim ~~21~~, wherein the calcination is carried out at a temperature not in excess of 500° C.

~~23~~. The method of claim 1, wherein the lifetime of the selective hydrogenation catalyst is increased when compared to an otherwise similar selective hydrogenation catalyst having a non-chlorided catalyst support.

CLAIMS

What is claimed is:

1. A method of selectively hydrogenating a highly unsaturated hydrocarbon to an unsaturated hydrocarbon comprising contacting in a reaction zone under hydrogenation conditions a feedstream comprising the highly unsaturated hydrocarbon with a selective hydrogenation catalyst composition having palladium and a chlorided catalyst support wherein the palladium has a skin thickness of from about 1 micron to about 3000 microns and, wherein a fouling rate of the selective hydrogenation catalyst is at least about 25 percent less than the fouling rate of an otherwise similar selective hydrogenation catalyst having a non-chlorided catalyst support under like hydrogenation conditions.

2. The method of claim 1, wherein the selective hydrogenation catalyst is produced by a process comprising: contacting an inorganic catalyst support with a chlorine-containing compound to form the chlorided catalyst support; subsequently removing at least some of the chlorine-containing compound from the chlorided catalyst support to form a clean chlorided catalyst support; and subsequently adding palladium to the clean chlorided catalyst support to form a supported-palladium composition.

3. The method of claim 1, wherein the feedstream is a product of a hydrocarbon cracking or pyrolysis process.

4. The method of claim 1, wherein the highly unsaturated hydrocarbon comprises acetylene, methylacetylene, propadiene, or combinations thereof.

5. The method of claim 1, wherein the feedstream further comprises carbon monoxide.

6. The method of claim 5, wherein the carbon monoxide is present in the feedstream in an amount of less than about 0.15 mole % based on the total moles of a fluid in the feedstream.

7. The method of claim 1, wherein the reaction zone has a temperature in the range of from about 5° C. to about 300° C.

8. The method of claim 1, wherein the reaction zone has a pressure in the range of from about 15 psig to about 2000 psig.

9. The method of claim 1, wherein the reaction zone is a component of a backend acetylene removal unit and the feedstream comprises hydrogen and acetylene.

10. The method of claim 9, wherein a mole ratio of hydrogen to acetylene is in the range of from about 0.1 to about 10.

11. The method of claim 1, wherein the reaction zone is a component of a frontend deethanizer acetylene removal unit, a frontend depropanizer acetylene removal unit, or a raw gas acetylene removal unit and the feedstream comprises hydrogen and acetylene.

12. The method of claim 11, wherein the mole ratio of hydrogen to acetylene is in the range of from about 10 to about 3000.

13. The method of claim 1, wherein the reaction zone is a component of a frontend depropanizer acetylene removal unit or raw gas acetylene removal unit and the feedstream comprises hydrogen and methylacetylene.

14. The method of claim 13, wherein the mole ratio of hydrogen to methylacetylene is in the range of from about 3 to about 3000.

15. The method of claim 1, wherein the reaction zone is component of a frontend

depropanizer acetylene removal unit or raw gas acetylene removal unit and the feedstream comprises hydrogen and propadiene.

16. The method of claim 15, wherein the mole ratio of hydrogen to propadiene is in the range of from about 3 to about 3000.

17. The method of claim 1, further comprising recovering an effluent stream comprising ethylene and less than about 5 ppm of the highly unsaturated hydrocarbon.

18. The method of claim 1, further comprising recovering an effluent stream having about 90% less acetylene when compared to the amount of acetylene in the feedstream.

19. The method of claim 1, further comprising regenerating the selective hydrogenation catalyst.

20. The method of claim 19, wherein the selective hydrogenation catalyst is regenerated by a calcination in the presence of a gas comprising oxygen.

21. The method of claim 20, wherein the calcination is carried out at a temperature not in excess of 500° C.

22. The method of claim 1, wherein the lifetime of the selective hydrogenation catalyst is increased when compared to an otherwise similar selective hydrogenation catalyst having a non-chlorided catalyst support.