WHAT IS CLAIMED IS:

1. A vapor phase process for selective removal of at least 80 mole % of acetylenic impurities from an input gaseous stream ~~wherein said input stream comprises C1 to C9 unsaturated hydrocarbon monoolefins, diolefins and~~including one or more hydrocarbons, acetylenic impurities and steam, ~~wherein said process comprises~~comprising:

contacting said input stream in the vapor phase at a temperature in the range of 250°C (480° F) to 900°C (1650° F) with a solid ~~zinc free~~ catalyst~~, said catalyst having the following metals only:~~ comprising Ni, Fe, an alkali metal, and optionally an alkaline earth element~~(s)~~ wherein said Ni ~~is~~ present in an amount of 0.25-20 wt% on a dry basis of said catalyst, ~~and~~ Fe is present in an amount of 30-75 ~~wt~~% on a dry basis of said catalyst~~;~~ and ~~thereafter~~ recovering an output stream wherein said output stream ~~retains at least 95 mole % of said C1 to C9 unsaturated hydrocarbon monoolefins and diolefins but~~ lacks at least 80 mole % of said acetylenic impurities, wherein the input stream is selected from streams (a), (b), (c), (d) or (e):

wherein stream (a) comprises ethylene in at least 75 mol% based on the hydrocarbon, acetylenic impurities and steam content of the stream;

wherein stream(b) comprises propylene in at least 75 mol% based on the hydrocarbon, acetylenic impurities and steam content of the stream;

wherein input stream (c) comprises styrene in at least 75 mol% based on the hydrocarbon, acetylenic impurities and steam content of the stream;

wherein stream (d) comprises isoprene in at least 75 mol% based on the hydrocarbon, acetylenic impurities and steam content of the stream; and

wherein stream (e) comprises less than 50 mol% C4 hydrocarbons based on the hydrocarbon content of the input stream.

~~2. The process of claim 1, wherein said process selectively removes at least 95 mol% of said acetylenic impurities.~~

2. The process of claim 1, wherein said catalyst is a zinc-free catalyst.

3. The process of claim 1, wherein said catalyst is a solid zinc-free catalyst, said catalyst comprising Ba, Ni. Na and Fe, wherein said Ba is present in an amount of 0.25-40 wt% on a dry basis of said catalyst, Ni present in an amount of 0.25-20 wt% on a dry basis of said catalyst, Na present in an amount of 0.25-40 wt% on a dry basis of said catalyst, and Fe is present in an amount of 30-75% on a dry basis of said catalyst.

~~3~~4. The process of claim 1, wherein said selectively removed acetylenic impurities are vinyl acetylene~~s~~.

5. The process of claim 1, wherein said input stream contains less than 20% C4 hydrocarbons.

6. The process of claim 1, wherein said temperature ranges from about 315°C (600^{o}F) to about 760°C (1400^{o}F).

~~4~~7. The process of claim 1, wherein said temperature ranges from about 480°C (900^{o}F) to about 650°C (1200^{o}F).

~~5~~8. The process of claim 1, wherein said process is carried out ~~catalyst is in a reaction zone~~ at a pressure of ~~from~~about ~~0.014 to 2.1~~ 0-2.1 MPa (~~2~~0-300 psia).

~~6~~9. The process of claim 1, wherein Ba is present in about 1-20 wt% on dry basis of said catalyst, Ni is present in about 1-~~15~~10 wt% on dry basis of said catalyst, Na is present in about 0.5-30 wt% on dry basis of said catalyst, with the remainder ~~of catalytic metal~~ being Fe.

~~7~~10. The process of claim 1, wherein ~~said~~ Ba is present in about 5-8 wt% on dry basis of said catalyst, Ni is present in about 7-9 wt% on dry basis of said catalyst, Na is present in about 10-14 wt% on dry basis of said catalyst, with the remainder being Fe.

~~8~~11. The process of claim 1, wherein said catalyst is prepared from barium carbonate, nickel carbonate, sodium hydroxide and iron oxide.

~~9~~12. The process of claim 1, wherein said input stream contains about 1-2 mole % acetylenic impurities and said output stream contains less than 0.02 mole% acetylenic impurities.

~~10~~13. The process of claim 1, wherein said output stream retains more than about 98 mole% of said C1 to C9 unsaturated hydrocarbon monoolefins and diolefins.

14. The process of claim 1, wherein said output stream is cooled to remove water.

~~11~~15. The process of claim 1, additionally comprising the step of regenerating the catalyst after use.

~~12~~16. The process of claim ~~11~~15, wherein said regeneration comprises controlled oxidation with air or steam in the absence of hydrocarbon.

17. The process of claim 1, wherein the molar ratio of oxygen content to hydrocarbon content in the input stream is less than 0.01.

~~13. A zinc-free catalyst for selective removal of acetylenic impurities from a hydrocarbon stream, said catalyst having the following metals, only: Ni, Fe, alkali metal, and optionally alkaline earth element(s) wherein said Ni is present in an amount of 0.25-20 wt% on a dry basis of said catalyst, Fe is present in an amount of 30-75 wt% on a dry basis of said catalyst.~~

~~14. The zinc-free catalyst of Claim 13, wherein Ba is present in 1-20 wt% on dry basis of said catalyst, Ni is present in 1-10 wt% on dry basis of said catalyst, Na is present in 0.5-30 wt% on dry basis of said catalyst, with the remainder of catalytic metal being Fe.~~

~~15. The zinc-free catalyst of Claim 13, wherein Ba is present in 5-8 wt% on dry basis of said catalyst, Ni is present in 7-9 wt% on dry basis of said catalyst, Na is present in 10-14 wt% on dry basis of said catalyst, with the remainder of catalytic metal being Fe.~~

~~16~~18. A vapor phase process for selective removal of at least 80 mole % of acetylenic impurities from an input gaseous stream, wherein said input stream comprises C1 to C9 unsaturated hydrocarbon monoolefins and diolefins ~~including one or more hydrocarbons~~, acetylenic impurities and steam without substantial amounts of added hydrogen or oxygen, further wherein said process comprises ~~comprising:~~

contacting said input stream in the vapor phase at a temperature in the range of ~~from~~ 250°C (480^{o} F) to 900°C (1650^{o} F) with a ~~solid~~ catalyst comprising Ni, Fe, an alkali metal, and optionally an alkaline earth element wherein said Ni ~~is~~ present in an amount of 0.25-20 wt% on a dry basis of said catalyst, ~~and~~ Fe is present in an amount of 30-75 ~~wt~~%

on a dry basis of said catalyst and thereafter recovering an output stream wherein said output stream retains at least 95 mole% of said C1 to C9 unsaturated hydrocarbon monoolefins and diolefins but lacks at least 80 mole % of said acetylenic impurities~~, wherein the input stream is selected from streams (a), (b), (c), (d) or (e):~~

~~wherein stream (a) comprises ethylene in at least 75 mol% based on the hydrocarbon, acetylenic impurities and steam content of the stream;~~

~~wherein stream(b) comprises propylene in at least 75 mol% based on the hydrocarbon, acetylenic impurities and steam content of the stream;~~

~~wherein input stream (c) comprises styrene in at least 75 mol% based on the hydrocarbon, acetylenic impurities and steam content of the stream;~~

~~wherein stream (d) comprises isoprene in at least 75 mol% based on the hydrocarbon, acetylenic impurities and steam content of the stream; and~~

~~wherein stream (e) comprises less than 50 mol% C4 hydrocarbons based on the hydrocarbon content of the input stream, wherein said process does not involve oxidative dehydrogenation~~.

19. The process of claim 18, wherein said input stream contains less than 25% C4 hydrocarbons.

20. A vapor phase process for selective removal of at least 80 mole % of acetylenic impurities from an input gaseous stream, comprising feeding

said stream to a reactor wherein said input stream comprises C1 to C9 unsaturated hydrocarbon monoolefins and diolefins, acetylenic impurities and steam without substantial amounts of oxygen, further wherein said process comprises contacting said input stream in the vapor phase in the reactor at a temperature in the range of 250°C (480° F) to 900°C (1650° F) with a catalyst comprising Ni, Fe, an alkali metal, and optionally an alkaline earth element wherein said Ni present in an amount of 0.25-20 wt% on a dry basis of said catalyst, Fe is present in an amount of 30-75% on a dry basis of said catalyst and thereafter recovering an output stream from the reactor wherein said output stream retains at least 95 mole % of said C1 to C9 unsaturated hydrocarbon monoolefins and diolefins but lacks at least 80 mole % of said acetylenic impurities.

~~17. The process of Claim 16, wherein said catalyst has the following metals, only: Ni, Fe, alkali metal, and optionally alkaline earth element(s).~~

~~18. The process of Claim 16, wherein the molar ratio of oxygen content to hydrocarbon content in the input stream is less than 0.005 and preferably less than 0.0025.~~