CLAIMS

1. Method for treating a gas stream comprising hydrogen and propane, comprising the steps of:
    a) providing a membrane having a feed side and a permeate side, the membrane being selective for hydrogen over propane;
    b) passing the gas stream across the feed side of the membrane;
    c) withdrawing from the feed side a retentate stream depleted in hydrogen and enriched in propane compared with the gas stream;
    d) withdrawing from the permeate side a permeate stream enriched in hydrogen and depleted in propane compared with the gas stream;
    e) subjecting the retentate stream to elevated pressure distillation to separate hydrogen from propane, wherein the elevated pressure distillation is conducted at pressures above 20 barg; and
    f) combining the hydrogen obtained from the elevated pressure distillation with the permeate stream, wherein the hydrogen is at least partly recycled.

2. Method according to claim 1, wherein the membrane being selective for hydrogen over propane exhibits a selectivity for hydrogen over propane of at least 5.

3. Method according to claim 1, wherein the gas stream further comprises at least one further gas chosen from the group consisting of: H_2O, CO_2, CO, H_2S, NH_3 and light hydrocarbons.

4. Method according to claim 3, wherein the retentate stream is subjected to one or more supplementary treatment steps to remove at least a portion of the at least one further gas before being subjected to the elevated pressure distillation.

5. Method according to claim 3, wherein the gas stream at least further comprises CO_2 and H_2S, and wherein the gas stream is subjected to an amine scrubbing step to remove at least a portion of the CO_2 and H_2S gas components before being provided to the membrane.

6. Method according to claim 1, wherein the gas stream is derived from a renewable feedstock.

7. Method according to claim 6, wherein the gas stream is derived from hydrodeoxygenation of a glyceridic feedstock and/or a glycerol-containing feedstock.

8. Method according claim 1, wherein the elevated pressure distillation is conducted at pressures between 25 and 40 barg.

9. Method according to claim 1, wherein the elevated pressure distillation is conducted at temperatures above –70°C.

10. Method according to claim 1, wherein the gas stream contains at least 75 mol-% hydrogen.

11. Method according to claim 1, wherein the gas stream contains at least 3 mol-% propane.

12. Method according to claim 1, wherein the retentate stream contains less than 65 mol-% hydrogen.

13. Method according to claims 1, wherein the retentate stream contains more than 15 mol-% propane.

14. Method according to claim 1, wherein the propane obtained from the elevated pressure distillation is formulated into a propane-containing product.

15. Method for treating a hydrotreating reactor outlet gas stream generated from the hydrodeoxygenation and optionally further hydrotreatment of a glyceridic feedstock comprising hydrogen and propane as well as at least one contaminant selected from the group consisting of: H_2O, CO_2, CO, H_2S, NH_3 and light hydrocarbons, by elevated pressure distillation separating hydrogen from propane, the method comprising the steps of:

    a) providing an elevated pressure distillation unit;

b) positioning upstream of the elevated pressure distillation unit, a membrane separation unit selectively permeable to hydrogen, the membrane separation unit being in connection with the elevated pressure distillation unit such that a retentate stream from the membrane separation unit can pass to the elevated pressure distillation unit;

c) using the membrane separation unit to create a permeate stream enriched in hydrogen and depleted in propane compared with the hydrotreating reactor outlet gas stream, that bypasses the elevated pressure distillation unit, and the retentate stream depleted in hydrogen and enriched in propane compared with the hydrotreating reactor outlet gas stream;

d) using the elevated pressure distillation unit to create a propane rich stream from which hydrogen has been substantially removed and a hydrogen rich stream, wherein the elevated pressure distillation is conducted at pressures above 20 barg;

e) recycling and/or combining the permeate stream with the hydrogen rich stream.

16. Method according to claim 1, wherein the elevated pressure distillation is conducted at temperatures above 0°C.

17. Method according to claims 1, wherein the retentate stream contains more than more than 25 mol-% propane.

18. Method according to claim 14, wherein the propane-containing product further comprises an odorizing agent.