CLAIMS:

1. A method for separating a wax product from a hydrocarbon feedstream comprising:

~~a)~~ conducting a hydrocarbon feedstream to a membrane separation zone, wherein the ~~raw crude~~ hydrocarbon feedstream contacts a first side of ~~a membrane element, and the membrane element comprises~~ at least one membrane;

~~b)~~ retrieving a retentate product stream from the first side of the at least one membrane ~~element~~;

~~c)~~ retrieving a permeate product stream ~~having a wax phase and an oil phase~~ from a second side of the at least one membrane ~~element~~, wherein the permeate product stream has:

a wax phase and an oil phase;

a pour point of the wax phase of the permeate product stream that is higher than a pour point of the oil phase of the permeate product stream; and

a content of aromatics with a molecular weight greater than 500 that is at least 70 wt.% lower than a content of aromatics with a molecular weight greater than 500 of the hydrocarbon feedstream; and

~~d)~~ separating a wax product from the wax phase of the permeate product stream.

2. The method of claim 1, wherein the pour point of the wax phase of the permeate product stream is at least 10°C higher than the pour point of the oil phase of permeate product stream.

3. The method of ~~any of the previous claims~~ claim 1, wherein the wax product has a pour point of at least 15°C.

4. The method of ~~any of the previous claims~~ claim 1, wherein the wax product has a pour point in a range of from about 15°C to about 60°C.

5. The method of ~~any of the previous claims~~ claim 1, wherein the wax product has a pour point in a range of from about 15°C to about 40°C.

6. The method of claim 1, wherein the wax product comprises hydrocarbon molecules having at least 20 carbon atoms and contains essentially no hydrocarbon molecules with less than 20 carbon atoms.

~~6.~~7. The method of ~~any of the previous claims~~ claim 1, wherein the wax product has a boiling point in a range of from about 800°F to about 1200°F.

~~7.~~8. The method of ~~any of the previous claims~~ claim 1, wherein the hydrocarbon feedstream is a raw crude.

~~8.~~9. The method of ~~any of the previous claims~~ claim 1, wherein the raw crude has an API density greater than 20.

~~9.~~10. The method of ~~any of the previous claims~~ claim 1, wherein the permeate product steam is at least 5 wt.% of the total amount of the hydrocarbon feedstream.

~~10.~~11. The method of ~~any of the previous claims~~ claim 1, wherein the permeate product stream is 70 wt.% to 95wt.% of the total amount of the hydrocarbon feedstream.

~~11.~~12. The method of ~~any of the previous claims~~ claim 1, wherein the permeate product stream is 80 wt.% to 95 wt.% of the total amount of the hydrocarbon feedstream.

~~12.~~13. The method of ~~any of the previous claims~~ claim 1, wherein the permeate product stream is 90 wt.% to 95 wt.% of the total amount of the hydrocarbon feedstream.

~~13.~~14. The method of ~~any of the previous claims~~ claim 1, wherein a wax-oil separation unit is used for the separation of ~~step d)~~ the wax product from the wax phase, and the wax-oil separation unit is selected from the group consisting of: a wax settler, a centrifuge, a wax filter, a crystallizer, a cyclone, a fluid extraction device, a solvent dewaxing device and a combination thereof.

~~14.~~15. The method of ~~any of the previous claims~~ claim 1, wherein the at least one membrane is an organic membrane, an inorganic membrane, a supported liquid or facilitated transport membrane, a hybrid or mixed-matrix membrane, or a combination thereof.

~~15.~~16. The method of ~~any of the previous claims~~ claim 15, wherein the at least one membrane comprises a mixed-matrix membranes ~~comprise~~ comprising inorganic particles as dispersed phase and a polymer matrix as continuous phase.

~~16.~~17. The method of ~~any of the previous claims~~ claim 1, wherein the membrane is a polymeric membrane, a ceramic membrane, a carbon membrane, or a combinations thereof.

~~17.~~18. The method of ~~any of the previous claims~~ claim 1, wherein the membrane has an average pore size from about 0.3 nanometer to about 20 nanometer.

~~18.~~19. The method of ~~any of the previous claims~~ claim 1, wherein the membrane has an average pore size from about 0.3 nanometer to about 10 nanometer.

~~19.~~20. The method of ~~any of the previous claims~~ claim 1, wherein the membrane has a molecular weight cut-off of about 0.1kD to about 500kD.

~~20.~~21. The method of ~~any of the previous claims~~ claim 1, wherein the membrane has a molecular weight cut-off of about 0.1kD to about 8kD.

~~21.~~22. The method of ~~any of the previous claims~~ claim 1, wherein the membrane has a ~~differential~~ transmembrane pressure across it from about 20 psi to about 3000 psi.

~~22.~~23. The method of ~~any of the previous claims~~ claim 1, wherein the at least one membrane element comprises two membranes arranged in sequence.

~~23.~~24. The method of ~~any of the previous claims~~ claim 1, wherein the membrane separation is conducted in a trans-membrane pressure of from 200 psig to 800 psig.

~~24.~~25. The method of ~~any of the previous claims~~ claim 1, wherein the membrane separation is conducted in an operating temperature of from about 15°C to about 300°C.

~~25.~~26. The method of ~~any of the previous claims~~ claim 1, wherein the permeate product stream has a saturates content that is at least about 70 wt% of the saturates content of the hydrocarbon feedstream.

~~26.~~27. The method of ~~any of the previous claims~~ claim 1, wherein the permeate product stream has a saturates content that is at least about 80 wt% of the saturates content of the hydrocarbon feedstream.

~~27. The method of any of the previous claims, wherein the permeate product stream has a content of aromatics with a molecular weight greater than 500 that is at least 70% lower than a content of aromatics with a molecular weight greater than 500 of the hydrocarbon feedstream.~~

28. The method of ~~any of the previous claims~~ claim 1, wherein the permeate product stream has a micro carbon residue content that is at least 80 wt% lower than a micro carbon residue content of the hydrocarbon feedstream.

29. The method of ~~any of the previous claims~~ claim 1, wherein the permeate product stream has an inorganic metals content that is at least 60 wt% lower than an inorganic metals content of the hydrocarbon feedstream.

30. The method of ~~any of the previous claims~~ claim 1, wherein an average boiling point of the permeate product stream is from 500 to 700°F lower than an average boiling point of the retentate product stream.

31. The method of ~~any of the previous claims~~ claim 1, wherein the oil phase of the permeate product stream is further processed into an oil product having a pour point of at least 15°C.

32. The method of ~~any of the previous claims~~ claim 1, wherein the oil phase is further processed in an atmospheric pipestill, a vacuum pipestill or an atmospheric pipestill and then a vacuum pipestill.

~~33. The method of any of the previous claims, wherein the wax product comprises hydrocarbon molecules having at least 20 carbon atoms and contains essentially no hydrocarbon molecules with less than 20 carbon atoms.~~

~~34. The method of any of the previous claims, wherein the wax product contains no hydrocarbon molecules with less than 20 carbon atoms.~~

~~35.~~33. An apparatus for separating a wax product from a hydrocarbon feedstream, ~~which comprises~~ the apparatus comprising a membrane separation unit and a wax-oil separation unit, wherein:

the membrane separation unit comprises:

a membrane element, and the membrane element has at least one mixed-matrix membrane comprising inorganic particles as a dispersed phase and a polymer matrix as a continuous phase,

a retentate zone wherein the hydrocarbon feedstream contacts a first side of the at least one mixed-matrix membrane element, and

a permeate zone from which a permeate product stream having a wax phase and an oil phase is obtained from a second side of the at least one mixed-matrix membrane element, wherein a pour point of the wax phase of permeate product stream is higher than a pour point of the oil phase of permeate product stream; and

the wax-oil separation unit separates a wax product from the wax phase of permeate product stream, wherein the wax-oil separation unit is selected from the group consisting of: a wax settler, a centrifuge, a wax filter, a crystallizer, a cyclone, a fluid extraction device, a solvent dewaxing device and a combination thereof.

36. The apparatus of claim 32, wherein the membrane is an organic membrane, an inorganic membrane, a supported liquid or facilitated transport membrane, a hybrid or mixed matrix membrane, or a combination thereof.

37.34. The apparatus of anyone of claims 32 and claim 33, wherein the membrane is separation unit comprises a polymeric membrane, a ceramic membrane, a carbon membrane, or a combinations thereof.

38. The apparatus of anyone of claims 32-34, wherein the mixed-matrix membranes comprise inorganic particles as dispersed phase and a polymer matrix as continuous phase.

39.35. The apparatus of anyone of claims 32-35 claim 33, wherein the mixed-matrix membrane has an average pore size from about 0.3 nanometer to about 20 nanometer.

40.36. The apparatus of anyone of claims 32-36 claim 33, wherein the mixed-matrix membrane has a molecular weight cut-off of about 0.1kD to about 500kD.

41.37. The apparatus of anyone of claims 32-37 claim 33, wherein the mixed-matrix membrane has a molecular weight cut-off of about 0.1kD to about 8kD.

~~42.~~38. The apparatus of ~~anyone of claims 32-38~~ claim 33, wherein the membrane ~~element~~ separation unit comprises at least two membranes arranged in sequence.

39. The apparatus of claim 33, wherein:

the permeate product stream comprises a wax phase and an oil phase, wherein a pour point of the wax phase of permeate product stream is higher than a pour point of the oil phase of the permeate product stream; and

the wax-oil separation unit is capable of separating a wax product from the wax phase of permeate product stream.

40. A method for separating a wax product from a hydrocarbon feedstream comprising:

conducting a hydrocarbon feedstream to a membrane separation zone, wherein the hydrocarbon feedstream contacts a first side of at least one mixed-matrix membrane comprising inorganic particles as dispersed phase and a polymer matrix as continuous phase;

retrieving a retentate product stream from the first side of the membrane element;

retrieving a permeate product stream from a second side of the membrane element, wherein the permeate product stream has:

a wax phase and an oil phase, and

a pour point of the wax phase of the permeate product stream that is higher than a pour point of the oil phase of the permeate product stream; and

separating a wax product from the wax phase of the permeate product stream.

41. A method for separating a wax product from a hydrocarbon feedstream comprising:

conducting a hydrocarbon feedstream to a membrane separation zone, wherein the hydrocarbon feedstream contacts a first side of at least one membrane;

retrieving a retentate product stream from the first side of the at least one membrane;

retrieving a permeate product stream from a second side of the at least one membrane, wherein the permeate product stream has:

a wax phase and an oil phase,

a pour point of the wax phase of the permeate product stream that is higher than a pour point of the oil phase of the permeate product stream, and

a micro carbon residue content that is at least 80 wt % lower than a micro carbon residue content of the hydrocarbon feedstream; and

separating a wax product from the wax phase of the permeate product stream.