CLAIMS

What is claimed is:

1. A process for separating paraffins in a hydrotreated hydrocarbon stream comprising the steps of:

providing a hydrotreated hydrocarbon stream comprising paraffins, aromatics and/or other multi-ring hydrocarbon compounds;

contacting the hydrotreated hydrocarbon stream with a molecular sieve membrane; and

separating the paraffins to provide a wax product feed stream, and a stream of fuel or lube by-products, wherein solvent is not used in the separation process,

wherein the molecular sieve membrane comprises:

one or more layers of size-selective catalyst, wherein the size-selective catalyst comprises a crystal structure of ZSM-48 and/or mordenite, wherein each layer of size-selective catalyst has a plurality of perpendicular membrane channels and a plurality of opening pores, and wherein the perpendicular membrane channels are perpendicular to a direction of flow of the hydrotreated hydrocarbon stream, and

wherein the plurality of perpendicular membrane channels is in fluidic communication with the plurality of opening pores; and a porous support comprising a plurality of diffusing gaps, wherein the porous support is in fluidic communication with the plurality of opening pores providing a fluidic pathway between the perpendicular membrane channels and the diffusing gaps, and the molecular sieve membrane is configured for cross-flow of the hydrotreated hydrocarbon stream over the molecular sieve membrane causing a continuous flow of a permeate comprising the wax product feed stream into the perpendicular membrane channels through the plurality of opening pores into and out of the diffusing gaps of the porous support.

2. The process of claim 1, wherein the wax product stream comprises paraffins, 1-ring naphthenes, and ringed aromatics and the lube product stream comprises multi-ring naphthenes.

3. The process of claim 1, wherein the hydrotreated hydrocarbon stream comprises Group II+ base stock.

4. The process of claim 1, wherein the permeate or retentate comprises a Group III+ base stock.

5. The process of claim 1, wherein the process is carried out in blocked mode operation.

6. The process of claim 1, wherein the process further comprises the step of pretreating the molecular sieve membrane to minimize acidity of the molecular sieve membrane.

7. The process of claim 1, wherein the hydrotreated hydrocarbon stream comprises at least one of a Group I, Group II, or Group III lube base stock, wherein the permeate has a volume between about 65 vol% and about 75 vol% of the hydrotreated hydrocarbon stream and wherein the process further comprises forming a retentate having a volume between about 25 vol% and about 35 vol% of the hydrotreated hydrocarbon stream.

8. The process of claim 1, wherein the hydrotreated hydrocarbon stream comprises at least one of a Group I, Group II, or Group III lube base stock, wherein the permeate comprises paraffins in a volumetric amount of about 45 vol% and 1-ring naphthene in a volumetric amount of about 25 vol% of the hydrotreated hydrocarbon stream and wherein the process further comprises forming a retentate comprising multi-ring naphthene and mono-aromatics in a volumetric amount of about 30 vol% of the hydrotreated hydrocarbon stream.

9. The process of claim 1, wherein the porous support comprises graphite, clays and/or two-dimensional ionic conductors.

10. The process of claim 1, wherein the porous support is a single layer.

11. The process of claim 1, wherein the porous support is a coating.

12. The process of claim 1, wherein each of the perpendicular membrane channels is between about 4 Angstroms to about 10 Angstroms.

13. The process of claim 1, wherein each of the perpendicular membrane channels is between about 4 Angstroms to about 8 Angstroms.

14. The process of claim 1, wherein each of the perpendicular membrane channels is between about 4 Angstroms to about 6 Angstroms.

15. The process of claim 1, wherein the molecular sieve membrane is not acidic as determined by titration, ammonia adsorption, pyridine adsorption, or a combination thereof.

16. The process of claim 1, wherein the membrane is tubular.

17. The process of claim 1, wherein the molecular sieve membrane is configured to separate wax from lube oil.

18. The process of claim 1, wherein the membrane channels are two dimensional in shape.

19. A process for separating paraffins in a hydrotreated hydrocarbon stream comprising the steps of:

providing a hydrotreated hydrocarbon stream comprising Group II base stock;

contacting the hydrotreated hydrocarbon stream with a molecular sieve membrane; and

separating the Group Il base stock to provide a Group III base stock, and a stream of fuel or lube by-products, wherein solvent is not used in the separation process, wherein the molecular sieve membrane comprises:

one or more layers of size-selective catalyst, each layer of size-selective catalyst having a plurality of perpendicular membrane channels and a plurality of opening pores, wherein the perpendicular membrane channels are perpendicular to a direction of flow of the hydrotreated hydrocarbon stream and wherein the size-selective catalyst comprises a crystal structure of ZSM48 and/or mordenite, and

wherein the plurality of perpendicular membrane channels is in fluidic communication with the plurality of opening pores; and a porous support comprising a plurality of diffusing gaps, wherein the porous support is in fluidic communication with the plurality of opening pores providing a fluidic pathway between the perpendicular membrane channels and the diffusing gaps, and the molecular sieve membrane is configured for cross-flow of the hydrotreated hydrocarbon stream over the molecular sieve membrane causing a continuous flow of a permeate comprising the wax product feed stream into the perpendicular membrane channels through the plurality of opening pores into and out of the diffusing gaps of the porous support.