CLAIMS

1. A system for oil separation and upgrading, the system comprising:

an inlet stream comprising crude oil;

an atmospheric distillation unit (ADU), the ADU in fluid communication with the inlet stream, and operable to separate the inlet stream into an ADU tops stream and an ADU middle stream, the ADU tops stream comprising naphtha, and the ADU middle stream comprising diesel;

a naphtha hydrotreating unit (NHT), the NHT in fluid communication with the ADU and operable to treat with hydrogen the naphtha in the ADU tops stream;

a naphtha reforming unit (NREF), the NREF in fluid communication with the NHT and operable to reform a hydrotreated naphtha stream produced by the NHT, and the NREF further operable to produce separate hydrogen and reformate streams;

an aromatics complex (ARC), the ARC in fluid communication with the NREF and operable to receive the reformate stream produced by the NREF, and the ARC further operable to separate the reformate stream into a gasoline pool stream, an aromatics stream, and an aromatic bottoms stream, wherein the aromatic bottoms stream is in fluid communication with the ADU middle stream comprising diesel; and

a diesel hydrotreating unit (DHT), the DHT in fluid communication with a diesel inlet stream, the diesel inlet stream comprising fluid flow from the ADU middle stream and the aromatic bottoms stream, and the DHT operable to treat the diesel inlet stream with hydrogen.

2. The system according to claim 1, wherein the system further comprises a secondary ADU in fluid communication with the ARC and the ADU middle stream, wherein the secondary ADU is operable to separate the aromatic bottoms stream into a gasoline stream and a stream comprising hydrocarbons boiling in a diesel-boiling-point range.

3. The system according to claim 1, wherein the aromatic bottoms stream comprises aromatic compounds with boiling points in the range of about 100°C to about 350°C.

4. The system according to claim 2, wherein the gasoline stream is used as a gasoline blending component without any further treatment.

5. The system according to claim 2, wherein benzene content of the gasoline pool stream and the gasoline stream is less than about 3% by volume.

6. The system according to claim 2, wherein benzene content of the gasoline pool stream and the gasoline stream is less than about 1% by volume.

7. A method for oil separation and upgrading, the method comprising:

supplying an inlet stream comprising crude oil;

separating the inlet stream into a tops stream and a middle stream, the tops stream comprising naphtha, and the middle stream comprising diesel;

treating with hydrogen the naphtha in the tops stream to produce a hydrotreated naphtha stream;

reforming the hydrotreated naphtha stream;

producing separate hydrogen and reformate streams;

separating the reformate stream into a gasoline pool stream, an aromatics stream, and an aromatic bottoms stream;

recycling the aromatic bottoms stream to the middle stream comprising diesel; and

treating the middle stream comprising diesel and the aromatic bottoms stream with hydrogen.

8. The method according to claim 7, further comprising the step of separating the aromatic bottoms stream into a gasoline stream and a stream comprising hydrocarbons boiling in a diesel-boiling-point range before treating the middle stream comprising diesel and the aromatic bottoms stream with hydrogen.