CLAIMS

It is claimed:

1. Integrated process to convert crude oil into petrochemical products comprising the steps of:

subjecting crude oil to crude oil distillation to produce a gases fraction, resid and at least one of kerosene or gasoil; subjecting resid to resid upgrading to produce LPG and a liquid resid upgrading effluent;

subjecting a hydrocarbon feed to aromatic ring opening to produce LPG; subjecting LPG produced by at least one of the resid upgrading or the aromatic ring opening to olefins synthesis; subjecting part of the liquid resid upgrading effluent to fluid catalytic cracking to produce a light-distillate, a middle-distillate and olefins;

wherein said hydrocarbon feed comprises at least one of the kerosene or the gasoil produced by the crude oil distillation; and the middle- distillate produced in the process; wherein the resid upgrading is resid hydrocracking.

2. The process according to claim 1, wherein at least 50 wt-% of the combined kerosene and gasoil produced by the crude oil distillation in the process is subjected to aromatic ring opening.

3. The process according to claim 2, wherein at least 90 wt-% of the combined kerosene and gasoil produced by the crude oil distillation in the process is subjected to aromatic ring opening.

4. The process according to any one of claims 1-3, wherein the olefins synthesis comprises pyrolysis of ethane and dehydrogenation of propane.

5. The process according to any one of claims 1-4, wherein the olefins synthesis comprises pyrolysis of butane.

6. The process according to any one of claims 2-5 further comprising subjecting part of the liquid resid upgrading effluent, and optionally light-distillate produced by aromatic ring opening, to fluid catalytic cracking to produce light-distillate, middle-distillate and olefins, and subjecting said middle-distillate produced by fluid catalytic cracking to aromatic ring opening.

7. The process of claims 1-6, wherein the process is conducted in an installation to convert crude oil into petrochemical products, the installation comprising:

a crude distillation unit (10) comprising an inlet for crude oil (100) and at least one outlet for kerosene and/or gasoil (310);

an aromatic ring opening unit (26) comprising an inlet for a hydrocarbon feed to aromatic ring opening (302) and an outlet for LPG (222); and

a unit for olefins synthesis (30) comprising an inlet for LPG produced by the integrated petrochemical process installation (200) and an outlet for olefins (500)

; and refinery unit-derived middle-distillate produced the integrated petrochemical process installation;

wherein said hydrocarbon feed to aromatic ring opening comprises kerosene and/or gasoil produced by the crude oil distillation unit (10).

8. The process according to claim 7, wherein: the crude distillation unit (10) comprises an outlet for gases fraction (230), an outlet for resid (400) and at least one outlet for kerosene and/or and gasoil (310); and a resid upgrading unit (40) comprising an inlet for resid (400) and refinery unit-derived heavy-distillate (401), an outlet for LPG produced by resid upgrading (223) and outlet for liquid resid upgrading effluent (326).

9. The process according to claim 7 or 8, further comprising a fluid catalytic cracking unit (60) comprising an inlet for a part of the liquid resid upgrading effluent (326) and optionally light-distillate produced by aromatic ring opening (328) and an outlet for middle-distillate produced by fluid catalytic cracking (324) and olefins produced by fluid catalytic cracking (540).

10. The process according to any one of claims 7-9 further comprising a gas separation unit (50) comprising an inlet for gases produced in the integrated process (200), an outlet for ethane (240) and an outlet for propane (250);

an ethane cracker (31) comprising an inlet for ethane (240) and an outlet for ethylene (510); and a propane dehydrogenation unit (32) comprising an inlet for propane (250) and an outlet for propylene (520).

11. The process according to any one of claims 7-10 further comprising a butane cracker (34) comprising an inlet for butane (260) and an outlet for olefins (530) and an outlet for BTX (600).

12. The process of claims 1-6, wherein the process is conducted in an installation to convert crude oil into petrochemical products, wherein the installation comprises:

a crude distillation unit comprising an inlet for crude oil and at least one outlet for kerosene and/or gasoil and an outlet for resid;

a resid upgrading unit comprising an inlet for resid and refinery unit-derived heavy-distillate, an outlet for LPG produced by resid upgrading and outlet for liquid resid upgrading effluent for receiving;

an aromatic ring opening unit comprising an inlet for a hydrocarbon feed to aromatic ring opening and an outlet for LPG;

a unit for olefins synthesis comprising an inlet for LPG produced in the resid upgrading unit or the aromatic ring opening unit, said unit for olefin synthesis including an outlet for olefins produced in the olefins synthesis unit, and

a fluid catalytic cracking unit comprising an inlet for a part of the liquid resid upgrading effluent produced by aromatic ring opening and an outlet for middle-distillate produced by fluid catalytic cracking and olefins produced by fluid catalytic cracking;

wherein said hydrocarbon feed to aromatic ring opening comprises kerosene and/or gasoil produced by the crude oil distillation unit; and refinery unit-derived middle-distillate produced by the fluid catalytic cracking unit.

13. The process according to claim 12, wherein: the crude distillation unit further comprises an outlet for gases fraction.

14. The process according to claim 13 further comprising a gas separation unit comprising an inlet for gases produced in the integrated process, an outlet for ethane and an outlet for propane; an ethane cracker comprising an inlet for ethane and an outlet for ethylene; and a propane dehydrogenation unit comprising an inlet for propane and an outlet for propylene.

15. The process according to claim 14, further comprising a butane cracker comprising an inlet for butane and an outlet for olefins and an outlet for BTX.