

CLAIMS

The invention claimed is:

1. An integrated hydrocracking process for production of olefinic and aromatic petrochemicals from a hydrocarbon feedstock comprising crude oil, the process comprising:
 - treating the hydrocarbon feedstock comprising crude oil and a coker liquid product in a first hydrocracking zone in the presence of hydrogen under conditions producing a first effluent having an increased hydrogen content;
 - separating the first effluent into a liquefied petroleum gas (LPG) comprising stream and a liquid phase stream;
 - separating said LPG comprising stream into one or more streams selected from the group consisting of a stream comprising hydrogen, a stream comprising methane, a stream comprising ethane, a stream comprising butanes, a stream comprising propane and a stream comprising C4-minus;
 - further processing one or more of the streams obtained in a steam cracker unit and at least one unit chosen from a butanes dehydrogenation unit, a propane dehydrogenation unit, a combined propane-butenes dehydrogenation unit, or a combination of units thereof to produce a mixed product stream(s);
 - feeding said mixed product stream(s) from said steam cracker unit and said at least one unit, chosen from said butanes dehydrogenation unit, said propane dehydrogenation unit, said combined propane-butenes dehydrogenation unit, or said combination of units thereof to a second separation section;
 - thermally cracking the liquid phase feed under effective conditions producing coke and a coker liquid product, wherein the coker liquid product is recycled to the first hydrocracking zone and wherein petroleum coke is recovered; separating the mixed product stream(s).

2. An integrated hydrocracking process for production of olefinic and aromatic petrochemicals from a hydrocarbon feedstock comprising crude oil, the process comprising:
 - treating the hydrocarbon feedstock comprising crude oil and a coker liquid product in a first hydrocracking zone in the presence of hydrogen under conditions producing a first effluent having an increased hydrogen content;
 - separating the first effluent into a liquefied petroleum gas (LPG) comprising stream and a liquid phase stream;
 - separating said LPG comprising stream into one or more streams selected from the group consisting of a stream comprising ethane and a stream comprising C2-minus;
 - further processing one or more of the streams obtained in a steam cracker unit and at least one unit chosen from a butanes dehydrogenation unit, a propane dehydrogenation unit, a combined propane-butenes dehydrogenation unit, or a combination of units thereof to produce at least one mixed product stream;
 - feeding said at least one mixed product stream from said steam cracker unit and said at least one unit, chosen from said butanes dehydrogenation unit, said propane dehydrogenation unit, said combined propane-butenes dehydrogenation unit, or said combination of units thereof to a second separation section;
 - thermally cracking the liquid phase feed under effective conditions producing coke and a coker liquid product, wherein the coker liquid product is recycled to the first hydrocracking zone and wherein petroleum coke is recovered;
 - separating the at least one mixed product stream, and feeding at least one stream chosen from the group of said stream comprising ethane, and said stream comprising C2-minus to said steam cracker unit.

3. The process according to claim 1, further comprising feeding at least one stream chosen from said stream comprising propane, said stream comprising butanes said stream comprising C4-minus, to at least one dehydrogenation unit chosen from said butanes dehydrogenation unit and said propane dehydrogenation unit, or a combination thereof.
4. The process according to claim 1, further comprising: recovering olefins and aromatics from the separated mixed product stream.
5. The process according to claim 1, further comprising: treating said liquid phase feed in a second hydrocracking zone in the presence of hydrogen under effective conditions producing a second effluent having an increased hydrogen content; and
recovering from the second effluent from said second hydrocracking zone a stream comprising a mixture of benzene, toluene, xylenes, and ethyl benzene (BTXE), a LPG comprising stream and a residual liquid stream.
6. The process according to claim 5, further comprising thermally cracking said residual liquid stream under effective conditions producing coke and the coker liquid product, wherein:
the coker liquid product is recycled to an inlet of the first hydrocracking and/or second hydrocracking zone, and wherein petroleum coke is recovered.
7. The process according to claim 5, further comprising combining the LPG comprising stream originating from said first hydrocracking zone with the LPG comprising stream originating from said second hydrocracking zone.
8. The process according to claim 1, further comprising recovering vapour products from the coker liquid product and combining the vapour products recovered with the LPG comprising stream(s).
9. The process according to claim 5, further comprising separating from the first effluent originating from said first hydrocracking zone and the effluent originating from said second hydrocracking zone residual liquid fractions and recycling said residual liquid fractions to inlet of the first hydrocracking and/or second hydrocracking zone.
10. The process according to claim 1, further comprising recovering methane from the separated mixed product stream(s) and recycling said methane to the steam cracker to be used as fuel for burners and/or heaters.
11. The process according to claim 5, further comprising recovering and purifying hydrogen from the separated mixed product stream(s) and recycling it to an inlet of the first and/or second hydrocracking zone.
12. The process according to claim 5, further comprising recovering pyrolysis fuel oil from the separated mixed product stream(s) and recycling said pyrolysis fuel oil to an inlet of said first and/or second hydrocracking zone.
13. The process according to claim 1, further comprising: recovering an olefin from the separated mixed product stream.
14. The process according to claim 1, further comprising: recovering aromatic from the separated

mixed product stream.

15. The process according to claim 1, further comprising recovering vapour products from the coker liquid product.

16. The process according to claim 1, further comprising: treating said liquid phase feed in a second hydrocracking zone in the presence of hydrogen under effective conditions producing a second effluent having an increased hydrogen content.

17. The process according to claim 1, further comprising: treating said liquid phase feed in a second hydrocracking zone in the presence of hydrogen under effective conditions producing a second effluent having an increased hydrogen content; and recovering from the second effluent from said second hydrocracking zone a LPG comprising stream.

18. The process according to claim 1, further comprising: treating said liquid phase feed in a second hydrocracking zone in the presence of hydrogen under effective conditions producing a second effluent having an increased hydrogen content; and recovering from the second effluent from said second hydrocracking zone a stream comprising a mixture of benzene, toluene, xylenes, and ethyl benzene (BTXE).

19. The process according to claim 1, further comprising: treating said liquid phase feed in a second hydrocracking zone in the presence of hydrogen under effective conditions producing a second effluent having an increased hydrogen content; and recovering from the second effluent from said second hydrocracking zone a residual liquid stream.

20. The process according to claim 1, further comprising recovering methane from the separated mixed product stream(s).