CLAIMS:

1. A process for upgrading an ethane-containing C_{5-} paraffin stream, the process comprising:

(a1) contacting the ethane-containing C_{5-} paraffin stream, wherein the ethane-containing C_{5-} paraffin stream comprises at least about 80 wt% ethane and less than about 20 wt% methane, propane, butane, and pentane, with an oxygen containing gas in the presence of a selective oxidation catalyst under conditions to selectively oxidize at least part of the ethane in the ethane-containing C_{5-} paraffin stream and produce a first product stream comprising ethylene, a residual C_{5-} paraffin stream, and oxygenates selected from the group consisting of carboxylic acids, alcohols, aldehydes, esters, ketones, and combinations thereof;

(b1) contacting the first product stream which contains ethylene, a residual C_{5-} paraffin stream, and oxygenates selected from the group consisting of carboxylic acids, alcohols, aldehydes, esters, ketones, and combinations thereof, with an isoparaffin-containing feed in the presence of a solid alkylation catalyst, without intermediate separation, under conditions to alkylate at least part of the isoparaffin with at least part of the ethylene and produce a second product stream comprising C_{6+} alkylate and a residual C_{5-} paraffin stream; and

(c1) recovering C_{6+} alkylate from the second product stream and recycling at least part of the residual C_{5-} paraffin stream of the first product stream or the second product stream to the contacting step (a1).

2. The process of claim 1, wherein the ethane-containing C_{5-} paraffin stream comprises ethane and propane.

3. The process of claim 1, wherein the ethane-containing C_{5-} paraffin stream comprises a natural gas liquid containing less than 20 wt% methane based on the weight of the natural gas liquid or a fraction of a natural gas liquid containing less than 20 wt % methane based on the weight of the fraction.

4. The process of claim 1, where the ethane-containing C_{5-} paraffin stream comprises less than 20wt% propane.

5. The process of claim 1, wherein the selective oxidation catalyst comprises a mixed metal oxide.

6. The process of claim 5, wherein the mixed metal oxide is a mixed metal oxide of at least molybdenum and vanadium.

7. The process of claim 6, wherein the mixed metal oxide is a mixed metal oxide of at least molybdenum, vanadium and niobium.

8. The process of claim 1, wherein the conditions in the contacting step (a1) include a temperature from 200 ºC to 700 ºC and a pressure from 100 kPa-a to 6895 kPa-a.

9. The process of claim 1, wherein at least 50% of the ethane selectively oxidized in the contacting step (a1) is converted to ethylene.

10. The process of claim 1, wherein the first product stream comprises one or more oxygenates selected from carboxylic acids and esters thereof, alcohols, aldehydes, ketones and mixtures thereof.

11. The process of claim 1, wherein the solid alkylation catalyst employed in the contacting step (b1) comprises a molecular sieve and/or a mixed metal oxide.

12. The process of claim 1, wherein the solid alkylation catalyst employed in the contacting step (b1) comprises a molecular sieve having at least one of an MWW framework, a BEA framework, a FAU framework, a MOR framework, or a mixture of two or more thereof.

13. The process of claim 1, wherein the solid alkylation catalyst employed in the contacting step (b1) comprises a mixed oxide of zirconium and tungsten.

14. The process of claim 1, wherein the isoparaffin-containing feed comprises at least one C_4 to C_8 isoparaffin.

15. The process of claim 1, wherein the isoparaffin-containing feed comprises isobutane.

16. The process of claim 1, wherein the contacting step (b1) is conducted in at least one reactor selected from a fluidized bed reactor, a fixed bed reactor and a continuous stirred tank reactor.

17. The process of claim 1, wherein the conditions in the contacting step (b1) include a temperature from 135ºC to 375ºC and a pressure from 2170 kPa-a to 10,445 kPa-a.

18. A process for upgrading an ethane-containing C_{5-} paraffin stream, the process comprising:

(a2) contacting the ethane-containing C_{5-} paraffin stream, wherein the ethane-containing C_{5-} paraffin stream comprises at least about 80 wt% ethane and less than about 20 wt% methane, propane, butane, and pentane, with an oxygen containing gas in the presence of a selective oxidation catalyst under conditions to selectively oxidize at least part of the ethane in the ethane-containing C_{5-} paraffin stream and produce a first product stream comprising ethylene and oxygenates selected from the group consisting of carboxylic acids, alcohols, aldehydes, esters, ketones, and combinations thereof;

(b2) contacting the first product stream which contains ethylene and oxygenates selected from the group consisting of carboxylic acids, alcohols, aldehydes, esters, ketones, and combinations thereof, with an oligomerization catalyst, without intermediate separation, under conditions to dimerize at least part of the ethylene and produce a second product stream comprising C_{4+} olefins;

(c2) contacting at least part of the second product stream which contains C_{4+} olefins with an isoparaffin-containing feed in the presence of a solid alkylation catalyst and under conditions to alkylate at least part of the isoparaffin with at least

part of the C_{4+} olefins and produce a third product stream comprising C_{8+} alkylate; and

(d2) recovering the C_{8+} alkylate from the third product stream.

19. The process of claim 18, wherein the ethane-containing C_{5-} paraffin stream comprises a natural gas liquid containing less than 20 wt % methane.

20. The process of claim 18, where the ethane-containing C_{5-} paraffin stream comprises less than 20wt% propane.

21. The process of claim 18, wherein the selective oxidation catalyst comprises a mixed metal oxide.

22. The process of claim 21, wherein the mixed metal oxide is a mixed metal oxide of at least molybdenum and vanadium.

23. The process of claim 18, wherein the oligomerization catalyst comprises a metal or compound thereof selected from nickel and copper.

24. The process of claim 18, wherein the solid alkylation catalyst employed in the contacting step (c2) comprises a molecular sieve and/or a mixed metal oxide.

25. The process of claim 18, wherein the solid alkylation catalyst employed in the contacting step (c2) comprises a molecular sieve having at least one of an MWW framework, a BEA framework, a FAU framework, a MOR framework, or a mixture of two or more thereof.

26. The process of claim 18, wherein the solid alkylation catalyst employed in the contacting step (c2) comprises a mixed oxide of zirconium and tungsten.

27. The process of claim 18, wherein the contacting step (b2) and the contacting step (c2) are conducted in the same reaction zone in the presence of a multifunctional

catalyst comprising an oligomerization component and a solid acid component.

28. The process of claim 18, wherein the third product stream further comprises residual C_{4+} olefins and the process further comprises recycling at least part of the residual C_{4+} olefins to the contacting step (c2).

29. The process of claim 18, wherein the third product stream further comprises residual C_{5-} paraffins and the process further comprises recycling at least part of the residual C_{5-} paraffins to the contacting step (a2).

30. The process of claim 18, wherein the isoparaffin-containing feed comprises at least one C_4 to C_8 isoparaffin.

31. The process of claim 18, wherein the isoparaffin-containing feed comprises isobutane.