C L A I M S

1. Process for the preparation of an olefin product comprising ethylene and/or propylene, which process comprises the steps of

a) cracking a paraffin feedstock comprising C2 - C5 paraffins under cracking conditions in a cracking zone to obtain a cracker effluent comprising olefins;

b) converting an oxygenate feedstock in an oxygenate-to-olefins conversion system, comprising a reaction zone in which an oxygenate feedstock is contacted with an oxygenate conversion catalyst under oxygenate conversion conditions, to obtain a conversion effluent comprising ethylene and/or propylene;

c) combining at least part of the cracker effluent and at least part of the conversion effluent to obtain a combined effluent, and separating an olefin product stream comprising ethylene and/or propylene from the combined effluent, wherein the cracker effluent and/or the conversion effluent comprises a C4 portion comprising unsaturates, and wherein the process further comprises at least partially hydrogenating at least part of the C4 portion, to obtain an at least partially hydrogenated C4 feedstock; and recycling at least part of the at least partially hydrogenated C4 feedstock as recycle feedstock to step a) and/or step b).

2. Process according to claim 1, wherein the recycle feedstock comprises butene, preferably at least 10 wt% butene, and wherein the recycle feedstock comprising butene is recycled to step b).

3. Process according to claim 2, wherein the recycle feedstock is contacted with the oxygenate conversion catalyst in the oxygenate-to-olefins reaction zone.

4. Process according to claim 2, wherein the oxygenate-to-olefins conversion system comprises an olefin cracking zone separate from the oxygenate-to-olefins reaction zone, and wherein the recycle feedstock is fed to the olefin cracking zone.

5. Process according to any one of claims 1-4, wherein the C4 portion comprises butadiene, and wherein the recycle feedstock comprises butene obtained from hydrogenating butadiene.

6. Process according to any one of claims 1-5, wherein the recycle feedstock comprises butane, preferably at least 10 wt% butane, and wherein the recycle feedstock comprising butane is recycled to step a).

7. Process according to claim 6, wherein the cracking conditions in the cracking zone are selected such that 97 wt% or less of butane are converted during a single pass through the cracking zone.

8. Process according to any one of claims 1-7, wherein the recycle feedstock comprises butane, preferably at least 10 wt% butane, and wherein the process further comprises cracking the recycle feedstock comprising butane under low severity cracking conditions, wherein butane conversion is 90 wt% or less, to obtain a butane cracking effluent, and feeding part or all of the butane cracking effluent to step b).

9. Process according to claim 8, further comprising feeding steam to the oxygenate-to-olefins conversion system, and wherein the recycle feedstock is added to the steam, before or after subjecting the steam to superheating, in particular wherein superheating is conducted in one of a superheating furnace or a superheating zone in a convection section of a cracking furnace including the cracking zone.

10. Process according to any one of claims 6-9, wherein at least part of the butane is obtained by hydrogenating unsaturates from the C4 portion.

11. Process according to any one of claims 6-10, wherein the recycle feedstock that is subjected to cracking conditions comprises less than 10 wt% unsaturates.

12. Process according to any one of claims 6-11, wherein the recycle feedstock that is subjected to cracking conditions comprises butane obtained by first selectively hydrogenating a C4 fraction of the combined effluent to obtain a partly hydrogenated C4 effluent, and further hydrogenating the partly hydrogenated C4 effluent to convert butene to butane.

13. Process according to any one of claims 1-9, wherein the light paraffin feedstock comprises ethane, and wherein the cracking conditions in the cracking zone are selected such that 60 wt% or less of ethane in the light paraffin feedstock are converted during a single pass through the cracking zone.

14. Integrated system for the preparation of an olefin product comprising ethylene and/or propylene, which system comprises

a) a steam cracking system having one or more inlets for a paraffin feedstock comprising C2 - C5 paraffins and steam, and an outlet for a cracker effluent comprising C2 - C4 olefins;

b) an oxygenate-to-olefins conversion system, having one or more inlets for receiving an oxygenate feedstock, and comprising a reaction zone for contacting the oxygenate feedstock with an oxygenate conversion catalyst under oxygenate conversion conditions, and an outlet for a conversion effluent comprising C2 - C4 olefins;

c) a work-up section arranged to receive at least part of the cracker effluent and at least part of the conversion effluent to obtain a combined effluent, the work-up section comprising a separation system, an outlet for a lower olefin product stream, and a hydrogenation unit for at least partially hydrogenating at least part of a C4 portion from the combined effluent, an outlet for an at least partially hydrogenated C4 feedstock; and means for recycling at least part of the at least partially hydrogenated C4 feedstock to step the steam cracking system and/or the oxygenate-to-olefins conversion system.

CLAIMS

1. Process for the preparation of an olefin product comprising ethylene and/or propylene, which process comprises the steps of

a) cracking a paraffin feedstock comprising C2 - C5 paraffins under cracking conditions in a cracking zone to obtain a cracker effluent comprising olefins;

b) converting an oxygenate feedstock in an oxygenate-to-olefins conversion system, comprising a reaction zone in which an oxygenate feedstock is contacted with an oxygenate conversion catalyst under oxygenate conversion conditions, to obtain a conversion effluent comprising ethylene and/or propylene;

c) combining at least part of the cracker effluent and at least part of the conversion effluent to obtain a combined effluent, and separating an olefin product stream comprising ethylene and/or propylene from the combined effluent, wherein the cracker effluent and/or the conversion effluent comprises a C4 portion comprising unsaturates, and wherein the process further comprises at least partially hydrogenating at least part of the C4 portion, to obtain an at least partially hydrogenated C4 feedstock; and recycling at least part of the at least partially hydrogenated C4 feedstock as recycle feedstock to step a) and/or step b), wherein the recycle feedstock comprises butane, preferably at least 10 wt% butane, and wherein the recycle feedstock comprising butane is recycled to step a) and wherein at least part of the butane is obtained by hydrogenating unsaturates from the C4 portion.