C L A I M S

1. A process for producing olefins, comprising:

a. cracking an ethane-comprising feed in a cracking zone under cracking conditions to obtain an cracking zone effluent comprising at least olefins and hydrogen;

b. converting an oxygenate feedstock in an oxygenate-to-olefin zone to obtain an OTO zone effluent at least olefins and hydrogen;

c. combining at least part of the cracking zone effluent and part of the OTO zone effluent to a combined effluent; and

d. separating hydrogen from the combined effluent, wherein at least part of the oxygenate feedstock is obtained by providing hydrogen obtained in step d) and a feed containing carbon monoxide and/or carbon dioxide to an oxygenate synthesis zone and synthesizing oxygenates.

2. A process according to claim 1, wherein the olefins obtained in step a) and/or b) include ethylene and propylene.

3. A process according to claim 1 or 2, comprising providing hydrogen and at least one of carbon monoxide and carbon dioxide to the oxygenate synthesis zone in a molar ratio of in the range of from 2.0 to 3.0, preferably 2.0 to 2.2.

4. A process according to any one of the preceding claims, wherein the feed containing carbon monoxide and/or carbon dioxide comprises a synthesis, preferably synthesis gas with a molar ratio of hydrogen to carbon monoxide and/or carbon dioxide of in the range of from 1.0 to 1.9, more preferably of from 1.3 to 1.8.

5. A process according to any one of the preceding claims, wherein the feed containing carbon monoxide and/or carbon dioxide comprises carbon dioxide obtained from a subsurface natural gas or oil reservoir.

6. A process according to any one of the preceding claims, wherein the feed containing carbon monoxide and/or carbon dioxide comprises carbon dioxide obtained from a process for preparing ethylene oxide and/or Mono-ethylene-glycol.

7. A process according to according to any one of the preceding claims, wherein the olefins obtained in step a) and/or b) include ethylene and comprising:

- providing at least part of the ethylene to an ethylene oxidation zone together with a source of oxygen and performing a process for preparing ethylene oxide to obtain ethylene oxide and carbon dioxide.

8. A process according to any one of the preceding claims, wherein the olefins obtained in step a) and/or b) include ethylene and comprising:

- converting at least part of the ethylene with benzene to obtain styrene monomer and hydrogen; and
- providing at least part of the obtained hydrogen to the oxygenate synthesis zone.

9. A process according to any of the preceding claims, comprising:

i) providing a feed comprising methane and ethane;
ii) separating the feed into at least a methane-comprising feed and an ethane-comprising feed;
iii) providing at least part the methane-comprising feed to a process for preparing synthesis gas to obtain a synthesis gas; and

iv) providing at least part of the ethane to the cracking zone and at least part of the synthesis gas to the oxygenate synthesis zone.

10. A process according to claim 10, wherein the feed comprising methane and ethane is natural gas or associated gas.

11. A process according to claim 10, wherein the feed comprising methane and ethane comprises in the range of 1 to 20 mol% of ethane, based on the total feed.

12. An integrated system for producing olefins, which system comprises:

a) a steam cracking system having one or more inlets for an ethane-comprising feedstock and steam, and an outlet for a cracker effluent comprising olefins and hydrogen;

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 oxygenate-to-olefins effluent comprising olefins;

c) a work-up system arranged to receive at least part of the cracker effluent and at least part of the oxygenate-to-olefins effluent to obtain a combined effluent, the work-up section comprising a separation system, an outlet for a olefin product stream and an outlet for hydrogen;

d) an oxygenate synthesis system having one or more inlets for a feed containing carbon monoxide and/or carbon dioxide and an inlet for hydrogen, and an outlet for an oxygenate feedstock; and means for providing hydrogen from the outlet for hydrogen of the workup section to the hydrogen inlet of the oxygenate synthesis system.

C L A I M S

1. A process for producing olefins, comprising:

a. cracking an ethane-comprising feed in a cracking zone under cracking conditions to obtain an cracking zone effluent comprising at least olefins and hydrogen;

b. converting an oxygenate feedstock in an oxygenate-to-olefin zone to obtain an OTO zone effluent at least olefins and hydrogen;

c. combining at least part of the cracking zone effluent and part of the OTO zone effluent to a combined effluent; and

d. separating hydrogen from the combined effluent, wherein at least part of the oxygenate feedstock is obtained by providing hydrogen obtained in step d) and a feed containing carbon monoxide and/or carbon dioxide to an oxygenate synthesis zone and synthesizing oxygenates.

2. A process according to claim 1, wherein the olefins obtained in step a) and/or b) include ethylene and propylene.

3. A process according to claim 1 or 2, comprising providing hydrogen and at least one of carbon monoxide and carbon dioxide to the oxygenate synthesis zone in a molar ratio of in the range of from 2.0 to 3.0, preferably 2.0 to 2.2.

4. A process according to any one of the preceding claims, wherein the feed containing carbon monoxide and/or carbon dioxide comprises a synthesis, preferably synthesis gas with a molar ratio of hydrogen to carbon monoxide and/or carbon dioxide of in the range of from 1.0 to 1.9, more preferably of from 1.3 to 1.8.

5. A process according to any one of the preceding claims, wherein the feed containing carbon monoxide and/or carbon dioxide comprises carbon dioxide obtained from a subsurface natural gas or oil reservoir.

6. A process according to any one of the preceding claims, wherein the feed containing carbon monoxide and/or carbon dioxide comprises carbon dioxide obtained from a process for preparing ethylene oxide and/or Mono-ethylene-glycol.

7. A process according to according to any one of the preceding claims, wherein the olefins obtained in step a) and/or b) include ethylene and comprising:

- providing at least part of the ethylene to an ethylene oxidation zone together with a source of oxygen and performing a process for preparing ethylene oxide to obtain ethylene oxide and carbon dioxide.

8. A process according to any one of the preceding claims, wherein the olefins obtained in step a) and/or b) include ethylene and comprising:

- converting at least part of the ethylene with benzene to obtain styrene monomer and hydrogen; and
- providing at least part of the obtained hydrogen to the oxygenate synthesis zone.

9. A process according to any of the preceding claims, comprising:

i) providing a feed comprising methane and ethane;
ii) separating the feed into at least a methane-comprising feed and an ethane-comprising feed;
iii) providing at least part the methane-comprising feed to a process for preparing synthesis gas to obtain a synthesis gas; and

iv) providing at least part of the ethane to the cracking zone and at least part of the synthesis gas to the oxygenate synthesis zone.

10. A process according to claim 10, wherein the feed comprising methane and ethane is natural gas or associated gas.

11. A process according to claim 10, wherein the feed comprising methane and ethane comprises in the range of 1 to 20 mol% of ethane, based on the total feed.

12. An integrated system for producing olefins, which system comprises:

a) a steam cracking system having one or more inlets for an ethane-comprising feedstock and steam, and an outlet for a cracker effluent comprising olefins and hydrogen;

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 oxygenate-to-olefins effluent comprising olefins;

c) a work-up system arranged to receive at least part of the cracker effluent and at least part of the oxygenate-to-olefins effluent to obtain a combined effluent, the work-up section comprising a separation system, an outlet for a olefin product stream and an outlet for hydrogen;

d) an oxygenate synthesis system having one or more inlets for a feed containing carbon monoxide and/or carbon dioxide and an inlet for hydrogen, and an outlet for an oxygenate feedstock; and means for providing hydrogen from the outlet for hydrogen of the workup section to the hydrogen inlet of the oxygenate synthesis system.