CLAIMS

1. A steam reforming system comprising a steam cracker and a steam reformer, wherein the steam cracker comprises

i) a steam cracking unit arranged for steam cracking a steam cracking feed stream to produce a steam cracking product stream comprising hydrogen, methane and C2+ hydrocarbons,

ii) a heat exchanger for cooling the steam cracking product stream to provide a cooled steam cracking product stream,

iii) a separation unit arranged for separating the cooled steam cracking product stream into a first, gas stream comprising hydrogen and methane and a second, liquid stream comprising methane and C2+ hydrocarbons,

iv) a demethanizer arranged for being fed at least with the second stream and producing a third stream comprising methane and hydrogen, and a fourth stream comprising C2+ hydrocarbons, wherein the amount of methane in the third stream is at least 95 wt%; and the steam reformer comprises

v) a feed preheater arranged for being fed with the third stream and steam to provide a preheated stream, and

vi) a steam reforming unit arranged for heating the preheated stream to a temperature of 800 ºC and steam reforming the heated stream to obtain a steam reforming product stream comprising hydrogen and CO_2;

wherein the steam cracker further comprises a cryogenic separation unit for separating the first stream into a fifth, gas stream comprising hydrogen and a sixth, liquid stream comprising methane, wherein the demethanizer is arranged for further being fed with the sixth stream.

2. The system according to claim 1, wherein the third stream comprises C2+ hydrocarbons at an amount of less than 3 wt%, more preferably less than 2 wt%, more preferably less than 1 wt% and more preferably less than 0.5 wt%

3. The system according to any one of claims 1 to 2, wherein the amount of C2+ hydrocarbons in the fourth stream is at least 99 wt%.

4. The system according to any one of claims 1 to 2, wherein the preheated second stream has a temperature of at least 500 ºC.

5. The system according to claim 1, wherein the amount of hydrogen in the fifth stream is at least 88 vol% and/or the amount of methane in the sixth stream is at least 95 wt%.

6. A steam reforming process using a system comprising a steam cracker and a steam reformer, wherein the steam cracker comprises:

i) a steam cracking unit arranged for steam cracking a steam cracking feed stream to produce a steam cracking product stream comprising hydrogen, methane, and C2+ hydrocarbons,

ii) a heat exchanger for cooling the steam cracking product stream to provide a cooled steam cracking product stream,

iii) a separation unit arranged for separating the cooled steam cracking product stream into a first, gas stream comprising hydrogen and methane and a second, liquid stream comprising methane and C2+ hydrocarbons,

iv) a demethanizer arranged for being fed at least with the second stream and producing a third stream comprising methane and a fourth stream comprising C2+ hydrocarbons, wherein the amount of methane in the third stream is at least 95 wt%; and the steam reformer comprises

v) a feed preheater arranged for being fed with the third stream and steam to provide a preheated stream, and

vi) a steam reforming unit arranged for heating the preheated stream to a temperature of 800 ºC and steam reforming the heated stream to obtain a steam reforming product stream comprising both hydrogen and CO_2, wherein the steam cracker further comprises a cryogenic separation unit for separating the first stream into a fifth, gas stream comprising hydrogen and a sixth, liquid stream comprising methane, wherein the demethanizer is arranged for further being fed with the sixth stream,

wherein the process comprises the steps of:

a) steam cracking the steam cracking feed stream by the steam cracking unit to produce the steam cracking product stream,

b) cooling the steam cracking product stream by the heat exchanger to provide the cooled steam cracking product stream,

c) separating the cooled steam cracking product stream into the first stream and the second stream by the separation unit,

d) feeding at least the second stream to the demethanizer to produce the third stream and the fourth stream comprising C2+ hydrocarbons,

e) feeding the third stream and steam to the feed preheater to provide the preheated stream and

f) heating the preheated stream to a temperature of 800 ºC and steam reforming the heated stream by the steam reforming unit to obtain the steam reforming product stream; and

g) feeding back the third stream from the demethanizer to the heat exchanger, to assist cooling of the steam cracking product stream, and

h) feeding back a fifth stream from the cryogenic separation unit to the heat exchanger, to assist cooling of the steam cracking product stream,

wherein the third stream comprises C2+ hydrocarbons at an amount of less than 0.5 wt%.

7. A steam reforming process using a steam reforming system comprising a steam cracker and a steam reformer, wherein the steam cracker comprises:

i) a steam cracking unit arranged for steam cracking a steam cracking feed stream to produce a steam cracking product stream comprising hydrogen, methane, and C2+ hydrocarbons,

ii) a heat exchanger for cooling the steam cracking product stream to provide a cooled steam cracking product stream,

iii) a separation unit arranged for separating the cooled steam cracking product tream into a first, gas stream comprising hydrogen and methane and a second, liquid stream comprising methane and C2+ hydrocarbons,

iv) a demethanizer arranged for being fed at least with the second stream and producing a third stream comprising methane and a fourth stream comprising C2+ hydrocarbons, wherein the amount of methane in the third stream is at least 95 wt%; and the steam reformer comprises

v) a feed preheater arranged for being fed with the third stream and steam to provide a preheated stream, and

vi) a steam reforming unit arranged for heating the preheated stream to a temperature of 800 ºC and steam reforming the heated stream to obtain a steam reforming product stream comprising both hydrogen and CO_2, wherein the steam cracker further comprises a cryogenic separation unit for separating the first stream into a fifth, gas stream comprising hydrogen and a sixth, liquid stream comprising methane, wherein the demethanizer is arranged for further being fed with the sixth stream, the process

consisting of the steps of a) steam cracking the steam cracking feed stream by the steam cracking unit to produce the steam cracking product stream, b) cooling the steam cracking product stream by the heat exchanger to provide the cooled steam cracking product stream, c) separating the cooled steam cracking product stream into the first stream and the second stream by the separation unit, d) feeding at least the second stream to the demethanizer to produce the third stream and the fourth stream comprising C2+ hydrocarbons, e) feeding the third stream and steam to the feed preheater to provide the preheated stream, and f) heating the preheated stream to a temperature of 800 ºC and steam reforming the heated stream by the steam reforming unit to obtain the steam reforming product stream; g) feeding back the third stream from the demethanizer to the heat exchanger, to assist cooling of the steam cracking product stream, and feeding back a fifth stream from the cryogenic separation unit to the heat exchanger, to assist cooling of the steam cracking product stream, wherein the third stream comprises C2+ hydrocarbons at an amount of less than 0.5 wt%.