Claims

~~1. A method for generating synthesis gas comprising the following steps:~~
~~decomposing a hydrocarbon containing fluid into carbon and hydrogen by means of introduction of energy, the energy at least partially being provided by heat, wherein the carbon and the hydrogen have a temperature of at least 200°C after the decomposing step;~~
~~bringing water into contact with at least a portion of the carbon generated by the decomposing step at a temperature between 800 and 1700°C, wherein upon bringing the carbon into contact with water, the carbon obtained by the decomposing step has cooled down by no more than 50% in °C with respect to its temperature after the decomposing step;~~
~~transforming at least a portion of the water and the carbon obtained by the decomposing step into synthesis gas;~~
~~wherein the carbon obtained by the decomposing step and the hydrogen obtained by the decomposing step are jointly brought into contact with the water.~~

1~~2~~. A method for generating synthesis gas comprising the following steps:
decomposing a hydrocarbon containing fluid into carbon and hydrogen by means of introduction of energy, the energy at least partially being provided by heat, wherein the carbon and the hydrogen have a temperature of at least 200°C after the decomposing step;
bringing water into contact with at least a portion of the carbon generated by the decomposing step at a temperature between 800 and 1700°C, wherein upon bringing the carbon into contact with water, the carbon obtained by the decomposing step has cooled down by no more than 50% in °C with respect to its temperature after the decomposing step;
transforming at least a portion of the water and the carbon obtained by the decomposing step into synthesis gas;
wherein the carbon obtained by the decomposing step is separated at least partially from the hydrogen obtained by the decomposing step prior to the step of bringing the carbon into contact with the water, and
wherein at least a portion of the separated hydrogen is added to the synthesis gas generated by the transformation.

2~~3~~. The method for generating synthesis gas according to claim 1 ~~or 2~~, wherein the decomposing step takes place at a temperature above 1000°C; and wherein the carbon is brought into contact with the water at a temperature of at least 1000°C, particularly at a temperature between 1000°C and 1200°C.

34. The method for generating synthesis gas according to one of the preceding claims, wherein the heat required to reach the temperature of between 800 and 1700°C for the transformation originates essentially completely from the heat that is provided for decomposing the hydrocarbon containing fluid.

45. The method for generating synthesis gas according to one of the preceding claims, wherein at least a portion of the heat of at least a portion of the carbon obtained by the decomposing step and/or a portion of the hydrogen obtained by the decomposing step is used to heat the water prior to bringing the water in contact with carbon and/or is used to heat the process chamber, in which the water is brought into contact with the carbon.

56. The method for generating synthesis gas according to one of the preceding claims, wherein the synthesis gas has a temperature of 800 to 1700°C after transformation; and wherein at least a portion of its heat is used to preheat the water and/or other media used for the process.

67. The method for generating synthesis gas according to one of the preceding claims, wherein at least a portion of the heat of at least a portion of the carbon obtained by the decomposing step and/or a portion of the hydrogen obtained by the decomposing step and/or a portion of the synthesis gas is used for generating electricity, wherein the electricity particularly may be provided as energy carrier for introducing energy for decomposing the hydrocarbon containing fluid.

78. The method for generating synthesis gas according to one of the preceding claims, wherein the energy for decomposing the hydrocarbon containing fluid is primarily introduced by means of a plasma.

89. The method for generating synthesis gas according to one of the preceding claims, wherein the decomposing step is performed in a Kvaerner reactor.

910. The method for generating synthesis gas according to claim 78 or 89, wherein the carbon generated by decomposing and the hydrogen generated by decomposing are brought into contact with water in form of an aerosol.

1011. The method for generating synthesis gas according to claim 12, wherein at least a portion of the additional hydrogen added to the synthesis gas is generated by decomposing a hydrocarbon containing fluid at a temperature below 1000°C, particularly below 600°C, by means of a microwave plasma.

1112. The method for generating synthesis gas according to one of claims 12 to 1011, wherein the ratio of CO to hydrogen of the synthesis gas has a value of 1:1 to 1:3, particularly a value of about 1:2.1.

1213. A method for generating synthetic functionalised and/or non-functionalised hydrocarbons, wherein at first a synthesis gas is generated according to the method of one of the claims 1 to 1112 is generated, and wherein the synthesis gas is brought into contact with a suitable catalyst in order to cause the transformation of the synthesis gas to synthetic functionalised and/or non-functionalised hydrocarbons, wherein the temperature of the catalyst and/or the synthesis gas is open-loop controlled or close-loop regulated to a predetermined range of temperatures.

1314. The method for generating synthetic functionalised and/or non-functionalised hydrocarbons according to claim 1213, wherein the transformation of the synthesis gas is carried out by means of a Fischer-Tropsch process, particularly a SMDS process.

1415. The method for generating synthetic functionalised and/or non-functionalised hydrocarbons according to claim 1213, wherein the transformation of the synthesis gas is carried out by means of a Bergius-Pier process, a Pier process or a combination of a Pier process and a MtL process.

1516. The method according to one of the preceding claims, wherein the hydrocarbon containing fluid to be decomposed is natural gas, methane, wet gases, heavy oil or a mixture thereof.

~~17. An apparatus for generating synthesis gas comprising:~~
~~a hydrocarbon converter for decomposing a hydrocarbon containing fluid into carbon and hydrogen, wherein the hydrocarbon converter comprises at least one process chamber having at least one inlet for a hydrocarbon containing fluid and at least one outlet for carbon and/or hydrogen and at least one unit for introducing energy into the process chamber, the energy consisting at least partially of heat;~~
~~a C converter for transformation of water and carbon, the C converter comprising at least one further process chamber having at least one inlet for water, at least one inlet for at least carbon and at least one outlet, wherein the inlet for at least carbon is directly connected to the at least one outlet of the hydrocarbon converter;~~
~~wherein the hydrocarbon converter, the at least one outlet of the hydrocarbon converter, the C converter and the at least one inlet of the C converter are adapted to concurrently direct said carbon and said hydrogen produced in the hydrocarbon converter into the C converter.~~

16~~18~~. An apparatus for generating synthesis gas comprising:
a hydrocarbon converter for decomposing a hydrocarbon containing fluid into carbon and hydrogen, wherein the hydrocarbon converter comprises at least one process chamber having at least one inlet for a hydrocarbon containing fluid and at least one outlet for carbon and/or hydrogen and at least one unit for introducing energy into the process chamber, the energy consisting at least partially of heat;
a C converter for transformation of water and carbon, the C converter comprising at least one further process chamber having at least one inlet for water, at least one inlet for at least carbon and at least one outlet, wherein the inlet for at least carbon is directly connected to the at least one outlet of the hydrocarbon converter;
wherein a separation unit is provided for separating the carbon obtained by decomposing and the hydrogen obtained by decomposing, the separation unit having separate outlets for the separated materials coming from the separation unit, wherein the outlet for carbon is connected to the C converter, wherein a separate inlet pipe for the hydrogen coming from the separation unit is provided, the inlet pipe for hydrogen leading into the C converter or into a mixing chamber located downstream.

17~~19~~. The apparatus for generating synthesis gas according to claim 16~~17~~, wherein the at least one unit for introducing energy into the process chamber is designed in such a way that it can generate, at least locally, temperatures above 1000° C.

18~~20~~. The apparatus for generating synthesis gas according to ~~one of~~ claim~~s~~ 16 or 17 ~~17 to 19~~, wherein the at least one unit for introducing energy into the process chamber comprises a plasma unit, particularly a microwave plasma unit.

19~~21~~. The apparatus for generating synthesis gas according to one of the claims 16~~17~~ to 18~~20~~, wherein the process chamber of the C converter is formed by an outlet pipe of the hydrocarbon converter, wherein the outlet pipe is connected to an inlet for water.

20~~22~~. The apparatus for generating synthesis gas according to one of claims 16~~17~~ to 19~~21~~, wherein the hydrocarbon converter comprises a Kvaerner reactor.

21~~23~~. The apparatus for generating synthesis gas according to claim 18~~20~~ or 20~~22~~, wherein the hydrocarbon ~~C~~ converter is further adapted to produce an aerosol comprising carbon and hydrogen.

22~~24~~. The apparatus for generating synthesis gas according to one of claims 16~~17~~ to 21~~23~~ having

at least one additional hydrocarbon converter for decomposing a hydrocarbon containing fluid into carbon and hydrogen, the hydrocarbon converter comprising:
at least one process chamber having at least one inlet for the hydrocarbon containing fluid;
at least one unit for introducing energy into the process chamber, the energy at least partially consisting of heat;
a separation unit for separating the carbon obtained by decomposing and the hydrogen obtained by decomposing, with separation unit having separate outlets for carbon and hydrogen, wherein the outlet for hydrogen is connected to the separate inlet for hydrogen.

23~~25~~. The apparatus for generating synthesis gas according to claim 22~~24~~, wherein the at least one additional hydrocarbon converter is of a type carrying out decomposing at temperatures below 1000°C, particularly below 600°C by means of a microwave plasma.

24~~26~~. An apparatus for transforming synthesis gas into synthetic functionalised and/or non-functionalised hydrocarbons comprising:
an apparatus according to one of claims 16~~17~~ to 23~~25~~; and
a CO converter having a process chamber, in which a catalyst is located, and means for bringing the synthesis gas in contact with the catalyst, and a control unit for the open-loop controlling or closed-loop regulating the temperature of the catalyst and/or the synthesis gas to a predetermined temperature.

25~~27~~. The apparatus according to claim 24~~26~~, wherein the CO converter comprises a Fischer-Tropsch converter, particularly a SMDS converter.

26~~28~~. The apparatus according to claim 24~~26~~, wherein the CO converter comprises a Bergius-Pier converter, a Pier converter or a combination of a Pier converter with a MtL converter.

27~~29~~. The apparatus according to one of claims 24~~26~~ to 26~~28~~ further comprising a control unit for open-loop controlling or closed-loop regulating the pressure of the synthesis gas in the CO converter.