# C L A I M S

CLAIMS

1. A reactor configuration comprising at least one electrically heated furnace which defines a space, with at least one reactor tube placed within the furnace space and said reactor tube having an exit and entrance outside of the reactor furnace, and wherein said furnace is further provided with
- at least one electrical radiative heating element suitable for heating to high temperatures in the range of 400 to 1400 °C, said heating element being located inside said furnace in such a way that the heating element is in no direct contact with the at least one reactor tube; and
- a number of inspection ports in the furnace wall such to be able to visually inspect the condition of the at least one reactor tube on all sides of said reactor tube during operation, the total number of inspection ports being sufficient to inspect all reactor tubes present in the furnace at their full length and circumference; and
wherein the heating duty of the furnace is at least 3 MW.
2. A reactor configuration according to claim 1, wherein the at least one radiative heating element is a resistance based heating element.
3. A reactor configuration according to any one of the preceding claims, wherein the at least one electrical heating element comprises NiCr, SiC, $MoSi_2$ or FeCrAl based resistance heating elements.
4. A reactor configuration according to claim 3, wherein the electrical heating element comprises $MoSi_2$ or FeCrAl based resistance heating elements.

5. A reactor configuration according to any one of the preceding claims, wherein the reactor furnace comprises ten or more reactor tubes.

6. A reactor configuration according to any one of the preceding claims, wherein the reactor furnace comprises at least two heating zones, wherein each heating zone has its own power control unit.

7. A reactor configuration according to any one of the preceding claims, comprising at least ten electrically heated furnaces, each of which defines a space, and within each space at least ten reactor tubes, each of said reactor tubes having an exit and entrance outside of the reactor furnace, each of said furnaces further being provided with

- ten or more electrical radiative heating elements suitable for heating the reactor tubes to high temperatures in the range of 600 to 1100 °C, arranged in at least four heating zones; and

- a number of inspection ports in the furnace wall such to be able to visually inspect the condition of the at least one reactor tube on each opposite side of said reactor tube during operation with the use of infrared radiant measurement techniques, the total number of inspection ports being sufficient to inspect all reactor tubes present in the furnace at their full length and circumference; and

wherein the heating duty of each furnace is at least 3 MW.

8. A reactor configuration according to any one of the preceding claims, being provided with a power supply connection to a renewable source for supplying at least part of the required power for the electrical heating.

9. A method of performing a gas conversion process at high temperatures, comprising introducing at least one gaseous reactant into a reactor configuration of claims 1-8,

electrically heating the at least one heating element to a temperature in the range of 400 - 1400 °C, and performing the high temperature gas conversion while inspecting the reactor tube by means of sight on the reactor tube.

10. A method of performing a gas conversion process of claim 9, wherein the gas conversion process comprises producing a synthesis gas by means of steam methane reforming, dry $CO_2$ reforming, reverse water-gas shift or a combination thereof, comprising the steps of:

i. Providing hydrocarbons and steam and/or $CO_2$ to the reactor configuration, such that the reaction mixture enters the at least one reactor tube;

ii. Maintaining the furnace of the reactor at a temperature of at least 400 °C by providing electrical energy to the at least one heating element;

iii. Allowing the hydrocarbons and steam to be converted into hydrogen and carbon monoxide; and

iv. Obtaining from the reactor a synthesis gas stream.

11. The method of claim 9 or 10, comprising controlling the temperatures in different sections of the reactor furnace, and wherein the reactor furnace comprises at least two heating zones, wherein each heating zone has its own power control unit that is regulated to achieve a heat flux profile over the surface of the at least one reactor tube.

12. The method of any one of claims 9 to 11, further comprising supplying at least part of the power for the electrical heating from a renewable source.