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C L A I M S

1. An electrically heated reactor having an outer surface area, an inlet and an outlet, wherein
 - (a) the reactor is a tube surrounded by electrical heating means at a certain distance;
 - 5 (b) the electrical heating means comprises radiative sheeting placed coaxially around the reactor tube, the surface area of the sheeting facing the outer surface area of the reactor tube defining an inner surface area of the electrical heating means;
 - 10 (c) the inner surface area of the heating means covers at least 60% of the reactor tube outer surface area; and
 - (d) the distance between the reactor tube and the heating means is selected such that the ratio between the inner
15 surface area of the electrical heating means to the reactor tube outer surface area is in the range of 0.7 to 3.0.
2. A reactor according to claim 1, wherein the radiative sheeting is divided into at least two segments which are
20 placed lengthwise along the reactor tube, each of which segments being connected to a separate power control.
3. A reactor according to any one of the preceding claims, wherein the radiative sheeting comprises NiCr or FeCrAl based resistance heating materials.
- 25 4. A reactor according to any one of the preceding claims, wherein the heating means is a radiative sheeting placed coaxially around the reactor tube, while leaving an opening along the length of the reactor tube with a size that matches the diameter of the reactor tube.

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5. A reactor according to any one of the preceding claims,
wherein the heating means is a radiative sheeting
consisting of panels of the radiative heating material.
6. A furnace, comprising within the furnace one or more
5 reactor tubes according to any one of claims 1 to 5, said
one or more reactor tubes having an entrance and exit
outside of the furnace; and one or more inspection ports
in the furnace wall, each of which inspection ports being
placed opposite to a reactor tube.
- 10 7. A method of performing a gas conversion process at high
temperatures, comprising introducing at least one gaseous
reactant into a reactor of any one of claims 1-5,
electrically heating the reactor to a temperature in the
range of 400 - 1400 °C through radiative heating of the
15 heating means, and performing the high temperature gas
conversion.
8. A method of performing a gas conversion process of claim
7, wherein the gas conversion process comprises producing
a synthesis gas by means of steam methane reforming, dry
20 CO₂ reforming, reverse water-gas shift or a combination
thereof, comprising the steps of:
 - i. Providing hydrocarbons and steam and/or CO₂ to the
reactor according to any one of claims 1-5, such
that the reaction mixture enters the at least one
25 reactor tube;
 - ii. Maintaining the reactor at a temperature of at
least 400 °C by providing electrical energy to the
heating means;
 - iii. Allowing the hydrocarbons and steam to be converted
30 into hydrogen and carbon monoxide; and
 - iv. Obtaining from the reactor a synthesis gas stream.
9. The method of claim 7 or 8, comprising controlling the
temperatures/heat fluxes in different segments of the

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heating means, wherein the heating means comprises at least two segments, wherein each segment has its own power control unit that is regulated to achieve a desired heat flux profile over the surface of the at least one reactor.