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Shut-down process for Fischer Tropsch reactor - which does not result in deterioration of catalyst performance by hot-spot formation during shut down

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Process for the shut-down of a reactor which is used for the preparation of an at least partly liq. hydrocarbonaceous prod. by reaction of CO and H_2 at elevated temp. and pressure and using a catalyst, the reactor is provided with cooling means and with means to recycle gas through the catalyst for equalising the temp. of the catalyst, comprises

(a) interrupting the feed of synthesis gas;

(b) depressurising the reactor downstream of the catalyst, and providing the reactor upstream of the catalyst with inert gas; and

(c) cooling the catalyst to ambient conditions.

Reactor for carrying out the above process is also claimed.

ADVANTAGE

Shut-down process which does not result in a deterioration of the performance of the catalyst by the creation of hot spots during shut-down, the process including the passivation of the catalyst.

EMBODIMENTS

After the interruption of the supply of carbon monoxide and hydrogen (primary synthesis gas as well as recycled synthesis gas), a gas stream through the catalyst bed is maintained at a sufficient velocity to prevent the formation of hot spots, gas stream becomes more and more inert by the increasing proportion of inert gas. The supply of inert gas is maintained until the catalyst is cooled down to ambient conditions, when it can be unloaded.

When the reactor is provided with means to recycle liquid prod. through the catalyst, the process comprises further between steps (b) and (c) of cooling the catalyst to a temp. slightly above the solidification temp. of the liq. prod; and interrupting the recycling of the liq. prod, so that initially the liq. prod. recycling is used for the cooling and temp. levelling and deposits of solidified hydrocarbons are avoided.

Hydrogen for use as inert gas during the shut-down process is accumulated or on the inert packing bodies in the

reactor space above the catalyst during the normal operation of the reactor, when according to a first embodiment the inert bodies comprise an interfacial membrane permeable to hydrogen and impermeable to carbon monoxide, or according to a second embodiment the inert bodies comprise material which absorbs hydrogen under reaction conditions and desorbs hydrogen under shut-down conditions.

PROCESS CONDITIONS

Reactor conditions are a temp. of 100° - 500°C, total pressure of 1-200 bar abs. and a space velocity of 200 - 20,000 m^3 (S.T.P.) gaseous feed/m^3 reaction zone/hour; pref. temp. of 150° - 300°C, pressure of 5 - 100 bar abs. and space velocity of 500 - 5000 m^3 (S.T.P.) gaseous feed/m^3 reaction zone/hour. The molar ratio of hydrogen to carbon monoxide is normally 0.4 - 4.0 pref. 1.8-2.5.(15pp1684CGDwgNo0/0)

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