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Prodn. of synthesis gas from hydrocarbon(s) - and of methanol from synthesis gas, and appts. for controlling exothermic reaction temp.

D/S: N(AU BR JP NO) + E(BE CH DE FR GB NL)

The following are claimed: (A) method for prodn. of synthesis gas from a hydrocarbon gas; (B) methods for prodn. of methanol from a hydrocarbon gas; (C) methods for prodn. of methanol from synthesis gas; (D) process for prodn. of synthesis gas from a hydrocarbonaceous material; (E) appts. for controlling the temp. of an exothermic catalytic reaction zone.

Method (A) comprises (a) preheating the hydrocarbon gas to over 1500° F by heat exchange with the synthesis gas, (b) reacting the gas with O₂ in the presence of steam to effect further effect heating of the gas, and (c) reforming the gas.

ADVANTAGES

The methods and appts. provide more efficient prodn. of synthesis gas from natural gas and similar gases.

DETAILS

One method (B) comprises (a) reforming the hydrocarbon gas in the presence of steam and CO₂, (b) condensing unreacted steam from the resulting synthesis gas, (c) absorbing CO₂ from the synthesis gas using a liq. absorbent, (d) catalytically converting most of the synthesis gas to methanol, (e) stripping CO₂ from the CO₂-rich absorbent, and (f) mixing the CO₂ with the hydrocarbon gas.

Another method (B) comprises (a) producing heat and methanol by partially oxidising a hydrocarbon gas with compressed O₂ and by absorbing the methanol vapour in a liq. absorbent, (b) reforming the gas to produce synthesis gas, (c) catalytically converting the synthesis gas to methanol, and (d) stripping methanol from the absorbent using at least part of the heat from (a).

Another method (B) comprises (a) partially oxidising the hydrocarbon gas to produce methanol and a partially reformed gas, (b) recovering the methanol, (c) reforming the partially reformed gas, and (d) catalytically converting the resulting synthesis gas to methanol.

One method (C) includes the steps of (a) countercurrently contacting the synthesis gas with methanol produced in the process to obtain S-contg. methanol, and (b) heating

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the S-contg. methanol and stripping it with an inert purge gas from the process.

Another method (C) includes the steps of (a) flashing crude methanol produced in the process to selectively purge CH_4 , and (b) returning at least part of the crude methanol (after flashing) for contact with gases resulting from synthesis of the methanol.

Process (D) is a process for producing synthesis gas from a hydrocarbonaceous material in the presence of water vapour in a reforming reaction zone and for consuming at least part of the synthesis gas in a heat-producing reaction zone. The process includes the steps of (a) passing a gas and water in heat-exchange relationship with the heat-producing zone to control its temp., and (b) introducing the resulting mixt. of gas and water vapour into the reforming zone.

Appts. (E) comprises two plenum chambers defining an annular reaction zone contg. catalyst particles. Several heat-exchange tubes are arranged coaxially in the reaction zone. One plenum chamber has a gas inlet and the other has a gas outlet. (45pp367).

(E)ISR:- US4099383 US4271086 US4203915