85-205179/34 E36 J04 FLUO 30.01.84
FLUOR CORP *GB 2153-382-A
30.01.84-US-574921 (21.08.85) C01b-03/36

Auto:thermal synthesis gas prodn., pref. in one reactor - with zones for successive prim. reforming, combustion and sec. reforming, and heat transfer from prod. to prim. reforming

C85-089360

Autothermal process for synthesis gas prodn. from a hydrocarbon feed includes:
(i) passing a mixt. of steam and feed through a first catalyst zone, heat for the reaction (pref. reforming) being provided by a combustion reaction effluent gas (A) passing in counter-current flow, pref. outside the catalyst tubes; and
(ii) introducing O_2 or O_2-enriched air to the effluent from the catalyst to provide an (A).

The (A) from step (ii) is pref. passed through a second catalyst zone to provide additional reaction before passing to step (i).

USE/ADVANTAGE

The synthesis gas is useful for prodn. of MeOH, NH_3 H_2, oxo-alcohols, or hydrocarbons by Fischer-Tropsch reaction. Primary and secondary reforming can here be accomodated in a single reactor, in separate zones. The capital cost is less than for standard fired reformers.

The process can be applied to high pressure reforming and is easily modularized. Startup time can be reduced. Start-up and control can be automated.

EMBODIMENTS

The reactor may be vertical cylindrical, and comprise (starting from the top) : zone (I), for catalytic primary reforming; zone (II), in which the primary reformer prod. passes down an axial tube in a catalyst bed, up which passes the combustion gas, undergoing secondary reforming; and zone (III), the combustion reaction chamber, in which primary reformed prod. from the central tube of (II) is mixed with O_2 or O_2-enriched air, and the mixt. after reaction returns upwards through the catalyst bed of (II). The reactor is internally-insulated, e.g. with ceramic to conserve heat.

In zone (I), the catalyst-filled reaction tubes are mounted by suspension from the reactor wall, and the zone also contains horizontal baffles to direct the upward flow of prod. gas, initially at 1500-2100°F after secondary reforming, around the tubes. Prod. gas leaves the reactor near the top, at 1000-1300°F.

Prod. gas from (I) enters (III) at 1100-1400°F and is

there heated by combustion to 2500-3500°F. The reactor pressure may be from atmospheric to 1200 psig, e.g. 700 psig for use of the prod. in NH_3 synthesis.(0pp1492RBHdwgNo 0/0),