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 Controlled short residence time coal liquefaction - providing sufficient liquid yields for solvent balance

H(9-A1)

19

ADVANTAGES

Distillate liquid (C_5 -454°C) yields are at least equal to that which would be obtained under the same process conditions but with a total slurry residence time of 0.3-0.5 hrs. No hydrogenation, downstream or otherwise, of the relatively H-depleted recycle solvent is required.

DETAILS

(A) is pref. a tubular zone, suitably in two stages, a first heated, and a serially connected, second, unheated stage. The pref'd. reaction conditions are 460-490 (esp. about 475)°C, an H_2 pressure of 2000-2500 (esp. about 2000) psig and a residence time of 0.02-0.15 (esp. 0.06-0.135) hrs. The H_2 feed rate to (A) is 0.5-6 (pref. 1.5-4) wt.% based on the feed slurry, and the H_2 consumption is 0.5-2.5 wt.% based on feed coal (MF).

Quenching may be effected before or on the effluent entering the sepn. zone. The quench fluid is pref. a cool distillate.

In one embodiment, in addition to the first fraction of the sepn., i.e. the solvent-boiling-range liquid, a portion of the second fraction - a slurry of normally solid dissolved coal, mineral residue and solvent-boiling-range liquid - is also recycled to the liquefaction zone. (50pp920).

(E) ISR: No Search Report.

D/S: E(DE FR GB IT NL SE)

A coal liquefaction process, for the prodn. of a deashed, normally solid dissolved coal product, is operated by passing a slurry of feed coal in a recycle solvent (I) through a preheating-reaction zone (A) at 455-500°C and an H_2 pressure of above 1500 psig with a controlled short (up to 0.2 hrs) residence time, the reaction effluent being immediately quenched to below 425°C to inhibit polymerisation and limit insoluble organic matter yields to below 9 (pref. below 8, esp. below 7.5) wt.% based on feed coal (MF). No hydrogenative reactions take place subsequent to the quenching, and the sepn. of the quenched effluent yields (i) a solvent-boiling-range liquid recycled as (I), and (ii) normally solid dissolved coal in amts. of at least 30 (pref. at least 40) wt.% based on feed coal (MF). The yield of recycle solvent is sufficient to provide at least 80 (pref. at least 90, esp. 100)% of that needed to maintain an overall solvent balance.

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