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Coal liquefaction with high mixing energy - to prevent coke deposit formation

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Coal liquefaction is effected by introducing H_2 and a slurry of coal in recycle solvent into a reaction zone and imparting a mixing energy of at least 3500 ergs per cc of reaction zone vol. per sec to the slurry., thereby causing H_2 transfer from the gas phase to the slurry in amts. sufficient to prevent H_2 starvation of the slurry and prevent formation of deleterious cementitious coke deposits.

ADVANTAGES

The high mixing energy not only prevents coke deposits but also increases liq. yields and reduces 1-4 C hydrocarbon gas prodn.

DETAILS

The mixing energy is pref. 3500-4500 erg/cc.sec. This energy can be supplied by sparging the slurry with gas (esp. H_2 or synthesis gas) or by using an impeller. Sparge gas is pref. injected at a superficial velocity of 3-20 (esp. 5-15) cm/sec.

Liquefaction is pref. effected in a non-packed reactor at 430-470 deg.C and an H_2 partial pressure of at least 1500 psig. The total slurry residence time may be 0.5-2 hr. The slurry may also include recycle mineral residue and recycle normally solid dissolved coal.

EXAMPLE

Liquefaction tests were performed in a 1-litre CSTR reactor at 455 deg.C and 2000 psig with a residence time of 1 hr. for 16 hr. At stirrer speeds of 1000, 400, 200 and 150 rpm, the vol.% of reactor deposits was 0.0, 4.7 and 10.3 respectively.(16pp367DwgNo0/0).

(E) ISR:- GB2062669; US4288405; US4371667

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