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Prodn. of organic cpd., e.g. methanol, from hydrocarbon feed - via syn-gas prodn. in prim. and sec. reformers with recycle of hydrogen obtd. from purge gas

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E(10-E4E1) H(4-E5) N(6)

Prodn. of an organic cpd. from a hydrocarbon-contg. feedstock comprises:

(a) dividing the feedstock into 2 fractions;

(b) subjecting the 1st fraction to primary steam reforming by mixing with steam and heating the mixt. by indirect heat exchange in presence of a reforming catalyst, to form an H_2-contg. gaseous effluent at 650-850°C.

(c) mixing the effluent gas from (b) with the 2nd fraction from (a);

(d) reacting in a single stage the gas mixt. from (c) with an O_2-rich gas in a secondary reformer operating essentially adiabatically and contg. a single catalyst bed, to give a syngas at 850-1250°C contg. a % CH_4 equivalent of less than 1/10th of that of the gas mixt. from (c) and with a z ratio of 0.80-1.00 (z = moles H_2/(2(moles CO) + 3(moles CO_2)));

(e) mixing the effluent gas from (d) with a H_2-rich stream to form a final syngas stream;

(f) injecting the final syngas into a synthesis loop, forming organic cpds. therein, and extracting a purge gas stream therefrom;

(g) physically sepg. the purge gas stream into a H_2-rich stream and a residual gas stream; and

(h) recycling at least part of the H_2-rich stream to step (e).

USE/ADVANTAGE

Feedstocks ranging from CH_4 to naphtha can be converted to e.g. MeOH. The investment cost of the overall MeOH plant is reduced by reducing the size of the steam reforming heater. The size and wt. of the plant is reduced making it easier to build as a large-scale single-stream plant or on ship or barge. Like BP 1,569,014, the invention allows high-pressure operation by steam reforming at unusually low temp., but, unlike the BP, balancing of primary and secondary reformers is unnecessary: therefore much less reforming is performed in the primary reformer, which reduces the cost of the plant.

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PREFERRED CONDITIONS

The temp. of the effluent gas from (b) is pref. about 720-780°C, and that from (d) is pref. about 950-1100°C. The pressure in (b) and (d) is pref. above 30 bars. The O_2-rich gas used in (d) pref. contains at least 80 (esp. at least 95) vol.% O_2. Pref. the effluent gas from (d) has z = 0.88-0.98, and that from (e) has z = essentially 1.00. The 1st fraction of the feedstock, treated in (b) is pref. 5-60 (esp. 10-30)% of the whole.

PURGE GAS TREATMENT

The purge gas may be shift converted by reacting with steam in presence of a shift catalyst, and the mixt. then physically sepd. (step (g)), with opt. CO_2 removal before physical sepn. Physical sepn. may be effected by molecular sieve, selective membrane diffusion or low-temp. distn.

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(E)ISR: No Search Report