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Lower hydrocarbon prodn. from synthesis gas - using crystalline cobalt-modified silica catalyst

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

Prodn. of 1-4C hydrocarbons and their oxygenated derivs. is effected by contacting synthesis gas at 150-450°C and 1-700 bars with a catalyst contg. a crystalline, Co-modified silica prod. (I), (I) having been produced by (a) forming a mixt. contg. a SiO_2 source, a Co source, a nitrogenous base (II) and opt. a mineralising agent and/or an inorganic base, in a liq. medium comprising water and/or an alcohol; and (b) maintaining the mixt. at high temp. and pressure until (I) crystallises.

ADVANTAGES

The process yields mainly 1-4C hydrocarbons, with only minor amts. of oxygenates and practically no higher hydrocarbons.

DETAILS

(II) is pref. of formula $NR_4.OH$ (where R is 1-5C alkyl, phenyl or alkylphenyl). (I) is pref. calcined at 300-700°C for 2-24 hrs. and opt. impregnated with Co, Fe, Mn, Ni, Ru, Rh, Pd. Zn, Cr and/or Cu.

The synthesis gas pret. has an H_2/Co molar ratio of 5:1 to 1:5. The reaction is pref. effected at 200-400 (esp. 200-300)°C and 10-300 bars with a contact time of up to 30 (esp. 0.01-5) sec.

EXAMPLE

A catalyst was prepd. by dissolving 0.85g $NaNO_3$ in an aq. tetrapropylammonium hydroxide soln., adding 2.9g $Co(NO_3)_2.6H_2O$, mixing with 21.8g Ludox silica sol (40% SiO_2), standing for 2 hr., autoclaving at 150°C for 24 hr. and at 170°C for 60 hr., washing, drying crushing, and reducing in H_2 at 450°C for 6 hrs.

When contacted with synthesis gas (H_2/CO = 2) at 276°C and 50 bars (GHSV = 48,000), the catalyst gave 13% CO conversion with 61% selectivity for CH_4, 7% for C_2H_6, 11% for MeOH and 8% for EtOH.(14pp367).

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