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Converting synthesis gas to diesel fuel range linear paraffin(s) - with finely divided supported cobalt-contg. catalyst suspended in liq. medium, giving increased carbon mon:oxide reaction rate

C86-035074

E(10-J2D) H(4-E5, 4-F2E) N(2-B, 2-E, 3-A)

Conversion of synthesis gas comprising essentially CO and $H_2$ to a prod. rich in straight-chain paraffins in the diesel fuel boiling range comprises contacting it under conversion conditions with a catalyst comprising Co on a support dispersed in a fluid medium, the catalyst having average particle dia. about 10-110 μ and having been prepd. by impregnating the support with a non-aq. organic soln. of a Co salt.

ADVANTAGE

The smaller catalyst particles here used give higher rate of synthesis gas conversion and lower $CH_4$ yield than larger particles of the same catalyst: e.g. the CO conversion rate is up to 65% higher and $CH_4$ prodn. 50-66% lower than from a commercial fixed-bed Co catalyst. Impregnation with organic Co solns. gives more active catalysts than pptn. from aq. CO solns.

PREFERRED CATALYST

The support may be gamma-$Al_2O_3$ or $SiO_2$, and pref. has low acidity (Bronsted activity with $H_0 = 1.5$). The catalyst may also contain 5-25 wt.% Co and as promoter, 0.01-0.5 wt.% Ru, and pref. $La_2O_3$ also: its average particle dia. is pref. 10-80 (esp. 25-50) μ.

CATALYST PREPARATION

The support may be calcined at 450-750°C in air and impregnated by the incipient wetness technique with a soln. contg. e.g. $Co_2(CO)$ or $Co(NO_3)_2$ and Ru acetylacetonate and $La(NO_3)_3$ in an organic solvent, pref. acetone. The catalyst can be dried and calcined, pref. at 250-300°C and activated by a sequence of redn. oxidn. and redn.

PROCESS

The catalyst may be suspended in a gas or more pref. at a concn. of 2-40 (esp. 7-15) wt.% of total slurry in a liq. medium comprising e.g. a mineral oil, a synthetic olefin oligomer or esp. a liq. prod. fraction from the process of b.pt. 350-550°C. The CO and $H_2$ should be

passed in at fluidizing velocity (2-40 cm/sec) and pref. at 185-260°C and 10-30 atmospheres. CO may be converted at at least 500 (pref. 700-1250 or more) cc/g catalyst x hr. whereas the practical max. from a fixed bed reactor is about 250 cc CO/g catalyst x hr. The $CH_4$ yield is pref. less than 16 wt.% whereas the fixed bed process gives e.g. 27 wt.% $CH_4$. The 5C+ yield is e.g. 70-85 wt.%. (31pp1492RKMHDwgNo0/1).