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Lower olefin(s) prepn. by reaction of synthesis gas - over iron catalysts, yield is increased by addn. of lower alcohol(s)

D/S: E(FR GB NL)

In the prodn. of lower (esp. 2-4C) olefins by the reaction of carbon oxides with H₂ at 220-500°C and up to 30 bars in the presence of known (esp. Fe- and/or Co-based) catalysts, the improvement comprises effecting the reaction in the presence of low-molecular (esp. 1-3C) alcohols.

ADVANTAGES

The yield of lower olefins is increased synergistically. E.g., with added methanol, the yield of 2-4C olefins can be increased from 40.7 to 76.8 g/N cu.m.

DETAILS

The catalyst, usually as a solid bed, comprises (a) Fe and/or Co; (b) activators, e.g. oxides of Gp. IIa and/or IIb metals in amts. of 2-20 wt. % or Na₂CO₃ or K₂CO₃; and (c) selectivity-improvers for olefin prodn., e.g. difficultly-reducible oxides of V and/or Mn, or Ti or Th, in amts. of 5-50 wt. %. The CO:H₂ volumetric ratio in the synthesis gas is

A(1-D13) E(10-J2C3) H(4-E5) J(4-E1) N(2, 3)

70

normally 1:1. The synthesis gas:alcohol (vapour) volume ratio is pref. 1-4:1.

EXAMPLE

A laboratory reactor, of 2 cm. i.d., was packed with a mixt. of 50 ml. catalyst and 250 ml. silicon carbide. The catalyst comprised (pts. wt.): Fe in the form of Fe₂O₃, 100; V in the form of V₂O₅, 80; ZnO, 30; and K₂O, 4. The temp. was 335°C, and the pressure was 10 bar.

In three experiments, the flow rates (v/vh) were: (i) CO+H₂ 1005; (ii) CO+H₂ 944 and MeOH vapour 562; (iii) MeOH vapour 591 and N₂ 980. The 2-4C olefin yields (g/N cu.m.) were: (i) 40.7; (ii) 76.8; (iii) -. (15pp1492)
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