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Fisher-tropsch catalyst - contg. cobalt or iron on carbon support, giving greater activity

C86-034962 E(BE DE FR GB IT NL) N(AU JP NO US)

Full Patentees: British Petroleum Co Plc; Foster A I (for US only)

A Fischer-Tropsch catalyst comprises Co or Fe supported on C with a BET surface area at least 100 square m/g, ratio of BET:basal plane surface area not greater than 4:1, and ratio of basal plane surface area:edge surface area of at least 10:1.

USE

Prodn. of hydrocarbons by contacting a mixt. of CO and H_2 with the catalyst, at 150-300 deg. C and 0.1-5 MPa; the molar ratio of H_2:CO is 3-1:1 (claimed). Partic., the hydrocarbons are liq. at normal temp. and pressure.

ADVANTAGE

Activity is greater than for Fischer-Tropsch catalysts on an oxide support.

E(10-J2D) H(4-E5, 4-F2E) J(4-E4) N(2-A, 2-B)

PREFERRED CATALYST

C has BET surface area at least 200 square m/g, a ratio of basal plane surface area: edge surface area at least 100:1, and ratio of BET:basal plane surface area not greater than 2.5:1 (not greater than 1.5:1). The amt. of Co of Fe is 5-100%, w.r.t. C.

The catalyst may also contain Pt, esp. 0.2-10 wt. %, w.r.t. total catalyst.

EXAMPLE

(I) "Katepon" BKIV (RTM : activated C) was heated from room temp. to 1700 deg. C in a stream of He during 1 h, and cooled in the He stream to 25 deg. C. The C was then heated in air in a muffle furnace at 520 deg. C, to give 30 % wt. loss, followed by heating in He to 1800-1850 deg. C as before, and cooling to room temp. in He.

The properties were: BET surface area, 710-749 square m/g; basal plane surface area 416-666 square m/g; edge surface area 3.6-3.8 square m/g. The support was ground and sieved to 0.5-1 mm, and washed in dil. HCl and then water, followed by impregnation in an aq. soln. of $Co(NO_3)_2$, to give 16.7 wt. % Co on the catalyst. Impregnation was

at 50-80 deg. C and 200-800 mbar, and the impregnated C was dried overnight at 120 deg. C and 200-300 mbar. Before use, the catalyst was reduced for 2-8 h in a stream of H_2 at 400-450 deg. C and 8 bar.

(II) For comparison, a conventional Fischer-Tropsch catalyst contg. 22.7 wt. % Co, 1.2% MgO and 2.16% ZrO_2 on a SiO_2 support, was prepd. and reduced.

(III) Syngas, H_2:CO ratio 2:1, was passed at GHSV 500/h, 6 bar guage and 222 deg. C. Results were: CO conversion, (I) 59% (II) 60%; selectively to organic prods., (I) 93%, (II) 88%; selectivity to CO, (I) 7%, (II) 12%; alpha factor (for 3-10C prods.), (I) 0.63, (II) 0.87.(18pp510RHDwgNo0/0).

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