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EXXON RES & ENG CO

E17 H04

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E(10-J2C3, 10-J2D) H(4-E5, 4-F2E) N(2-E, 3-B, 3 E)

20.05.85-US-734783 (+ US-626024) (28.01.86) C07c-01/04

Adding rhenium to fischer-tropsch catalyst of ruthenium on titania - reduces deactivation rate while maintaining high selectivity to straight-chain middle-distillate hydrocarbon(s)

and 6.01-8 (esp. 0.1-4) wt. % Re.

CATALYST PREPARATION

The catalyst is prepd. from a piled, pelleted, beaded, extruded or sieved TiO_2 support impregnated with Ru and Re salts from soln., together or sequentially, and the prod. then dried at 65-150 deg. C, and reduced (e.g. by H_2 and opt. CO) at 150-565 deg. C and 100-4000 kPa for 0.5-24 hrs.

PROCESS

The H_2/CO mixt. is pref. contacted with the catalyst at a mole ratio of 0.1-10:1 (esp. 0.5-4:1), GHSV 100-20,000 (esp. 300-2,000), temp. 150-500 (esp. 180-300 deg. C), and pressure 100-100,000 (esp. 100-3,100) kPa. The prod. generally contains 60% (pref. at least 75%) C_{10}^+ liq. hydrocarbons.

EXAMPLE

H_2 and CO (2:1) were reacted at 280 psig, 230 deg. C and GHSV 1000 over catalysts (A) (following the invention), comprising 1% Ru/0.5% Re/ TiO_2 ; and (B) (comparative), comprising 1% Ru/ TiO_2 . Initially the total CO conversion was (A) 97%, (B) 97%; and CO conversion to hydrocarbons was (A) 90%, (B) 94%. The half-life of the conversion to hydrocarbons was (A) 231 days, (B) 26 days. (5pp1492R11DwgNo 0/0)

Process for hydrocarbon synthesis from a mixt. of CO and H_2 comprises contacting it with a catalyst comprising (i) Ru (1 proportion by wt.) composited with (ii) a TiO_2 or TiO_2 -contg. support, having a rutile:anatase ratio of at least about 2:3, and (iii) Re (0.25-2 proportions by wt.) in amt. sufficient to improve the maintenance of catalytic activity.

USE/ADVANTAGE

High quality middle distillate fuels are produced, consisting of mixts. of linear paraffins and olefins. The known good performance of Ru/ TiO_2 catalysts, including high acivity and low CH_4 and CO_2 selectivities (see US4042614), is maintained, but the rate of activity loss is reduced.

PREFERRED CATALYST

The rutile:anatase ratio of the support is about 2:3 to 100:1; and the catalyst contains 0.01-8 (esp. 0.2-4) wt. % Ru