87-101168/14 E18 H04 UNIC 01.11.83
UNION CARBIDE CORP *US 4652-538-A
26.09.85-US-780259 (+ US-547668) (24.03.87) B01j-29/10

Fischer-Tropsch coialyst comprising pref. iron or cobalt in pores - of steam-stabilised hydrophobic zeolite y provides prod. spectrum suitable for motor fuels and improves stability

C87-042084

E(10-J2B3, 10-J2D3) H(4-E5, 4-F2E) N(6-E)

Catalyst compsn. for enhanced syngas conversion to 5C+ hydrocarbon mixts. of enhanced suitability as liq. motor fuels comprises:

(a) a Fischer-Tropsch catalyst component; and

(b) a cocatalyst/support component, comprising a steam-stabilized hydrophobic zeolite Y catalyst.

The compsn. shows enhanced stability in the desired conversion, and gives relatively minor amts. of heavy prods. boiling beyond the diesel range.

USE/ADVANTAGE

Fuels in the gasoline, jet fuel and diesel fuel ranges may be produced. The amt. of CH_4 also is kept small. The amt. of branched mols. and aromatics in the 10-22C prod. fraction can be increased in some cases. The pref. catalyst (Co/UPH-Y zeolite) typically has lower initial activity than the prior art catalyst, Co/LZ-Y82, but, because of its slower deactivation, is the more active from e.g. 1 week onwards.

PREFERRED CATALYST

The zeolite has SiO_2/Al_2O_3 ratio of 4.5 or more (esp. 4.5-20); a unit cell dimension a_o of less than 24.45 A. (esp. 24.20-24.45); and H_2O vapour sorptive capacity at 25 deg.C and p/p_o=0.10 of less than 10.0 (esp. less than 4.0) wt. %. The zeolite pref. comprises zeolite Y in Al-extracted form, with Al content below 3 (esp. below 1) wt. %. It has the essential X-ray powder diffraction pattern of zeolite Y. The Fischer-Tropsch component is pref. Fe or Co, and positioned within the zeolite's pores.

CATALYST PREPARATION

The pref. zeolite is prepd. by extensive steaming of low-Na zeolite Y, e.g. following BE 874,373. The Fischer Tropsch component may be mounted in its pores by loading as a liq., esp. a carbonyl; by metal salt impregnation; by metal organic impregnation; or by ion exchange.

US4652538-A+

EXAMPLE

A catalyst of the invention comprised 15 wt. % Co, pptd. on UPH-Y zeolite. It was used to convert a syngas contg. equimolar CO and H_2 at 300 psig and 219 deg. C, with a flow rate of 400 cc/min per 31.4 g catalyst. CO conversion after 70 h. was 16.4 % on CO, and prod. selectivity (wt. %) comprised: CH_4, 7.3; 2-4C, 4.9; 5C-420 deg. F, 40.6; 420-700 deg. F, 39.9; 700 deg. F-endpoint 7.3.(12pp1492RKMH DwgNo0/0).

US4652538-A

85-111961/19 H04 (H06) UNIC 01.11.83
UNION CARBIDE CORP *EP -140-365-A
01.11.83-US-547668 (08.05.85) B01j-29/14 C07c-01/04

Conversion of synthesis gas - over Fischer-Tropsch catalyst with steam-stabilised zeolite-Y, gives high gasoline and diesel oil yield

C85-048388 D/S:AT BE DE FR GB IT LU NL SE

Synthesis gas is converted to liq. fuels by contacting with a catalyst comprising (i) a Fischer-Tropsch catalyst (pref. Fe or Co) and (ii), as cocatalyst and support, a steam-stabilised hydrophobic zeolite Y; the resulting hydrocarbon prod. having more than 10% of its C_5+ material in the 10-22C range, and relatively minor amts. of prods. of b.pt. above the diesel range.

The catalyst also is claimed.

USE/ADVANTAGE

The process is useful for prodn. of gasoline and diesel oil.

The prod. spectrum, with relatively small concns. of methane and of prods. boiling above diesel oil is favourable for motor fuel use. Catalyst stability is high, e.g. over a test run of 167 hr. Branched isomers of 4-6C hydrocarbons can be favoured.

H(4-D, 4-E5, 4-F2) N(6-A)

CATALYST

In the catalyst, component (ii) pref. has a SiO_2/Al_2O_3 molar ratio of 4.5 or above (esp. 4.5-9.0); the X-ray powder pattern of zeolite-Y; a unit cell dimension, a_0, of less than 24.45 A.U. (esp. 24.20-24.45 A.U.); and a sorptive capacity of water vapour of less than 10.0 (esp. less than 4.0) wt.% at 25°C and p/p_o of 0.10. The Fischer-Tropsch component is pref. positioned within the zeolite's pores.

CATALYST PREPARATION

Catalyst component (ii) can be prepd. by extensive steaming of the low-Na forms of zeolite-Y, following BE874373. Desirably, the zeolite (UHP-Y) thus obtd. is then acid-extracted, and the Al_2O_3 content thus reduced to less than 3 (esp. less than 1) wt.%.

REACTION CONDITIONS

The pressure is pref. 0-1000 (esp. 0-350)psig. With an Fe-contg. catalyst, the temp. is pref. 150-450°C; and with a Co-contg. catalyst, it is pref. 100-400 (esp. 240-320)°C.

EXAMPLE

A catalyst of the invention comprised UHP-Y zeolite contg

30% Fe. The syngas comprised (mole %): 60 H_2, 30 CO, and 10 Ar; and it was converted at GHSV 400 and pressure 300 psig. After 169 hr on stream, at 279°C, there was 37.03% conversion of CO and 30.89% of H_2, giving prod. selectivities (wt.%) of: 22.99 CH_4; 46.41 C_2-C_4; 28.77 C_5-420°C F; 1.63 420-700°F; and 0.20 700°F-end point. (54pp1492MHDwgNo0/0)
(E)ISR:GB2099716 US4139550

EP-140365-A