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Fischer-tropsch catalysts for hydrocarbon synthesis - comprising alloys of Gp = VIb, Gp = VIIb and/or Gp = VIII metals

C92-007730 R(AT BE CH DE DK ES FR GB GR IT LI LU NL SE)

Fischer-Tropsch catalysts comprise an alloy of at least two Group VIb, VIIb and/or VIII metals, provided that

(a) the alloy has a negative heat of formation w.r.t. the individual metals, and

(b) 1-20 mole % of total metal and at least 50 mole % of surface metal in the alloy is converted to carbide after contact with synthesis gas ($H_2/CO=2$) at 250°C and 1 bar for 3 hr.

ADVANTAGES

The catalysts have high initial activity and good activity stability for hydrocarbon synthesis.

SPECIFICALLY CLAIMED

The metals are Ni and Fe, with a Ni:Fe molar ratio of 45:55 to 70:30. The catalysts also include an alumina support.

H(4-E5, 4-F2E) J(4-E4) N(2-A1, 2-C1)
E(10-J2D)

The negative heat of formation is 0.1-10 (0.4-5) KJ/mole. The alloy upon contacting with synthesis gas forms a total amt. of carbide of 5-15 mole % and 60-90 mole % surface carbide.

EXAMPLE

2.29g of $K_3Fe(CN)_6$ was dissolved in 100 ml water and slowly injected into a soln. of 3.36g of $Ni(NO_3)_2 \cdot 6H_2O$ in 1 l. water in which 4.00g of Al_2O_3 (Degussa Al oxide C) had been suspended. The resulting pptc was filtered, washed and vacuum dried. The product was pelletised, crushed to obtn. Ni_2/Fe complex cyanide. Oxidation was then carried out at 305°C.

The obtd. catalyst was reduced with hydrogen under 0.1 MPa pressure while heating from 100 to 450°C over 64 hr. and ratio of reduction gas:argon/hydrogen of 9:1.

Synthesis gas was converted to hydrocarbons using the catalyst at 0.1 MPa, 250°C, H_2/CO ratio of 2 and GHSV of 60 NL/l/min. The catalyst showed high initial activity and good steady state activity. (9pp367RHIDwgNo0/0).

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