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SUD-CHEMIE AG

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Olefin esp. ethylene and propylene prepn. - by catalytically preparing alcohol mixt. from synthesis gas, removing methanol, dehydration and sepn.

Olefin-, esp.  $C_2H_4$  and  $C_3H_6$ , prepn. by aliphatic alcohol dehydration, comprises (a) preparing an alcohol mixt., contg. MeOH and higher aliphatic alcohols, from CO- and  $H_2$ -contg. gases, e.g. synthesis gas, using a Cu-, Zn-, and opt. Al oxide- and/or K oxide contg. catalyst promoted with Cr, Ce, La, Mn and/or Th, (b) separating MeOH from this alcohol mixt., (c) dehydrating catalytically the higher aliphatic alcohols, esp. EtOH and the propanols, to the corresponding olefins and (d) opt. fractionating the olefin mixt.

ADVANTAGE

In (a), 2-3C alcohol formation is controlled by catalyst promotion and conditions. In (c) conversions reach 91 mol % with 98% selectivity.

DETAILS

Pref. in step (a), a synthesis gas, contg., by vol., 25-30 (27)%  $CO$ , 0-15%  $N_2$ , 0-4%  $CO_2$ , 0-7%  $CH_4$ , balance  $H_2$ , is

converted catalytically to the alcohol mixt., at 250-400 (350) deg. C, under pressure 80-150 (100) bar, at space velocity 500-5000 (1500) l.gas/hr.l. catalyst. Synthesis gas conversion in (a) pref. takes place in tubular reactors externally cooled by flowing coolant or in infinite body reactors with cold gas cooling. Both reactor systems are opt. operated in a closed cycle.

In step (b), the alcohol mixt. from (a) is separated into (1) low-boiling by-prods. and MeOH and (2) higher alcohols and water, by using one or more distn. columns.

In (c), the dehydration catalyst is esp. an alkalis Al oxide or Ca phosphate. Dehydration takes place at 0.5-1 (0.75) bar, 350-500 (400-450) deg. C, at space velocity 1-7 (2-4) l. alcohol mixt./hr. l. catalyst. The catalyst is prepd. by impregnating Al oxide or Ca phosphate with aq. solns. of alkali hydroxides, (prefd.), e.g. LiOH (prefd.), KOH or NaOH, or of alkali carbonates. Alkali metal concn. can be 0.1-1.5 (0.3-0.8) wt. %.

In (d), the reaction mixt. from (c) is first cooled down to 10 deg. C and separated into liq. and gaseous prods. The gaseous components, freed from water, are further separated by low temp. distn. and the liq. components by distn. or extractive distn. (20pp200).

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