3, bp 70°C (8 mm), n_D^{20} 1.4471; 83% yield. IR spectrum (ν, cm^{-1}): 1160 (S=O). PMR spectrum (CCl_4, HMDS; δ, ppm): 1.08 t (6H, CH_3), 3.08 split q (4H, CH_2N), 3.33 s (3H, CH_3O). Mass spectrum (EI, 70 eV), m/z (I_{rel}, %): 151 $[M]^+$ (46), 136 $[M-Me]^+$ (47), 120 $[M-OMe]^+$ (100), 92 $[M-OMe-C_2H_4]^+$ (63), 79 $[M-72]^+$ (78), 72 $[EtNH=CHCH_3]^+$ (52), 64 $[SO_2]$ (68), 58 $[EtNH=CH_2]^+$ (18).

4, bp 84-85°C (8 mm), n_D^{20} 1.4430; 56% yield. IR spectrum (ν, cm^{-1}): 1160 (S=O). PMR spectrum (δ, ppm): 1.08 t (6H, CH_3), 1.31 s [9H, $(CH_3)_3C$], 2.98 q (4H, CH_2N). Mass spectrum (EI, 70 eV), m/z (I_{rel}, %): 193 $[M]^+$ (3), 137 $[M-i\text{-}C_4H_8]^+$ (6), 136 $[M-t\text{-}Bu]^+$ (1), 120 $[M-OBu\text{-}t]^+$ (67), 92 $[M-OBu\text{-}t-C_2H_4]^+$ (16), 73 $[M-i\text{-}C_4H_8-64]^+$ (37), 72 $[EtNH=CHCH_3]^+$ (14), 64 $[SO_2]^+$ (32), 58 $[EtNH=CH_2]^+$ (100).

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DEHYDROGENATION OF ISOBUTANE WITH CARBON DIOXIDE ON MANGANESE-CONTAINING CATALYSTS

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We previously reported [1, 2] the possibility of using CO_2 as an oxidant in heterogeneous catalytic processes.

The possibility of selective dehydrogenation of isobutane by a nontraditional oxidant, carbon dioxide, was demonstrated and the results of conversion of isobutane in the presence of CO_2 on manganese-containing catalysts are reported in the present article.

It was shown that dehydrogenation of isobutane on manganese catalysts modified with variable-valence metal oxides by carbon dioxide, in contrast to its conversion on an aluminoplatinum catalyst [3], takes place without accumulation of coke and with stable activity and selectivity. The following reactions take place at 750°C and 3600 h^{-1}: dehydrogenation into isobutylene, selective decomposition into propylene, accompanied by reduction of CO_2 to CO as a result of partial binding of the carbon dioxide oxygen by hydrogen with rupture of the C−H bond in isobutane. The yield of isobutylene (for the isobutane used) is 35% for 65% conversion of isobutane.

Isobutylene is formed according to a redox scheme, and the side reaction of decomposition of isobutane into propylene is the result of thermal cleavage of the C−C bond.

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