

A NOVEL SYNTHESIS OF PROPIONITRILE FROM ACETONITRILE,
CARBON MONOXIDE, AND HYDROGEN

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Reaction of alcohols with synthesis gas results in homologation. For example, methanol affords ethanol under severe conditions in the presence of noble metal catalysts of group VIII [1].

We have now carried out the homologation of acetonitrile with a mixture of carbon monoxide and hydrogen to give propionitrile.

In the presence of 10% M/Al₂O₃ catalysts (M = Co, Cr), previously reduced with hydrogen at 400°C, flow rate 100 h⁻¹, 350-450°C, 760 torr, propionitrile was formed from a mixture of 71.0 CO; 30.5 H₂; 8.5 vol. % CH₃CN. Methane and carbon dioxide were formed in addition to the required product (conversion of CO 5-9%). The catalysts were prepared from the appropriate salts (NH₄)₂MO₄.

In the absence of CO, with a gas mixture of composition 91.5 H₂ and 8.5 vol. % CH₃CN, no propionitrile was formed.

The composition of the reaction products was established by GLC. The presence of propionitrile was further confirmed by GC-MS.

The yield of propionitrile calculated on acetonitrile reacted was 12.5% (400°C) for the Mo catalyst, and 18.3% (425°C) for the Cr catalyst, conversion of acetonitrile being 46 and 40%, respectively.

LITERATURE CITED

1. I. Wender, Catal. Rev.-Sci. Eng., 14, 97 (1976).