CYANOETHYLATION OF TRIMETHYLAMMONIUM CHLORIDE

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It is known that ammonia and primary and secondary amines undergo cyanoethylation. We have found that in ethanolic solution trimethylammonium chloride (I) adds to acrylonitrile (II) at ∿20°C forming after some hours methyl-β-cyanomethylammonium chloride with a yield of 64%, mp 225-230°C (from ethanol, decomp.); see [1]. Found: C 48.55; H 8.61; Cl 23.84; N 18.86%. $C_6H_{13}ClN_2$. Calculated: C 48.48; H 8.76; Cl 23.9; N 18.85%.

$$Me_3\overset{+}{N}HCl^- + CH_2{=}CHCN \xrightarrow[\text{ethanol}]{\text{initiator}} Me_3\overset{+}{N}CH_2CH_2CN\,Cl^-$$

The reaction takes place only in the presence of small amounts (∿0.02 mole) of an initiator — alkali, Me_3N, Et_3N, and has a chain nature. Without an initiator an ethanolic solution of (I) and (II) remains unchanged indefinitely (not less than a week). This is the first known case of the cyanoethylation of a tertiary ammonium salt.

Triethylammonium chloride is not cyanoethylated under these conditions even if the solution is boiled.

LITERATURE CITED

1. D. B. Luten, J. Org. Chem., 3, No. 6, 588 (1938-9).

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