## ELECTROCHEMICAL OXIDATION OF 2-METHYL-5-ETHYLPYRIDINE

L. D. Borkhi

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2,5-Pyridinedicarboxylic (isocinchomeronic) acid was obtained by electrochemical oxidation of 2-methyl-5-ethylpyridine on a lead anode in sulfuric acid.

2-Methyl-5-ethylpyridine has recently assumed great significance as a raw material for the production of nicotinic acid. Isocinchomeronic acid, which is readily decarboxylated to nicotinic acid, is formed by oxidation of 2-methyl-5-ethylpyridine. In addition, isocinchomeronic acidhas independent importance for the manufacture of synthetic fibers and for a number of other purposes. The chemical methods described in the literature for oxidation of 2-methyl-5-ethylpyridine have a number of disadvantages: they are associated with the application of either costly oxidants, for example, potassium permanganate [1], or concentrated acids which require elevated pressures and temperatures (200-300°C) [2-4] and the use of poisonous catalysts (particularly selenium, and others) [5]. Vapor-phase oxidation with air oxygen [6-9] also requires high temperatures and pressures.

In this communication the electrochemical oxidation of 2-methyl-5-ethylpyridine to 2,5-pyridinedicarboxylic acid [10] is described:

$$CH_3 = \bigcup_{N=0}^{\infty} C_2H_5 + 9[0] \xrightarrow{18f'} HOOC = \bigcup_{N=0}^{\infty} COOH + CO_2 + 3H_2O$$

## EXPERIMENTAL

The electrochemical oxidation of 2-methyl-5-ethylpyridine was carried out in a cylindrical electrolyzer with a ceramic diaphragm. The anode was perforated lead previously coated with a layer of lead dioxide by anode treatment in 20% sulfuric acid; the cathode was also lead. The working volume of the anolyte was 100 ml. The composition of the anolyte was as follows: 9.38 g (0.077 mole) of 2-methyl-5ethylpyridine, 90 ml of 40%  $H_2SO_4$ , and 0.1 g of  $V_2O_5$ ; the catholyte was 60% sulfuric acid. The electrolysis conditions were as follows: anolyte temperature 75 ± 2°, anode current density 5 A/dm<sup>2</sup>, electricity passed 125-150% of the theoretical. The theoretical amount of electricity is 18 F/ mole (according to the above scheme).

The anolyte obtained after electrolysis was neutralized with 25% ammonium hydroxide to pH 1.5-2.0 and cooled to 0°. The precipitated crystals of isocinchomeronic acid were removed by filtration, washed with ice water, and dried to give 4-4.5 g of isocinchomeronic acid. For complete extraction of the latter, 45 ml of 15% copper sulfate was added to the filtrate, after which another 2.2-2.0 g of the copper salt of isocinchomeronic acid was isolated; decomposition of this with alkali by the method in [3, 7, 11] gave another 1.35-1.5 g of isocinchomeronic acid. The total yield of isocinchomeronic acid was 5.5-5.85 g containing 96-98% of pure substance, which corresponds to a yield of 42-45%, based on the starting 2-methyl-5-ethylpyridine, and a current yield of 28-30%.

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