distillation of the crude pyrolysis product. Styrene was also formed in the pyrolysis of phenyl acetoxypropionate. It was collected with the acetic acid fraction in the distillation and was isolated by adding salt water to the acetic acid fraction.

Further data on the pyrolysis of phenyl and *o*-tolyl acetoxypropionate are given in Tables I and II.

Properties of Phenyl Acrylate and *o*-Tolyl Acrylate.—Phenyl acrylate[7] as obtained by the pyrolysis of phenyl α-acetoxypropionate was a virtually colorless liquid that boiled at 63 to 64° at 1- to 2-mm. pressure and 87 to 94° at approximately 12 mm.; $n^{20}D$ 1.5210; d^{20}_4 1.0762. *Anal.* Calcd. for $C_9H_8O_2$: C, 72.97; H, 5.44; M_R, 41.35. Found: C, 72.77; H, 5.66; M_R, 41.92. Neither the phenyl nor the *o*-tolyl acrylate polymerized readily until it had been washed with dilute alkali.

The *o*-tolyl acrylate was a virtually colorless liquid: b. p. 55 to 57° at 0.5 mm.; 78 to 79° at 3 mm.; $n^{20}D$ 1.5160; d^{20}_4 1.050; M_R (calcd.) 45.96; M_R (obs.) 46.59.

Summary

1. Satisfactory methods have been developed for converting lactic acid into α-acetoxypropionyl chloride, phenyl α-acetoxypropionate and *o*-tolyl α-acetoxypropionate.
2. Pyrolysis of the phenyl and *o*-tolyl esters of acetoxypropionic acid yielded phenyl and *o*-tolyl acrylate, respectively. Styrene also was formed in the pyrolysis of phenyl acetoxypropionate.
3. Relatively hard resins were obtained by polymerizing phenyl and *o*-tolyl acrylate.

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NOTES

Polarographic Behavior of Aniline Oxidation Products

BY DAVID LESTER AND LEON A. GREENBERG

A recent paper by Levitan, Kolthoff, Clark and Tenenberg[1] describes the polarographic behavior of some of the oxidation products of sulfanilamide. For some time we have been interested in the possible use of the polarograph for the analysis of the intermediary products of the metabolism of aniline and therefore investigated the behavior of β-phenylhydroxylamine, *p*-aminophenol, and azoxybenzene at the dropping mercury electrode. Since we concluded at that time that this method of analysis was better replaced by specific and more sensitive colorimetric methods in the case of the first two compounds, our study was not pursued further.

Our study, however, yielded results which appear to be at variance with those published on the hydroxylamino derivative of sulfanilamide. We find that in 0.07 *M* phosphate buffer (*p*H 6.3) β-phenylhydroxylamine does not give a cathodic wave but does give an anodic oxidation wave with an $E^1/_2$ *vs.* the S. C. E. of −0.02 volt. Levitan, Kolthoff, Clark and Tenenberg do not mention an anodic wave but do find a cathodic wave in 0.1 *M* sodium hydroxide. It has been our experience with β-phenylhydroxylamine that in the presence of alkali it is converted quite completely and rapidly to the azoxybenzene derivative, which then exhibits a cathodic wave; it is therefore impossible to polarograph alkaline β-phenylhydroxylamine solutions. It would be noteworthy if hydroxylaminobenzenesulfonamide, through the presence of a sulfonamide group, would not undergo this same transformation. This point is supported by the fact that the half-wave potentials for the hydroxylamino and azoxy derivatives of sulfanilamide are practically identical. It is unfortunate that the electrode reduction of the azoxy compound had to be carried out in 50% methanol, thus making impossible comparisons of the diffusion currents.

With our apparatus (Fisher Scientific Co. Electropode) and capillary an anodic diffusion current of 5.23 μa. per 0.001 *M* solution was found for hydroquinone and *p*-aminophenol with the 0.07 *M* phosphate buffer (*p*H 6.3). Since it is known that two electrons are involved in this reaction, two electrons are probably also involved in the anodic oxidation of β-phenylhydroxylamine, which gives a diffusion current of 5.3 μa. per 0.001 *M* solution. We have found that with the same buffer, but containing 20% ethanol, the diffusion current of azoxybenzene is 7.5 μa. per 0.001 *M* solution, with an $E^1/_2$ *vs.* the S. C. E. of −0.63 volt. Since the addition of alcohol decreases the diffusion current, it is quite likely that four electrons or more may be involved in the reduction: thus $C_6H_5NONC_6H_5 \rightarrow C_6H_5NHNHC_6H_5 + H_2O$, that is, the reduction to hydrazobenzene and water.

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Alkylcyanopyruvic Esters from Aliphatic Nitriles

BY GLENN S. SKINNER, J. H. TAYLOR AND J. L. ERNST

It was reported[1] that mixtures of sodium and potassium are more effective than sodium alone in

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[1] N. I. Levitan, I. M. Kolthoff, W. G. Clark and D. J. Tenenberg, THIS JOURNAL, **65**, 2265 (1943).

[1] Skinner, THIS JOURNAL, **59**, 322 (1937).