m. p. 130–131°. The substance is easily soluble in hot water, alcohol and acetone, less soluble in chloroform, insoluble in cold water, benzene, ether and petroleum ether.

Anal. After drying at 100° *in vacuo* over H_2SO_4, calcd. for $C_{10}H_{13}O_2N$: C, 67.00; H, 7.32; N, 7.82. Found: C, 66.78; H, 7.11; N, 7.72.

ε-(*p*-Aminophenyl)-caproic Acid.—Ten grams of ε-(*p*-nitrophenyl)-caproic acid reduced in the same manner as the nitrophenylbutyric acid yielded 7.5 g. of crude ε-(*p*-nitrophenyl)-caproic acid. It was recrystallized from 80 volumes of boiling water. Long narrow microscopic platelets, m. p. 108–109°. The substance is soluble in hot water, alcohol and acetone, less soluble in chloroform and benzol, insoluble in cold water, ether and petroleum ether.

Anal. After drying at 100° *in vacuo* over H_2SO_4, calcd. for $C_{12}H_{17}O_2N$: C, 69.52; H, 8.27; N, 6.76. Found: C, 69.46; H, 8.36; N, 6.64.

New York, N. Y.

Received December 30, 1933

COMMUNICATIONS TO THE EDITOR

ANOMALOUS FRIEDEL–CRAFTS REACTIONS WITH FURANS

Sir:

The compound formed by interaction of benzene, 2-furoic acid and aluminum chloride is α-naphthoic acid and not 3-phenyl-2,3-dihydro-2-furoic acid [This Journal, **49**, 565 (1927)]. The formation of α-naphthoic acid, probably through an endoxy compound as a consequence of 1,4-addition, may be general with related types. Other catalysts and experimental conditions, with a miscellany of compounds, are being investigated.

In the reaction between 2-furfural, isopropyl chloride and aluminum chloride in carbon disulfide [*ibid.*, **55**, 4197 (1933)], the isopropyl group is introduced into a β-position despite the availability of an α-position. Bromination of the corresponding acid gives a 5-bromo-β-isopropyl-2-furoic acid identical with that obtained by the oxidation of the bromoaldehyde obtained from 5-bromo-2-furfural, isopropyl chloride and aluminum chloride. The same acid is obtained by hydrolysis of the ester resulting by interaction of ethyl 5-bromo-2-furoate, isopropyl chloride and aluminum chloride.

Department of Chemistry
Iowa State College
Ames, Iowa

Henry Gilman
M. McCorkle
N. O. Calloway

Received December 26, 1933

THE MUTAROTATION OF α-*d*-GLUCOSE IN DEUTERIUM WATER

Sir:

In a previous communication [This Journal, **55**, 5056 (1933)] it has been reported that the mutarotation of α-*d*-glucose in 60% heavy water at 18° has a velocity coefficient of 0.00290 as compared to 0.00546 found under identical conditions in ordinary distilled water. With the production of 100% deuterium water (D_2O) in this Laboratory, it became possible to determine the velocity coefficient of the mutarotation of α-*d*-glucose in this medium. A 0.6030-g. sample of pure α-*d*-glucose was dissolved in 3.3210 g. of D_2O of d_4^{20} 1.1055 and the rotation of the solution (d_{20}^{20} 1.175) was read at certain intervals of time in a 2-dm. semi-micro tube with sodium light at 20°. The first reading (α_0 38.50°) was taken seven minutes after the addition of D_2O. The results obtained are shown in Table I.

Table I

Time, minutes	α	$k_1 + k_2 = \frac{1}{t}\log\frac{\alpha_\infty - \alpha_0}{\alpha_\infty - \alpha}$
0	α_0 = 38.50	.....
15	37.05	0.00221
50	34.09	.00221
90	31.29	.00220
120	29.50	.00221
180	26.72	.00220
300	23.06	.00222
697	19.35	.00222
1440	α_∞ = 18.83	Mean 0.00221

The velocity coefficient for α-*d*-glucose in ordinary distilled water is given by Hudson and Dale [This Journal, **39**, 320 (1917)] as $k_1 + k_2 = 0.00635$ at 20°, and as $k_1 + k_2 = 0.00225$ at 10°. A comparison of these values with the mean value for $k_1 + k_2$ in Table I shows that the velocity of the mutarotation of α-*d*-glucose in pure D_2O at 20° is identical with that found in ordinary distilled water at 10°. In this case, therefore, the effect of the deuterium water on the velocity of the mutarotation is equivalent to a drop of 10° in the temperature. The specific rotation of the equilibrium solution in D_2O is $[\alpha]_D^{20}$ 18.83° ×