NOTES

A Note on the Use of Aniline in the Preparation of Amino Acids.—A standard method of isolating certain amino acids is to precipitate them from the alcoholic solutions of their hydrochlorides with pyridine. Cox, *J. Biol. Chem.*, **78**, 475 (1928), used aniline in preparing *d*-arginine monohydrochloride. A consideration of the basic ionization constants of glycine, alanine and aniline indicated that aniline should precipitate these amino acids from their hydrochlorides. Experiment justified this prediction. Glycine can be prepared by the method of Clarke and Taylor, "Organic Syntheses," **4**, 31 (1925), using aniline instead of pyridine. Alanine has been prepared by mixing acetaldehyde (1 mole), aqueous ammonium chloride (2 moles), and sodium cyanide (1 mole), and hydrolyzing by concentrated hydrochloric acid. This solution is then evaporated under reduced pressure to a thick paste, treated with absolute methanol (10 moles), filtered to remove solid chlorides and treated with aniline (1.3 moles). The yield of recrystallized alanine is 50% of the theoretical amount.

α-Amino-*iso*butyric and α-amino-*n*-valeric acids can be easily prepared in a similar manner.

CONTRIBUTION FROM THE
DENTAL SCHOOL
NORTHWESTERN UNIVERSITY
CHICAGO, ILLINOIS

H. C. BENEDICT

RECEIVED JANUARY 28, 1929
PUBLISHED JULY 5, 1929

β,β-Dinaphthyl Sulfide as a By-product in the Preparation of β-Naphthoic Nitrile. Reduction of the Sulfone with Sodium Cyanide.—Colver and Noyes,[1] while working on the synthesis of anthracene from naphthalene, found that the hydrolysis of the crude nitrile of β-naphthoic acid by boiling with a 30% solution of sodium hydroxide "left an unsaponifiable residue which is a reddish colored liquid at the temperature of the hot water-bath, but solidifies to a dirty red solid upon cooling. It is heavier than water, easily soluble in benzene but much more difficultly soluble in alcohol and ether." Other properties of the substance were not ascertained and no further investigation was made by them as to its identity.

Several years ago, during the course of an investigation on the preparation of certain ketones derived from β-naphthoic acid, a considerable amount of this unsaponifiable residue was accumulated and an investigation was undertaken to identify the material. It was distilled with steam, first in a concentrated alkaline solution and then in a concentrated acid solution; the non-volatile residue was separated from the water, dried and then distilled under reduced pressure. The distillate was a

---

[1] Colver and Noyes, THIS JOURNAL, **43**, 901 (1921).

greenish-yellow liquid which on cooling became a light yellow solid. On standing exposed to the air the surface of the material turned red; crystallization from benzene removed the impurity responsible for the red color; a second recrystallization from benzene and washing with petroleum ether gave colorless, glistening, crystalline flakes, m. p. 151°; further recrystallizations from benzene and from ethyl alcohol did not change the melting point.

Anal. Calcd. for $C_{20}H_{14}S$: C, 83.86; H, 4.93; S, 11.2. Found: C, 84.06; H, 4.88; S, 11.7.

The melting point and the analysis indicated that the compound at hand was β,β-dinaphthyl sulfide.[2] Further evidence as to its identity was obtained by the melting point remaining unchanged on mixing with a sample of pure dinaphthyl sulfide prepared by heating the lead salt of β-thionaphthol; when oxidized in acetic acid solution with potassium dichromate and sulfuric acid, β,β-dinaphthyl sulfone, m. p. 177°, was obtained.[3]

These results show that the unsaponifiable portion of crude β-naphthoic nitrile, prepared by the fusion of sodium β-naphthalene sulfonate and sodium cyanide, consists mostly of β,β-dinaphthyl sulfide; this sulfide is probably formed by the reduction of β,β-dinaphthyl sulfone

$$(C_{10}H_7)_2SO_2 + 2NaCN \longrightarrow (C_{10}H_7)_2S + 2NaCNO$$

This sulfone is formed in small quantities when naphthalene is sulfonated at 180°,[4] and is present as an impurity in the sodium naphthalene sulfonate which was used as the starting product for the synthesis of the nitrile.

CONTRIBUTION FROM THE
CHEMICAL LABORATORY OF THE
CASE SCHOOL OF APPLIED SCIENCE
CLEVELAND, OHIO

N. A. LANGE,
H. S. HAUPT

RECEIVED APRIL 5, 1929
PUBLISHED JULY 5, 1929

A New Series of Sulfonephthaleins.—In a recent article under the above title Harden and Drake, THIS JOURNAL, **51**, 562–566 (1929), a number of new compounds suitable for use as indicators for determining hydrogen-ion concentration were announced. Dr. I. M. Kolthoff, of the University of Minnesota, has kindly directed our attention to the fact that one of these compounds, tetrabromophenoltetrabromosulfonephthalein, has distinct advantages over brom phenol blue as an indicator. The new indicator shows a color change from yellow to blue, just as do brom cresol green and brom thymol blue, but without the interfering dichromatism.

[2] Krafft and Schönherr, *Ber.*, **22**, 825 (1899).

[3] Krafft, *ibid.*, **23**, 2366 (1890).

[4] Stenhouse and Groves, *ibid.*, **9**, 682 (1876).

Dr. Kolthoff suggests the use of the new indicator instead of brom phenol blue, and proposes the trade name of "tetrabrom phenol blue."

Contribution from the Laboratories of
Hynson, Westcott and Dunning and the
University of Maryland
Baltimore and College Park, Maryland

Wilton C. Harden
Nathan L. Drake

Received April 10, 1929
Published July 5, 1929

NEW BOOKS

Polar Molecules. By P. Debye, Ph.D., Professor of Physics and Director of the Physical Institute, Leipzig, Germany. The Chemical Catalog Company, Inc., 419 Fourth Avenue, New York, 1929. 172 pp. 33 figs. 15 × 23.5 cm. Price, $3.50.

During the past four years most papers dealing with dielectric constants have contained a reference somewhere in their first two or three pages to the chapter written by Professor Debye for one of the great German physical handbooks. Now one may expect to see this replaced by a reference to the present book, which makes available in English and in convenient form the most authoritative work on the theory of dielectrics. By this the reviewer does not mean to imply that the book is a mere translation or even a revision of the massive chapter which contains the foundation of so much recent dielectric investigation. It is, rather, a new work. The theory of dielectrics founded on the classical mechanics is presented and treated in the light of the recent extensive experimental investigations. The methods of calculating electric moments are considered and the relation of the moment of the molecule to its structure is shown by material taken from the recent literature. A chapter devoted to the constitution of simple polar molecules attacks the problem by means of the potential energy of the structure as calculated by Heisenberg and Hund. The chapter on anomalous dispersion for radio frequencies has the advantage over the earlier treatment that there is now available somewhat more experimental material to which the theory may be applied. Under electrical saturation effects, a problem of great interest to the physical chemist, that of the dielectric constant of ionic solutions, is treated with a reserve that is necessitated by the discordancy of the experimental results. The last four of the ten chapters are given over to recent developments in fundamental theory, as may be gathered from a list of the principal sub-headings: the thermodynamic potential and the quantum states, the dielectric constant and the Stark effect, geometrical optics and classical mechanics, wave optics and wave mechanics, the energy levels of a rotating diatomic molecule, the dielectric constant of polar gases, probabilities of transition, the wave function of polar molecules disturbed by a periodic field, infra-red dispersion of a polar gas.