α-Naphthaflavone as an Indicator in Iodometry

Many workers employ starch-test solution as the indicator of choice in iodometric titrations. The effectiveness of starch solution may depend upon the temperature, the amount of free iodide present, the presence of other salts and acids, the kind of starch used, and the method of preparation of the starch solution. Although the end reaction is usually accompanied by a blue color, or some shade thereof, the color obtained in iodine-starch combinations, depending upon the factors mentioned, may be at times violet or golden-yellow. Unless freshly prepared, starch solutions will decompose because of bacterial action; furthermore, the presence of suitable preservatives (Samuel, W. A. *Chem.-Anal.*, 1948, **37**, 33) results in interference with color reactions in microdeterminations.

In studies on the use of minute quantities (ppm) of free iodine in water disinfection, we found that starch solution was not a suitable reagent and would not reveal the presence of free iodine in very small amounts.

When α-naphthaflavone, xanthones, quinones, and phthaleins are introduced into iodine solutions they usually produce blue-colored addition products. A search of the literature revealed that G. Barger and W. W. Starling (*J. chem. Soc. Trans. London*, 1915, **107**, 411) first noted the production of a blue color with α-naphthaflavone and free iodine. This also was reported by H. Freundlich (*Physikal. chem. Grundlagen der Kolloidchemie.* Leipzig, 1924; English translation, Barger G. *The elements of colloidal chemistry.* New York: E. P. Dutton, 1924. P. 67), M. Hahn and co-workers (Hahn, M,. Schutz, F., and Pavlides, S. *Z. Hyg. Infekttionskr.*, 1929, **109**, 530), and J. F. Reith (*Pharm. Weekblad*, 1929, **66**, 1097).

Reith was the first worker to employ a 0.1% alcoholic solution of α-naphthaflavone as the reagent for titrimetric examinations and for the colorimetric analysis of free iodine solutions.

In our studies investigating the use of free iodine in water, especially in swimming pools, it was necessary to have available a very sensitive reagent or indicator to detect free iodine in amounts of less than 1 ppm. We found that a 0.1% alcoholic solution of α-naphthaflavone was stable and was more sensitive than starch-test solution in revealing minute quantities of free iodine. Concentrations as low as 0.1 ppm were readily detected, whereas starch reagent required at least 10 ppm of free iodine for the production of a sensitive color reaction.

In determinations where the free iodine concentrations were large (from 10 to 100 ppm), the color produced when using the α-naphthaflavone reagent varied from brown and brownish-blue to blue and violet. Quantities of free iodine less than 10 ppm revealed varying degrees of a blue, violet blue, and violet color.

LOUIS GERSHENFELD and BERNARD WITLIN

Department of Bacteriology,
Philadelphia College of Pharmacy and Science

Erratum

In my communication "Toxicity and the Chemical Properties of Ions" in the August 19th issue of *Science*, the ionic field was printed as $p^{\frac{1}{2}}$ (p. 194, second column, third line from bottom). It should be $r^{\frac{1}{2}}$, i.e. the reciprocal of the square of the ionic radius.

WILLIAM SEIFRIZ

University of Pennsylvania

Scientific Book Register

CRAIGIE, E. HORNE. *Bensley's practical anatomy of the rabbit.* (8th ed.) Philadelphia: Blakiston, 1948. Pp. xii + 391. (Illustrated.) $4.25.

DUKE-ELDER, STEWART. *The practice of refraction.* (5th ed.) St. Louis, Mo.: C. V. Mosby, 1949. Pp. xiv + 317. (Illustrated.) $6.25.

FIESER, LOUIS F., and FIESER, MARY. *Natural products related to phenanthrene.* (3rd ed.) New York: Reinhold, 1949. Pp. xii + 704. (Illustrated.) $10.00.

HEWITT, RICHARD M., *et al.* (Eds.) *Collected papers of the Mayo Clinic and the Mayo Foundation.* Philadelphia: W. B. Saunders, 1949. Pp. xii + 918. (Illustrated.) $11.00.

KLEIN, FELIX. *Geometry: elementary mathematics from an advanced standpoint* (Vol. II). (Trans. from 3rd German ed. by E. R. Hedrick and C. A. Noble.) New York: Dover Publ., 1949. Pp. ix + 214. $2.95.

ROBERTSON, B. L. and BLACK, L. J. *Electric circuits and machines.* New York: D. Van Nostrand, 1949. Pp. vii + 434. $5.00.

RUSHBROOKE, G. S. *Introduction to statistical mechanics.* New York: Oxford Univ. Press, 1949. Pp. xiii + 334. $5.50.

SCHNEIDER, WALTER A., and HAM, LLOYD B. *Experimental physics for colleges.* (Rev. ed.) New York: Macmillan, 1949. Pp. xii + 442. (Illustrated.). $3.80.

SIGGIA, SIDNEY. *Quantitative organic analysis via functional groups.* New York: John Wiley; London: Chapman and Hall, 1949. Pp. vii + 152. $3.00.

STAUFFER, ANDREW. (Ed.) *Introductory biology.* New York, Toronto, and London: D. Van Nostrand, 1949. Pp. ix + 722. (Illustrated.) $5.00.

STOUFFER, SAMUEL A., *et al.* *The American soldier: adjustment during army life.* (Vol. 1.) Princeton, New Jersey: Princeton Univ. Press, 1949. Pp. xii + 599. (Illustrated.) $7.50.

WARE, LAWRENCE A. and REED, HENRY R. *Communication circuits.* (3rd ed.) New York: John Wiley, 1949. Pp. x + 403. $5.00.