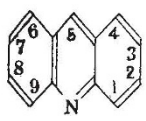
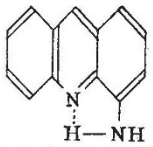
This solution was contained in a beaker fitted with stirrer, glass electrode and KCl-agar bridge connected to a calomel-half-cell, and a Leeds and Northrup universal *p*H potentiometer assembly. Similar results were obtained when water replaced methanol, but, owing to the base being in suspension, some difficulty was experienced in reaching equilibrium within a reasonable time. The acidity constants, calculated from both sets of results, are compared in the table. It will be seen that, with increasing strength of base, there is a progressive increase in bacteriostatic activity. It appears likely that proflavine and 5-aminoacridine are as strong bases as is desirable, since we have observed that a number of more basic diaminoacridines are equal or inferior to these.

Finally, we have attempted to correlate these great variations in basicity of a series of isomerides with their molecular structure. Acridine, the dissociation constant of which has not been previously recorded ($3{\cdot}4 \times 10^{-10}$ at 20° in 67 per cent methanol; 2×10^{-10} in water) is seen to be a base of similar strength to aniline ($5{\cdot}2 \times 10^{-10}$ at 25° in water) and forming a natural series with quinoline ($1{\cdot}1 \times 10^{-9}$ at 25°) and pyridine ($2{\cdot}4 \times 10^{-9}$ at 25°). The increased basic strengths of 3- and 4-aminoacridines compared to acridine appear reasonable for the addition of an amino group, whilst the reduced strength of 1-aminoacridine is attributed to hydrogen bonding:

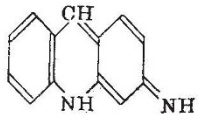


Acridine

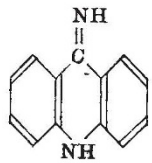


1-Aminoacridine

On account of the remarkably high basicity of the 2- and the 5-aminoacridines, it is preferable to represent these as the tautomeric acridonimines, as follows:



2-Aminoacridine



5-Aminoacridine

and this is consonant with the considerably greater basicity of the imino group compared to the amino group in the guanidine, thiourea, auramine and triphenylmethane series[3]. It is interesting to note that 4-aminopyridine (identical with the middle ring of 5-aminoacridine) is much more basic ($K = 1{\cdot}3 \times 10^{-5}$) than its isomerides[4].

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[1] Albert, A., Francis, A., Garrod, L. P., and Linnell, W. H., *Brit. J. Exper. Path.*, **19**, 41 (1938).
[2] Browning, C., *et al.*, *Proc. Roy. Soc.*, B, **93**, 329 (1922).
[3] Lecher, H., and Graf., F., *Annalen*, **438**, 154 (1924); **445**, 61 (1925). Sidgwick, N. V., "The Organic Chemistry of Nitrogen", pp. 93, 97, 281 and 297 (Oxford, 1937).
[4] Tropsch, H., *Sitzungsberichte der Kais. Akad. Wien*, (2B) **123**, 297 (1914).

ELECTRIC DISCHARGE LAMPS

DR. CLIFFORD C. PATERSON, director of the Research Laboratories of the General Electric Company, Ltd., has written an interesting review of the technical progress made last year in the development of electric discharge lamps (*Electrician*, Jan. 31). Last year he directed attention to the new problems which the 'black-out' has raised so far as general outdoor and shop-lighting are concerned. Except in special instances, these problems offer little scope for discharge lamps. On the other hand, the intensification of the War, while making these outdoor lighting (or darkening) problems more acute, has also created a greater need than ever for high efficiency light sources for our factories and workshops—a need which the existing discharge lamps go a long way to meet.

Mains voltage tubular fluorescent lamps, which follow naturally on the high-voltage fluorescent tubes in use in Great Britain since 1933, were introduced in the United States two years ago, and the demand last year reached several million lamps. The American lamps are made in a range of wattages and colours, particulars of which are given in the following table. The stated efficiencies are high, being 38 L./w. for the 30 w. daylight colour and 45 L./w. for the 30 w. white.

U.S.A. MAINS VOLTAGE, TUBULAR, FLUORESCENT LAMPS

Lamp wattage	Length (in.)	Diameter (in.)	Colours
15	18	1	Daylight, white, blue, green, pink, gold, red.
20	24	1½	
30	36	1	
40	48	1½	Daylight, white.

Dr. Paterson gave a general description of these lamps in his review last year, when their introduction in Great Britain was foreshadowed. Although the main programme on tubular fluorescent lamps has been held up in Great Britain until after the War, a special lamp to meet the requirements of war-time industry was put on the market early last year. This lamp, which is rated at 80 w., is 5 ft. long and 1½ in. in diameter. The quoted average life is 2,000 hours, by which time the efficiency has fallen to about 70 per cent of its initial value of 35 L./w., due to the action of the mercury vapour discharge on the fluorescent coating.

The introduction of the new fluorescent lamp is a step of real importance for the illumination engineer and the public alike. A condenser of about 0·05 mfd. is placed across the lamp to prevent radio interference. The power factor correction condenser has a capacity of about 0·75 mfd. and gives an overall power factor of about 90 per cent. When the supply voltage is

first switched on by closing the mains switch, the starting switch, which is either thermally or magnetically operated, short-circuits the lamp and allows the filamentary electrodes to heat up. The starting switch then opens automatically, inducing a momentary voltage kick across the lamp high enough to start the discharge.

The tube when alight has a creamy white appearance, the brightness being about 0·5 candles per sq. cm. The colour of the light, which is determined by the fluorescent coating, has been chosen very carefully to give an effect approximating to noon sunlight; the colour-rendering properties are excellent—very much better than those of ordinary incandescent filament lamps. It is not possible to obtain satisfactory colour-rendering by the use of a single fluorescent powder, since all the known powders give bands of light with a well-defined maximum in some region of the visible spectrum, but are deficient in light from other regions. To overcome this difficulty the fluorescent coating comprises a number of different powders, selected so that the peaks of their emission bands occur in complementary regions of the visible spectrum. The proportions of the component powders present in the mixture are adjusted to give the required luminosity distribution throughout the spectrum. The increase in light output due to the fluorescent coating is about 800 per cent. This application of fluorescent powders to obtain high-efficiency sources of white light was first developed in Great Britain in connexion with high-voltage tubular lighting.

Experience gained so far indicates that the new fluorescent lamp has applications in many spheres of industry and commerce, such as fine assembly benches, inspection benches, drawing and general offices, and in any situation where high-efficiency illumination approximating to daylight in its general properties is required. A range of trough reflector fittings, suitable either for high-intensity local lighting or for general lighting from greater heights, is available for use with the lamps.

FORTHCOMING EVENTS

Monday, March 17

ROYAL GEOGRAPHICAL SOCIETY (at Kensington Gore, London, S.W.7), at 5 p.m.—Capt. Graham Rowley: "Crossing Baffin Land".

Tuesday, March 18

ROYAL SOCIETY OF ARTS (Dominions and Colonies Section) (at John Adam Street, Adelphi, London, W.C.2), at 1.45 p.m.—Mr. C. W. Hobley: "Wild Life Conservation in its Wider Aspects."

Wednesday, March 19

INSTITUTE OF CHEMISTRY (London and South-Eastern Counties' Section) and the INSTITUTE OF PHYSICS (London and Home Counties' Branch) (Joint Meeting), (at the Royal Institution, Albemarle Street, London, W.1), at 2.30 p.m.—Dr. J. J. Fox: "Infra-Red Absorption and Molecular Structure".

Thursday, March 20

ROYAL SOCIETY (at Burlington House, Piccadilly, London, W.1), at 2.45 p.m.—Mr. G. E. Briggs, F.R.S.: "Photosynthesis in Intermittent Illumination". Mr. E. C. Bullard and Mr. T. F. Gaskell: "Submarine Seismic Investigations."

APPOINTMENTS VACANT

APPLICATIONS are invited for the following appointments on or before the dates mentioned:

PRINCIPAL of the Leeds College of Technology—The Director of Education, Education Department, Calverley Street, Leeds 1 (March 29).

DEMONSTRATOR IN ANATOMY at St. Thomas's Hospital Medical School—The Dean of the Medical School, Manor House, Godalming, Surrey (March 30).

PART-TIME DEMONSTRATOR IN BIOLOGY—The Principal, Technical College, Kingston-upon-Thames, Surrey.

REPORTS AND OTHER PUBLICATIONS

(not included in the monthly Books Supplement)

Great Britain and Ireland

British Empire Cancer Campaign. Seventeenth Annual Report of the Grand Council. Edited by J. P. Lockhart-Mummery. Pp. 280. (London: British Empire Cancer Campaign.) [52

Greece No. 1 (1941). Convention between His Majesty in respect of the United Kingdom and His Majesty the King of the Hellenes respecting the relations of Learning and Culture between Great Britain and Greece, Athens, December 30, 1940. (Cmd. 6250.) Pp. 7. (London: H.M. Stationery Office.) 2*d*. net. [102

University of Leeds: Department of Coal Gas and Fuel Industries, with Metallurgy. Report of the Livesey Professor (D. T. A. Townend) for the Session 1939-40. Pp. 15. (Leeds: The University.) [102

University of Birmingham. Report of the Vice-Chancellor and Principal to the Council for the Fortieth Session, 1939–40. Pp. 38. (Birmingham: The University). [102

Eleventh Annual Report of the National Smoke Abatement Society. Pp. 28. (Woodborough, Nottingham: National Smoke Abatement Society.) [102

University of St. Andrews. Handbook of the United College. Pp. 30+10 plates. (St. Andrews: The University.) [102

Abstracts of Dissertations approved for the Ph.D., M.Sc., and M.Litt. Degrees in the University of Cambridge during the Academical Year 1939–1940. Pp. 118. (Cambridge: Printed at the University Press.) [102

Other Countries

Records of the Geological Survey of India. Vol. 75, Professional Paper No. 6: Did the Indobrahm or Siwalik River Exist? By Dr. M. S. Krishnan and N. K. N. Ayengar. Pp. 24. (Calcutta: Geological Survey of India.) 5 annas; 6*d*. [52

Memoirs of the Geological Survey of India. Vol. 76, Water-Supply Paper No. 1: The Geology and Underground Water-Supply of Calcutta, Bengal; with Special Reference to Tube-Wells. By Dr. A. L. Coulson. Pp. vi+150+ix+4 plates. (Calcutta: Geological Survey of India.) 3·12 rupees; 6*s*. [52

Indian Forest Records (New Series). Utilization, Vol. 2, No. 2: The Formation of Growth Rings in Indian Trees, Part 2: (a) Champ (*Michelia champaca*); (b) Kokko (*Albizzia lebbek*); (c) Toon (*Cedrela toona*). By Dr. K. Ahmad Chowdhury. Pp. iii+41–58+4 plates. 12 annas; 1*s*. Entomology, Vol. 6, No. 5: New Cerambycidæ from India, 2, Coleoptera. By W. S. Fisher. Pp. ii+197-212. 8 annas; 9*d*. Entomology, Vol. 6, No. 6: New Indian Cerambycidæ (Coleoptera). By J. C. M. Gardner. Pp. ii+213–226. 9 annas; 10*d*. (New Delhi: Manager of Publications.) [52

New Zealand: Department of Scientific and Industrial Research. Geological Memoir No. 5: Metamorphism in the Lake Wakatipu Region, Western Otago, New Zealand. By C. Osborne Hutton. Pp. 90 (17 plates). (Wellington: Government Printer.) 6*s*. [52

Annual Report of the Agricultural Meteorology Section, India Meteorological Department, for the Year 1938–39. Pp. vi+48. (Simla: Government of India Press.) [52

Report on the Administration of the Meteorological Department of the Government of India in 1939–40. Pp. iii+35+8 plates. (Delhi: Manager of Publications.) 1·2 rupees; 3*s*. 9*d*. [52

Publications of the Observatory of the University of Michigan. Vol. 8, No. 4: A Method of Measuring Radial Velocities in Solar Prominences. By Robert R. McMath, with the collaboration of H. E. Sawyer, Orren Mohler and J. Brodie. Pp. 57–60+1 plate. (Ann Arbor, Mich.: University of Michigan.) [52

Catalogue of Indian Insects. Part 25: Thysanoptera. By Dr. T. V. Ramakrishna Ayyar and V. Margabandhu. Pp. iv+64. (Delhi: Manager of Publications.) 2·2 rupees; 3*s*. 9*d*. [52

Sudan Government: Department of Agriculture and Forests. Annual Report, Part 2: Being the Report of the Agricultural Research Service for the Year ended 31st December 1938, relating to Experimental Results obtained in the Crop Season 1937–38. Pp. 124. (Wad Medani: Agricultural Research Institute.) [52

Rainfall in Queensland: Tables showing Monthly and Annual Rainfall Totals at 110 Selected Stations covering all available Years of Record up to and including 1939. Pp. 168. (Crohamhurst: Crohamhurst Observatory.) [102

Observatoire de Zi-ka-wei. Annales de l'Observatoire astronomique de Zô-Sè (Chine). Tome 21, Fascicle 5: Tables des planetes 512, 700, 770, 800. Par le P. E. de la Villemarqué. Pp. 30D. (Zi-ka-wei: Observatoire.) [102