by Förster and Kasper¹, they are not sufficiently conclusive to eliminate other interpretations.

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¹ Förster, Th., and Kasper, K., Z. Elektrochem., 59, 977 (1955).

² Schmillen, A., Naturforsch., 16, a, 5 (1961).

Stevens, B., and Hutton, E., Nature, 186, 1045 (1960).
* Parker, C. A., and Hatchard, C. G., Nature, 190, 165 (1961).

⁵ Dorland's Illustrated Medical Dictionary (W. B. Saunders Co., 1960).

⁶ Berlman, I. B., J. Chem. Phys., 33, 1124 (1960).

^{*}Cohen, S. G., and Weinreb, A., Proc. Phys. Soc., B69, 593 (1960).

2,6-Difluoropyridine

As part of a programme involving the investigation of general laboratory methods for the preparation of fluoropyridines1, we wish to report the synthesis of The only other 2,6-difluoropyridine. recorded example of a pyridine containing more than one nuclear fluorine is pentafluoropyridine^{2,3}, which was prepared by methods best suited for the synthesis of perfluoro-aromatic compounds.

The present report describes the synthesis of 2,6-diffuoropyridine from starting materials readily obtainable by standard laboratory procedures. Conversion of methyl 6-fluoropicolinate⁴ (60.0 gm.) to 6-fluoropicolinic hydrazide (51·2 gm.), m.p. 120·5– 121° (found: C, 46·7; H, 4·0; $C_6H_6FN_3O$ requires C, 46.5; H. 3.9 per cent), with hydrazine in methanol, followed by a modified Curtius-type degradation, gave 2-amino-6-fluoropyridine, m.p. 58-59° (found: C, 53.6; H, 4.3; N, 24.9; C₅H₅FN₂ requires C, 53.6; H, 4.5; N, 25.0). As it is known that fluorine atoms adjacent to aromatic ring nitrogens undergo facile hydrolysis in acid solution⁵, it was found advisable to reverse the normal addition procedure of the Curtius degradation. Consequently, addition of N hydrochloric acid to a stirred slurry of sodium nitrite dissolved in water, 6-fluoropicolinic hydrazide (20.0 gm.), and ether gave 6-fluoropicolinic azide. This was decomposed in warm carbon tetrachloride to crude 6-fluoropicolinic isocyanate, which was hydrolysed directly to 2-amino-6-fluoropyridine (7.2 gm.) with 50 per cent aqueous acetic acid. By use of Roe's modification of the Schiemann reaction⁶, 2-amino-6fluoropyridine (10.0 gm.) was converted to 2,6difluoropyridine (2.8 gm.), b.p. 124.5° (743 mm.), n_D^{25} 1.4349 (found: C, 52.2; H, 2.6; N, 12.1; C₅H₃F₂N requires C, 52.2; H, 2.6; N, 12.2).

The infra-red spectrum of 2,6-difluoropyridine in carbon tetrachloride, obtained with a Perkin-Elmer model 21 spectrophometer equipped with sodium chloride optics, showed absorptions at 1,607, 1,592 and 1,493 cm.⁻¹, providing evidence for a pyridine nucleus. Additional absorptions at 3,110 and 717 cm.-1 contribute support for the proposed structure of this compound.

2.6-Difluoropyridine is exceptionally volatile and shows the same solubility characteristics as 2-fluoropyridine. In contrast to pentafluoropyridine, it does exhibit some basic properties in 50 per cent ethanol when titrated against 0.01 N hydrochloric acid. However, no hydrochloride was formed in ethereal hydrogen chloride and no picrate formed in ethanol.

An attempt to prepare 2,3-difluoropyridine from methyl 2-fluoronicotinate (10.0 gm.), b.p. 101° (10 mm.), n_D^{25} 1.4978 (found: C, 54.4; H, 3.9; N, 9.1; C₇H₄FNO₅ requires C, 54.2; H, 3.9; N, 9.0) by a

similar route failed because hydrazine was found to react preferentially with the fluorine rather than the ester moiety giving methyl 2-hydrazinonicotinate (1.3 gm.), m.p. 106-106.5° (found: C, 50.4; H, 5.4; N, 25.4; C, H₉N₃O₂ requires C, 50.3; H, 5.4; N, 25.1). A more detailed report of this and related work will

be published elsewhere.

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¹ Finger, G. C., and Starr, L. D., J. Amer. Chem. Soc., 81, 2674 (1959).

 ² Stacey, P. M., and Tatlow, J. C., Nature, 186, 231 (1960).
³ Stacey, P. M., and Tatlow, J. C., Nature, 186, 231 (1960).
³ Haszeldine, R. N., et al., Proc. Chem. Soc., 211 (1960).
⁴ Roe, A., Cheek, P. H., and Hawkins, G. F., J. Amer. Chem. Soc., 71, 4152 (1949). ⁶ Miller, W. K., Knight, S. B., and Roe, A., J. Amer. Chem. Soc., 72, 4765 (1950).

* Roe, A., and Hawkins, G. F., J. Amer. Chem. Soc., 69, 2443 (1947).

RADIATION CHEMISTRY

Polarization induced by Radiation in 'Perspex'

IF, after irradiation of a thick piece of 'Perspex' with a sufficient number of electrons of a few MeV., the specimen is knocked with a sharp tool, a rather intense 'lightning flash' is seen and a tree-like crack pattern occurs. The foot of the stem is situated at the point which was struck. Sometimes the discharge occurs spontaneously towards any disturbance at the surface of the 'Perspex' block.

As the irradiated sample is thicker than the range of the electrons, it is clear that these electrons are stopped in the 'Perspex', mainly at depths corresponding to the more or less straight sloping part of the absorption curve. The 'Perspex' being a good insulator, negative space charge builds up in the sample, and when the dose of radiation is sufficiently high, a discharge can occur.

Gross¹ has already studied this phenomenon in some detail, but some of his statements do not agree with my observations. However, I wish only to report here on another property of the irradiated specimen.

bombarded several identical polished T have 'Perspex' blocks 13 mm. \times 38 mm. \times 47 mm. with 1.2×10^{14} electrons of 2.5 MeV. The current of the linear accelerator was held at 0.1 µamp. The beam entered the blocks in the middle of one of the largest faces. The blocks were examined with a polariscope with convergent light, the specimen being placed so that one of the largest faces was viewed. Before irradiation, no interference pattern was observed. Immediately after irradiation, an interference pattern could be seen that behaved as if the 'Perspex' block was a uniaxial double refractive crystal, the optical axis coinciding with the direction of the beam. One could observe a circular isochromate and the wellknown dark cross, each line of which corresponds to the direction of the polarizer and analyser. This picture disappeared very quickly at first, but more slowly later on. After an hour, it was scarcely visible and after two hours it had disappeared completely, although it was still possible to create some cracking by knocking the sample. If the specimen was knocked when the interference pattern was still strong, the pattern disappeared nearly completely. From this we may conclude that in the circumstances considered