sulphur distance is 2.31 Å., which is reasonably close to the sum of the octahedral radius for Co(II) and the tetrahedral radius for sulphur, 2.36 Å. The inter-bond angles around the cobalt atom at the present stage of the analysis are shown in diagram II. The configuration is very similar to those derived theoretically, by two different methods, by Kimball⁵ and by Linnett and Mellish.

The process of refining the structure so as to establish the positions of the lighter atoms is now nearing completion, and full details of the methods used and of the final results will be submitted for publication elsewhere. It is already clear that the nitric oxide group is not perpendicular to the basal plane of sulphur atoms, with the cobalt, nitrogen and oxygen atoms collinear (III), as has hitherto been supposed by analogy with carbonyl complexes⁶; nor is it parallel to the basal plane (IV), as in the π -type complexes, for example, of ethylene⁷. It lies between these two orientations, being inclined at an angle of approximately 135° to the vertical axis of the pyramid, and appears to be bound either by forming an electron-pair bond (V), or by the donation of π -electrons to the metal atom, the atoms being arranged unsymmetrically because of the difference between their electronegativities (IV). The existence of unsymmetrical π -complexes has already been shown by Holden and Baenziger's work on styrene palladium chloride⁸, and we are indebted to Dr. L. E. Orgel for confirming that this type of bond can be justified on theoretical grounds in nitric oxide complexes. The arrangements in diagrams V and VI would both result in diamagnetism, but the angle Co—N—O of 135° is rather larger than would be expected for structure V. Structure VI fits our results better, but at the present stage of the analysis it is not possible to distinguish between V and VI with certainty.

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¹ Daudel, R., and Bucher, A., *J. Chim. Phys.*, **42**, 6 (1945).

² Mellish, C. E., and Linnett, J. W., *Trans. Farad. Soc.*, **50**, 657 (1954); **51**, 1311 (1955). Linnett, J. W., and Mellish, C. E., *ibid.*, **50**, 665 (1954).

³ Malatesta, L., *Gazz. Chim. Ital.*, **70**, 734 (1940). Cambi, L., *Z. anorg. u. allgem. Chem.*, **247**, 22 (1941).

⁴ *Chem. and Indust.*, No. 1, 13 (1955).

⁵ Kimball, G. E., *J. Chem. Phys.*, **8**, 188 (1940).

⁶ Addison, C. C., and Lewis, J., *Quart. Rev. Chem. Soc.*, **9**, 136 (1955).

⁷ Chatt, J., and Duncanson, L. A., *J. Chem. Soc.*, 2939 (1953). Dempsey, J. N., and Baenziger, N. C., *J. Amer. Chem. Soc.*, **77**, 4984 (1955).

⁸ Holden, J. R., and Baenziger, N. C., *J. Amer. Chem. Soc.*, **77**, 4987 (1955).

Photo-reduction of Pteridines

WHEN a solution of 7-hydroxypteridine¹ was spotted on a sheet of Whatman No. 1 filter paper, irradiated with ultra-violet light (principally 254 m μ) for 5 min., and developed (by ascending chromatography) in various solvents, two spots appeared. One of these was identical with the starting material

(unirradiated material was used as a control on the same piece of paper), and the other proved to be 5:6-dihydro-7-hydroxypteridine¹. This reaction did not take place in aqueous solution (although 2:6-dihydroxypteridine² undergoes photochemical change in water), but it did if allyl-thiourea was present as a hydrogen donor (unirradiated controls were not reduced). 2- and 4-hydroxypteridine were found also to be photo-altered on paper; but the products have not yet been identified.

Photosensitive pteridine pigments are believed to be important in the visual process of insects³. It will be interesting to see if a cycle of photo-reduction followed by enzymic oxidation is involved.

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¹ Albert, A., Brown, D. J., and Cheeseman, G., *J. Chem. Soc.*, 1620 (1952).

² Albert, A., Lister, J. H., and Pedersen, C., *J. Chem. Soc.* (in the press).

³ Forrest, H. S., and Mitchell, H. K., *J. Amer. Chem. Soc.*, **76**, 5656 (1954); **77**, 4865 (1955). Viscontini, M., Schoeller, M., Loeser, E., Karrer, P., and Hadorn, E., *Helv. Chim. Acta*, **38**, 397 (1955).

Optical Properties of 'Cellophane'

SOME years ago, one of us¹ used commercial 'Cellophane' in conjunction with a polarizer and an analyser to produce colours in unstained microscopic sections of decalcified teeth. Subsequent investigation has shown that a sheet of this kind of 'Cellophane' exhibits the curious property of behaving like a half-wave plate. We do not think that this property can be explained in the usual way, that is, by 'Cellophane' thickness in conjunction with ordinary and extraordinary ray velocities, because it is improbable that the manufacture of commercial 'Cellophane' involves such precise control of thickness as the usual half-wave plate theory demands. We are therefore led to conclude that its surfaces are instrumental in giving 'Cellophane' this property.

If this phenomenon is indeed a surface, rather than a thickness, effect, it should appear with all colours equally. This would give 'Cellophane' the property of being a half-wave plate for all colours. In practice, when 'Cellophane' is viewed between two 'polars' it shows a definite coloration which becomes more marked when the thickness of the 'Cellophane' is increased (by using a number of sheets). This is indeed a thickness effect which makes it impossible to verify the supposed half-wave property precisely. Nevertheless, allowing for the limitations imposed by the thickness effect, we find, as already stated, that a 'Cellophane' sheet does satisfy the customary tests for a half-wave plate, no matter what colour of light be used. While the thickness effect can be explained in terms of current theory, we can think of no such explanation for an achromatic half-wave plate property dependent (as we believe) upon surfaces. Polythene sheets exhibit similar properties but less markedly.

Applications of the above-mentioned properties of 'Cellophane' and polythene to histology will be described later in the *Irish Journal of Medical Science*. We should like to thank the Medical Research Council