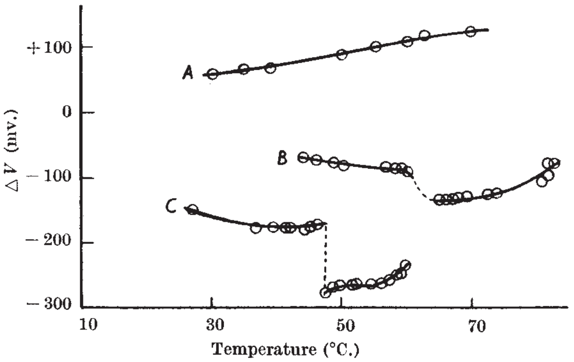

A, PARAFFIN WAX, M.P. 60° C. *B*, STEARIC ACID, M.P. 65° C. *C*, CETYL PALMITATE, M.P. 48° C.

Nickel Co. The potentials were measured by the usual method employed for following surface potential changes on unimolecular films spread on water, using a valve electrometer and a radioactive (polonium) electrode[1]. The accompanying figure shows the potential in millivolts as a function of temperature for the three materials. It is significant that the two polar materials exhibit an abrupt change at the melting point (within the experimental error) while the non-polar paraffin wax exhibits no abrupt change at the melting point. The recorded potentials are, of course, not absolute values since they involve various contact potentials inherent in the apparatus. The potentials recorded are the sum of these various contact potentials and the potentials arising at the boundary metal/film and film/air. Only the two latter sources of potential might be expected to show discontinuities at the melting points in the case of polar materials, since the passage from the liquid to the solid state will involve changes in molecular orientation.

The exact source of these potentials is not clear, but changes in orientation of polar molecules at phase boundaries might be expected to play a part, and the absence of any abrupt change in the case of the non-polar paraffin wax appears to be significant in this respect.

C. OCKRENT.
W. H. BANKS.

Printing and Allied Trades Research Assoc.,
Patra House, 10 Robin Hood Court,
Shoe Lane, London, E.C.4.

April 17.

---

[1] Adam and Harding, *Trans. Far. Soc.*, **29**, 837 (1933).

A Magnetic Study of the Effect of Bond Angle Distortion

THE prediction[1] that diamagnetic nickel complexes would prove to be square co-ordinated has been verified in a number of different ways. The discovery of isomeric nickel glyoximes[2], the crystal structure of potassium nickel dithioxalate[3] and investigations of crystal optics[4] and isomorphism[5] of other diamagnetic nickel compounds have all borne out the existence of this correlation between structure and magnetic properties. All internal nickel complexes in which four nitrogen atoms are bonded to the metal atom have proved, on investigation, to be diamagnetic, and they may therefore be presumed to be square bonded. The nickel derivatives of various glyoximes[2], phthalocyanine[6] and protoporphyrin[7] afford examples of this type of complex. In these circumstances it becomes possible to investigate magnetically the question as to whether distortion from a square configuration gives nickel-nitrogen bonds sufficient ionic character to make a complex paramagnetic.

Porter[8] has shown that when certain substituted pyrromethenes (with methyl groups in the α position) function as chelate groups and attempt to assume a planar configuration, as with nickel, clashing between methyl groups must occur. In a complex containing two pyrromethene molecules attached to a single nickel atom, the Ni-N bonds must be forced from their normal coplanar disposition. This occurs in nickel *bis* ethyl 3 : 3′–5 : 5′-tetramethyl-pyrromethene-4 : 4′ dicarboxylate, the compound chosen for investigation. Susceptibility measurements show that the compound is paramagnetic and that the nickel atom has a magnetic moment of 3·2 Bohr magnetons. From this it may be inferred that forcing the Ni-N bonds out of the plane profoundly alters their character; they are no longer essentially covalent bonds involving the use of *dsp*^{2} orbitals but are predominantly ionic in character.

Further details of this work will be published shortly. We are indebted to Dr. R. Lemberg for providing facilities for carrying out this and related work.

D. P. MELLOR.

Chemistry Department,
University of Sydney.

W. H. LOCKWOOD.

Institute of Medical Research,
Royal North Shore Hospital,
Sydney.

---

[1] Pauling, L., *J. Amer. Chem. Soc.*, **53**, 1367 (1931).

[2] Sugden, S., *J. Chem. Soc.*, 246 (1932); Cavell, H. J., and Sugden, S., *J. Chem. Soc.*, 621 (1935).

[3] Cox, E. G., Wardlaw, W., and Webster, K. C., *J. Chem. Soc.*, 1475 (1935).

[4] Mellor, D. P., and Quodling, F. M., *J. and Proc. Roy. Soc. N.S.W.*, **70**, 205 (1936).

[5] Brasseur, H., and de Rassenfosse, A., and Pierard, J., *Z. Krist.*, **88**, 210 (1934).

[6] Klemm, L., and Klemm, W., *J. prakt. Chem.*, **143**, 82 (1935).

[7] Coryell, C. D., and Pauling, L., *Proc. Nat. Acad. Sci.*, **22**, 159 (1936); Haurowitz, F., and Klemm, W., *Ber.*, **68**, 2312 (1935).

[8] Porter, C. R., *J. Chem. Soc.*, 368 (1938). See also P. Pfeiffer, "Stereochemie", by K. Freudenberg, 1226 (Leipzig: F. Deuticke, 1933).

History of the Vacuum Flask

LORD RAYLEIGH states in NATURE of April 20 that Dewar's assistant, Lennox, made the first vacuum flask. As one of the few survivors directly concerned with the production of the vacuum flask from its inception, I wish to place on record the facts as I know them.

I first met C. E. Muller, the expert glassblower, in 1887 at 147 Gower Street, where he lived with his brother, Emelius, who was established there as "Artificial Human Eye Maker". At that time I had a laboratory in Charlotte Street, Fitzroy Square, W., for which Muller made the chemical apparatus. At my suggestion Muller began business, in 1887, at 26 Charlotte Street, moving to next door (28) in 1888. In 1891 he removed to 148 High Holborn, the lease of which I helped him to negotiate, where