The passing of the instrument can be operated from any fixed holder, or it can be fitted to the customary types of stereo-taxis instruments.

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Sydnone

THE total polarizations (col. 2) of six sydnones, determined in benzene solution at 25°, are recorded in the following table, with the dipole moments (col. 4) estimated therefrom by the refractivities shown (col. 3):

Sydnone	(2)	(3)	(4)
N-Phenyl-	952 c.c.	45 c.c.	6.6 ₄ D.
N-Phenyl-C-methyl-	942	49	6.6 ₈
N-Phenyl-C-bromo-	923	58	6.5 ₈
N-Phenyl-C-phenyl-	962	69	6.6 ₈
N-Benzyl-	808	49	6.0 ₈
N-β-Naphthyl-	1045	63	6.9 ₈

These results are of interest in relation to the structure and formulation of this series of compounds¹⁻³. The insensitivity of the moments to the replacement of one substituent by another is a notable feature. To test whether the moments of the C-methyl- and C-bromo-derivatives are the resultants of that of N-phenyl sydnone and the usual vectors for C—Me and C—Br links respectively, the inclination, θ (expressed in degrees clockwise), of the 'parent' moment toward the C—Me or C—Br axis may be calculated. If $\mu_{\text{C—Br}}$ is 1.5D., θ is 102°; if $\mu_{\text{C—Me}}$ (a less certain quantity than that for C—Br) is between 0.3 and 0.4D., θ varies from 77–80°; θ is evidently *not* constant. The argument parallels that applied to quinoline⁴ and suggests, qualitatively, the occurrence of mesomerism⁵.

Two unperturbed 'Lewis' structures I and II have been included in previous discussions^{6,7}.

The first was suggested with reservation when the discovery of this new class of compounds was announced⁸; it is difficult to compute the moment to be expected for it, because of the uncertainty of its space formula, and lack of analogies. For (II), however, we can note that the moment of N-nitroso-methyl- and ethyl-anilines are 3.62 and 3.61 respectively⁹, while that of keten is 1.45¹⁰; the maximum possible moment of a molecule combining these units is therefore not higher than 5.1D.

If the stable hybrid is imagined as a roughly regular 5-ring, many fully polar forms (for example, III, IV, V and VI) may contribute.

Their moments would range from 12 to 20D. in magnitude and be well distributed in direction. It is therefore creditable that their effects could nearly cancel.

Formula III is the activated form of I; IV has analogies with the polar contributor which raises the observed polarities of α -pyrone derivatives⁹; further, the —N=O group is known to act as a 'donor', forming 5- or 6-rings, in the metallic derivatives of 'cupferron' or the nitroso-naphthols. Formula VI is suggested by keten, for which an assumed

25 per cent contribution $\text{CH}_2=\text{C} \equiv \text{O}^+$ has been necessary to explain the observed dipole moment *vis à vis* that of a normal ketone. Structures (II) and (VI) cannot be eliminated on the ground that sydnones do not exhibit chemical reactions of nitroso-compounds, since some of the metal complexes cited above also fail in this respect.

Finally, we think it unlikely that some mesomeric shifts are not also occurring in the aryl radicals of the sydnones. Quadripolar forms might therefore further affect the measured moment. In this respect, the low moment of N-benzylsydnone (where conjugation with N is broken by interpolation of $>\text{CH}_2$) and the high moment of the naphthyl derivatives may be significant.

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¹ Baker and Ollis, *Nature*, **158**, 703 (1946).

² Kenner and Mackay, *Nature*, **158**, 909 (1946).

³ Earl, *Nature*, **158**, 909 (1946).

⁴ Le Fèvre and Le Fèvre, *J. Chem. Soc.*, 1470 (1935).

⁵ Ingold, *Chem. Rev.*, **15**, No. 2 (1934). Sutton, *Trans. Farad. Soc.*, **30**, 789 (1934). Zahn, *ibid.*, 804.

⁶ Earl and Mackney, *J. Chem. Soc.*, 899 (1935).

⁷ Cowley and Partington, *J. Chem. Soc.*, 1252 (1933).

⁸ Hannay and Smythe, *J. Amer. Chem. Soc.*, **68**, 1357 (1946).

⁹ Le Fèvre and Le Fèvre, *J. Chem. Soc.*, 1088 (1937).

Dipole Moments and Structure of the Sydnones

THE letter by W. Baker and W. D. Ollis¹ concerning the structure of the sydnones, for example, N-phenylsydnone (I)², led to a joint programme of work being undertaken at Bristol and Oxford. As J. C. Earl and R. J. W. Le Fèvre kindly informed us that they had also been engaged upon a similar task and have given us their results, which are in large measure complementary to ours, it seems opportune to record our findings.