

tions, and it was found that this sample was, in fact, contaminated with tetrahydrobenzpyrene which was separated from it by chromatography on alumina from light petroleum solutions. The most easily eluted fraction gave colourless leaflets (m.p. 110°, not depressed by an authentic sample, m.p. 113°) of 1': 2': 3': 4'-tetrahydro-3: 4-benzpyrene⁴.

The presence of this contaminant appears to have misled also at least one other worker⁶, and we therefore record our finding.

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J. W. COOK
R. SCHOENTAL

Chemistry Department,
University, Glasgow, W.2.

Dec. 27.

¹ Berenblum, I., and Schoental, R., *Cancer Res.*, **6**, 699 (1946).

² Cook, J. W., and Schoental, R., *J. Chem. Soc.*, 170 (1948).

³ Schoental, R., and Scott, E. J. Y., *J. Chem. Soc.*, 1683 (1949).

⁴ Pieser, L. F., and Pieser, M., *J. Amer. Chem. Soc.*, **57**, 782 (1935).

⁵ 27th Annual Report British Empire Cancer Campaign, 229 (1949).

Peculiarity of Dichroism of Aromatic Molecular Compounds

THE measurement of pleochroism in crystals of aromatic compounds has seldom been carried out, notwithstanding its importance from the theoretical as well as the experimental point of view. This was mainly due to the difficulties in obtaining crystal pieces suitable for the measurement. Tsuchida and Kobayashi¹ have devised an apparatus which consists in principle of a polarizing microscope and a sector photometer, and enables the measurement of dichroism with microcrystals obtained by ordinary procedures of preparation of substances. By this method the dichroism of metallic complexes^{2,3} and aromatic compounds has been determined⁴.

As one of the conclusions, it was found that the π -band is more bathochromic by *c.* 0.250 Å., and several times more hyperchromic for light vibrating parallel to the benzene ring than for that perpendicular to the ring. This fact may be explained as the π -electrons in the benzene ring have higher density in the plane of benzene than in the direction perpendicular to the latter.

In recent studies of molecular compounds, p -C₆H₄O₂- p -C₆H₄(OH)₂, p -C₆Cl₄O₂-C₆(CH₃)₆, s -C₆H₃(NO₂)₃- p -C₆H₄Br(NH₂)₂, s -C₆H₂Cl(NO₂)₃-C₆(CH₃)₆ and s -C₆H₃(NO₂)₃-C₁₄H₁₀, the effect was found to be reversed; that is, the π -bands are more hypsochromic and hypochromic for the light vibrating parallel to the benzene ring than for that perpendicular to the plane of this ring. This fact may be explained as a change in electron density, suggesting the force contributing to the formation of these molecular compounds.

RYUTARO TSUCHIDA
MASAHISA KOBAYASHI
KAZUO NAKAMOTO

Department of Chemistry,
University of Osaka.

Dec. 8.

¹ Tsuchida, R., and Kobayashi, M., *Bull. Chem. Soc. Japan*, **13**, 619 (1938); *J. Chem. Soc. Japan*, **60**, 769 (1939); "The Colours and the Structures of Metallic Compounds" (Osaka, 1944).

² Tsuchida, R., Yamada, S., and Yoneda, H., *J. Chem. Soc. Japan*, **69**, 145 (1948).

³ Yamada, S., and Tsuchida, R., *J. Chem. Soc. Japan*, **70**, 44 (1949).

⁴ Tsuchida, R., Kobayashi, M., and Nakamoto, K., *J. Chem. Soc. Japan*, **70**, 12 (1949).

A Suitable Hydrocarbon for Oil-Water Dispersion Measurements

THE measurement of properties of emulsions and of interfacial phenomena is usually complicated by density differences between the 'oil' and aqueous phases and by the polarity of the oil. Sedimentation introduces non-uniformity and causes errors which cannot be assessed; creaming, by effectively increasing the concentration and bringing the drops into close contact, increases the rate of coagulation. Stirring or mixing is not usually permissible as it changes the size distribution. To overcome the former difficulty, workers have weighted their oils, often of 'Nujol' type, to the same density as that of the continuous phase. Thus, Sibree¹ added tribromomethane to medicinal liquid paraffin before measuring viscosities. This method is not to be recommended on account of (a) the appreciable solubility of tribromomethane in water, (b) its slow hydrolysis in aqueous solution, and (c) the introduction of a strongly polar compound. Similar arguments can be given against other weighting compounds, which are usually halogenated hydrocarbons.

To the requirements mentioned above can be added that of refractive index which, for easy and accurate microscopic measurements, should differ appreciably from that of the continuous phase. For weighted 'Nujol' and aqueous solutions at 25°C., $\Delta n \sim 0.15$ gives reasonable definition. If the water be mixed with glycerin to study effects at high viscosities, and the 'Nujol' hence weighted still further, Δn decreases until at 76 per cent glycerin $\Delta n \sim 0.06$, making accurate observation well-nigh impossible. Where water is one phase, the requirements for the oil are thus: density ~ 1 , non-polar and $n_D > 1.5$.

The physical properties of 3,3' ditolyl tabulated below fulfil these conditions:

Temp. (° C.)	d_4^{25}	η (centi-poise)	n_D (Abbe)	Δn
20.0	1.0013 \pm 0.0001	7.25 \pm 0.03	1.5962 \pm 0.00016	0.26
25.0	0.9989 \pm 0.0003	5.90 \pm 0.02	1.5930 \pm 0.00017	

This table was compiled from the measurements on eight preparations. In addition, the surface tension has been determined by the maximum bubble method at 20°C. to be $\gamma = 39.0 \pm 0.5$ dynes per cm. The parachor agrees well with that computed by the usual methods. The dipole moment is zero or very small. Although facilities were not available for an accurate determination, the dielectric constant at 25.0°C. was determined as $\epsilon = 2.51(9)$. 3,3' Ditolyl can be cooled to $\sim 1.5^\circ$ C. without solidifying, and here $\epsilon = 2.52(3)$. This variation is within the experimental error of the apparatus. $n_D^{25} = 2.53(7)$.

The molar refraction for the D-line is unusual. The value of 62.0 c.c. corresponds to a molar exaltation of 2.1 c.c. over the value calculated from bond refractivities². This is surprisingly higher than that quoted for diphenyl³, namely, 1.8 c.c. The nearest strong absorption band in the ultra-violet is at 2500 Å. ($\epsilon = c. 16,000$)^{4,5}.

Dispersions of ditolyl in conductivity water, as anticipated, do not cream over long periods; in spite of the absence of an emulsifying agent, they are remarkably stable at concentrations of 1 per cent. Immediately after preparation, the droplet sizes range between 1 and 3 μ . At this concentration and diameter, the collision frequency due to Brownian