

It can thus be said in a general way that the smaller capacities would be required for the higher frequencies and *vice versa*. The different motors having armatures of different inductance and self-capacity would, of course, require different values of capacity for minimum noise, even for the same frequency.

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April 17, 1943.

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1. Majumdar, S. C., Sen, S. M., and Khastgir, S. R., Communicated to *Ind. Jour. Physics*. 2. Howe, *Proc. I.R.E.*, 1937, 25, p. 708.

X-RAY DIFFRACTION STUDY OF CYBOTAXIS AT THE INTERFACE

THE structure of liquid in the interior may be taken as vaguely ordered statistical swarms of molecules, or it may be looked upon as a three-dimensional *quasi-crystalline* structure of ordered molecules, with molecules obeying gaseous laws in the interspaces, so that the composite arrangement shows both ordered and disordered properties simultaneously. The interface between two liquids, or between a liquid and a gas is, however, a region of permanently oriented molecules. The purpose of this note to study the nature of the interface structure, by X-ray diffraction method. For this purpose $\text{CuK}\alpha$ radiation, filtered through nickel was allowed to strike the liquid-air interface. The beam was extremely narrow and about 2 mm. in diameter. It passed grazing the interface, with its lower edge just inside the liquid, so that the pattern of the liquid in bulk, may not come out with great prominence. The photographed diffraction pattern was microphotometered and the *intensity* \rightarrow *interplanar spacing curve* was drawn. Fourier analysis of the main peak was done according to the method of P. Debye and H. Menke.¹ This gave the atomic distribution curve of the atoms, about any atom in the liquid, and for methyl alcohol, the atomic distribution curve showed maxima at 1.57, 2.94, 4.23, 5.64 Å, at 20° C. and at 1.63, 2.98, 4.36, 5.75 Å at 40° C. The peak at 1.57 Å is interpreted as arising from $(\text{CH}_2\text{OH})_2$; that at 2.94 Å, as arising from $(\text{CH}_2\text{OH})_3$; that peak at 4.36 Å has its origin in (CH_2OH) and the last peak is due to oriented molecules at the interface. Values of integrated intensities under the peaks are proportional to the relative number of molecules of the different species. With a fixed arrangement the integrated area under the last peak does not vary with temperature; while the relative integrated areas under the first three peaks change considerably with temperature. Assuming the number of triple molecules as small, the ratio of the polymers with 1 and 2 molecules, as obtained from the above analysis of the diffraction pattern, comes out as 0.25 and 0.20, at 20° and 40° C. respectively. The same values calculated from association factor ' α ' are 0.220

and 0.163 at the two temperatures mentioned ($\alpha = 1.82$ at 20° C. and 1.86 at 40° C.).

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1. P. Debye and H. Menke, *Phys. Zeits.*, 1930, 31, 797.

PREPARATION OF SUB-IODIDES OF CADMIUM AND ZINC

WOEHLER AND RODEWALD¹ prepared calcium sub-iodide in 1904. Preservation of sub-iodides is difficult. Samuel and Zakiuddin² succeeded in preserving calcium sub-iodide under carbon disulphide for some time. Kupfer³ found that the compound could be preserved for a fairly long interval in paraffin and he studied X-ray diffraction of the sub-iodide.

Employing the method suggested by Samuel and Zakiuddin, the sub-iodides of cadmium and zinc have been successfully prepared by the author of the note. Iodine and cadmium of C.P. quality were taken in the ratio of their equivalent weights and placed in a steel bomb provided with an air-tight screw. The bomb was heated in an electric furnace to about 1000° C. for 10 hours and cooled suddenly by immersion in water. The resulting greenish yellow powder was found, on chemical analysis, to be cadmium sub-iodide. It could be preserved for over a week under carbon disulphide. Zinc sub-iodide, prepared in a similar way and easily preserved under carbon disulphide, was black in colour.

Absorption spectra of these sub-halides will be studied later.

Meteorological Office,
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February 13, 1943.

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1. Woehler and Rodewald, *Z. f. anorg. Chemie*, 1904, 61, 54. 2. Samuel, R., and Zakiuddin, *Proc. Ind. Acad. Sci.*, 1935, 1, 723. 3. Dr. Kupfer, Private Communication to Dr. Zakiuddin, 1936.

A NEW PHOTOMETRIC METHOD FOR THE ESTIMATION OF TOCOPHEROL (VITAMIN E)

PAUL MEUNIER AND ANDREE VINET¹ pointed out that a solution of α -tocopherol in alcohol (a few γ) when mixed with a reagent composed of one drop of a 1 per cent. solution of potassium ferricyanide and one drop of 1.5 per cent. solution of ferric chloride mixed with 1 c.c. chloroform and made up to 10 c.c. with absolute alcohol, developed a blue colour. Experiments were conducted to find out the suitability of this colour production as a photometric method for the estimation of tocopherol in oils.

A standard solution of α -tocopherol in absolute alcohol was prepared by methyl-alcoholic alkali saponification of α -tocopherol acetate according to the method of Emmerie.² The solution was standardised by the FeCl_2 - $\alpha\alpha'$ -di-