

follows from their experimental work is to study the susceptibilities of salts in the solid and dissolved states. The predominant factor in the change of susceptibility on solution is ordinarily the release of ionic deformations.

From these points of view, a study has been made of the susceptibilities of some formates and acetates, nitrites and nitrates, iodates and selenites in the state of solid and in solutions in water. Formates and acetates show very small changes of susceptibility when dissolved in water. Investigations with iodic acid and iodates show that the specific diamagnetic susceptibility is greater in the solid state than in the state of solution. On comparing these results with Raman effect data obtained by Venkateswaran,<sup>3</sup> it looks most likely that the observed changes should be due to dissociation of iodic acid and iodate molecules in water but the matter seems to require further investigation. Nitrates show small changes in susceptibility when dissolved in water while nitrites show a comparatively large increase. Magnetic data support the view that the nitrogen in the nitrite ion is trivalent. In the case of selenites, the diamagnetic susceptibility increases when they are dissolved in water. This result supports quantitatively Venkateswaran's<sup>4</sup> inference that in the solid selenious acid, selenium is hexavalent while in aqueous solutions, it becomes tetravalent.

The following table gives the values of the ionic susceptibilities obtained from a careful study of over 16 salts in the solid and dissolved states:—

Ion	Ionic diamagnetic susceptibility.		
	Calculated from solid data	Calculated from solution data	Kido <sup>5</sup>
(COOH) <sup>-</sup>	17.3	17.6	20.2
(CH <sub>2</sub> COOH) <sup>-</sup>	29.8	30.2	31.4
(IO <sub>3</sub> ) <sup>-</sup>	47.3	41.1	52.2
(NO <sub>2</sub> ) <sup>-</sup>	8.0	11.4	15.0
(NO <sub>3</sub> ) <sup>-</sup>	18.1	19.5	20.1
(SeO <sub>3</sub> ) <sup>--</sup>	44.9	52.7	47.5

These considerations point to the necessity of studying salts in aqueous solutions before definite inferences could be drawn regarding the susceptibilities of the ions concerned. Full details will be published elsewhere.

S. RAMACHANDRA RAO.  
 S. SRIRAMAN.

Annamalai University,  
 Annamalainagar,  
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<sup>1</sup> These [references are given in Subramaniam, *Proc. Ind. Acad. Sci.*, 1936, 4, 404.

<sup>2</sup> *Ibid.*, 1935, 2, 161.

<sup>3</sup> *Ibid.*, 1935, 2, 119.

<sup>4</sup> *Ibid.*, 1936, 3, 533.

<sup>5</sup> *Sci. Rep. Tohoku Imp. Univ.*, 1933, 22, 835.

### Dispersion of Sound Velocity in Liquids.

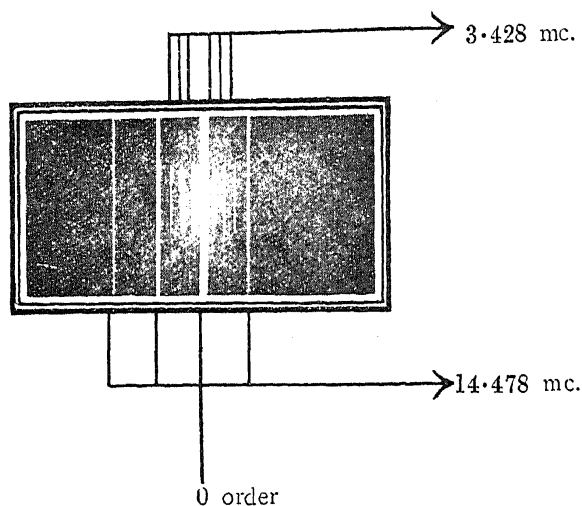
THE question of dispersion of sound velocity in liquids has assumed great importance in view of recent reports by several physicists,<sup>1</sup> of high absorption of sound in liquids at ultrasonic frequencies. But the experimental results<sup>2</sup> so far obtained are indecisive, and it is obvious, therefore, that an arrangement should be sought for, wherein errors likely to alter the velocity ever so little, are completely eliminated, before one could be certain of any dispersion.

An oscillator set was constructed with two sets of coil and condenser to give roughly 3.5 and 14.5 megacycles independently of each other and with only by a change of switches. But the circuit connecting the piezo-quartz was the same in both the cases, so that the crystal once immersed in a liquid was left undisturbed throughout the entire operation of obtaining the spectra at the two frequencies. In this method, the arrangement including the optical system was not altered, thereby eliminating all errors incidental to such disturbances.

The two diffraction spectra were taken on the same photographic plate; no error arises on account of the measurement of the distance between the fringes. The temperature of the liquid was measured accurately to one-tenth of a degree Centigrade before and after each experiment, and no fluctuation in temperature by even the above amount was noticed. The lower and higher frequencies were determined

accurately in each case by a precision wave-meter.

The accompanying photograph shows the diffraction spectra at 3.428 mc. and 14.478 mc. taken with toluene as the liquid.



Diffraction spectra in toluene.

Experiments were carried out with the above arrangement on six liquids. While toluene and *m*-xylene show no dispersion within the range investigated, benzene, carbon tetrachloride and tetralin show a definite increase in velocity at 14.5 mc. and amyl-acetate a decrease in velocity.

The following table gives the experimental results :—

Liquids	Temp. in °C.	Sound velocity in m./s.	
		at 3.5 mc.	at 14.5 mc.
1. Benzene ..	26.8	1284	1290
2. Toluene ..	30.9	1272	1272
3. <i>m</i> -Xylene ..	27.1	1302	1302
4. Tetralin ..	30.3	1430	1434
5. Carbon tetrachloride ..	27.6	907.4	912.4
6. Amyl-acetate ..	27.2	1190	1179

A detailed paper will be published elsewhere.

S. PARTHASARATHY.  
Indian Institute of Science,  
Bangalore,  
July 15, 1937.

<sup>1</sup> P. Biquard, *Thesis*, Paris, 1935.

R. Lucas and P. Biquard, *Trans. Farad. Soc.*, 1937, **33**, 130.

J. Clæys, J. Errera and H. Sack, *ibid.*, 1937, **33**, 136.

C. Sörensen, *Ann. Physik.*, 1936, **26**, 121.

<sup>2</sup> E. Hiedemann, N. Seifen, and E. Schreuer, *Naturwissen.*, 1936, **24**, 681.

S. Parthasarathy, *Proc. Ind. Acad. Sci.*, 1936, **4**, 17.

### The Condensation of Resacetophenone with Open-chain and Cyclic $\beta$ -ketonic Esters.

RESACETOPHENONE condenses with ethyl-acetoacetate in the presence of phosphorus oxychloride with the formation of 4-methyl-6-acetyl-7-hydroxycoumarin, (50% yield), which has already been isolated (in a small yield) by Jimaye and Gangal<sup>1</sup> from the Frie's migration product of 7-acetoxy-4-methylcoumarin. The condensation does not take place in the presence of either concentrated sulphuric acid or sodium ethoxide. The reaction can be applied to all the unsubstituted and mono-substituted open-chain, as well as cyclic  $\beta$ -ketonic esters, and we have already obtained a number of this type of coumarins and studied their properties. Full details will be shortly submitted for publication in the *Proceedings of the Indian Academy of Sciences*.

R. D. DESAI.

SHEIK ABDUL HAMID.

Muslim University,  
Aligarh,  
July 8, 1937.

<sup>1</sup> *Rasayanam*, 1936, **1**, 15.

### Synthesis of Thujane.

THE synthesis of thujane, the parent hydrocarbon of the naturally occurring bicyclic terpenes of this group, was undertaken simultaneously in this laboratory by two different methods: *viz.*, (i) starting from a cyclohexane derivative having two bromine atoms in positions 2 and 4, a methyl group in position 1, and an isopropyl group in position 4, and (ii) from a cyclopentene derivative possessing a methyl group in position 1, a double bond between the carbon atoms in positions 2 and 3, and an isopropyl