RAMAN SPECTRA OF IODIC ACID AT DIFFERENT DILUTIONS

FROM a study of the variation with concentration of physico-chemical properties, such as density, viscosity, surface tension parachor, refractive index, magnetic susceptibility, etc., M. R. Nayar and co-workers[1] have found breaks in the various curves at definite concentrations, namely, 0·09 N and 0·04 N. According to them a concentrated solution contains mainly trimeric molecules $(HIO_3)_3$, which gradually change into dimers $(HIO_3)_2$ and then into monomers and simple ions as dilution increases. The course of depolymerisation of the trimeric molecules of the acid has been pictured as:

$$\tfrac{1}{3}(HIO_3)_3 \xrightarrow[0\cdot09\ N]{} \tfrac{1}{2}(HIO_3)_2 \xrightarrow[0\cdot04\ N]{} HIO_3 \downarrow H^+ + IO_3^-$$

the last one refers to potassium iodate. It is evident that the Raman spectra of the acid solutions are not changed very much down to a concentration of about 0·2 N. The most intense line 789 in band III, however, disappears at this dilution, while the line 804 previously of medium intensity now becomes the most prominent. The less prominent lines constituting bands I and II have all disappeared.

In 0·07 N solution a line 812 makes its appearance for the first time, which persists with further dilution, while all other lines disappear. This line which is the only one present in 0·03 N solution is given also by KIO_3 solution (0·2 N). This frequency may reasonably be attributed to free IO_3 ions, while the rest must be partly ascribed to polymers of the acid, and partly to modification of the IO_3 frequency due to co-ordination.

Concn.	Band I	Band II	Band III
4·5 N ..	317(7)*, 332(7), 354(6),	449(1), 642(4), 653(3),	789(10) 806(8) 826(6)
1·0 N ..	318(4)	.. 641(3), 654(2),	785(10) 807(9) 824(7)
0·2 N ..	.. .. ..	.. .. ..	.. 804(5) 824(3)
0·07 N ..	.. .. ..	.. .. ..	.. {804(5) 812(4) 828(2)
0·03 N ..	.. .. ..	.. .. ..	.. 811 ..
0·2 N (KIO_3)	.. .. ..	.. .. ..	.. 811 ..

* The numbers within brackets refer to intensity estimated visually.

The breaks in the curves are attributed to transitions from one kind of molecule to another.

The fact that a solution of iodic acid yields different Raman spectra at different concentrations was first pointed out by Nayar and Sharma,[2] and subsequently confirmed by Venkateswaran.[3] In the present investigation Raman spectra of the acid solution have been obtained for concentrations ranging on either side of the transition points. Microphotometric records of all the plates were also obtained and the frequencies (wave numbers) were recorded (see table above).

The first five results refer to iodic acid, while

The results in any case are in conformity with the physico-chemical observations already referred to. The detailed paper will be published elsewhere.

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[1] Nayar and Gairola, *Zt. anorg. Ch.*, (1934), **220**, 163.
— and others, *ibid.*, (1939), **240**, 217.
—, *Curr. Sci.*, 1939, **8**, 73.
— and Mundle, *ibid.* 1941, **10**, 76.

[2] — and Sharma, *Zt. anorg. Ch.*, 1934, **220**, 169.

[3] Venkateswaran, *Proc. Ind. Acad. Sci.*, 1935, **2A**, 119.