The Raman Spectrum of Gaseous Carbon Dioxide

In a recent paper[1] it was ventured, that of the six new lines observed by Langseth and Nielsen,[2] probably not more than two are members of the Raman spectrum of gaseous CO_2. This conclusion was based wholly upon the predicted Raman spectrum of the molecule since the corresponding energy levels had not as yet been observed in the infrared.

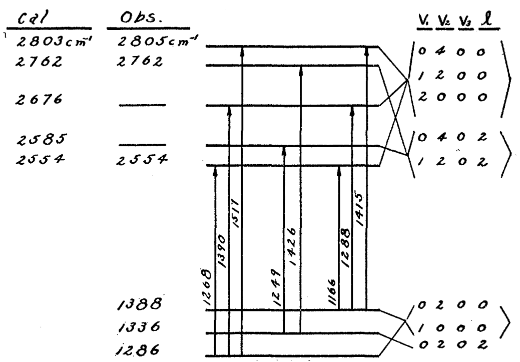

Fig. 1.

More recently[3] Professor E. F. Barker has succeeded in determining the positions of three of the five relevant levels from direct measurements in the infrared. The discovered values are in excellent accord with the calculated ones referred to above.

In the light of these results one may expect to find the Raman lines in question in the immediate neighborhood of the Raman transitions ($\Delta l = 0$) implied by the energy level diagram given in Fig. 1.

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September 25, 1933.

[1] Adel and Dennison, Phys. Rev. **43,** 716 (1933).
[2] Langseth and Nielsen, Zeits. f. physik. Chemie **B19,** 427 (1932).
[3] Barker and Wu, to be published in the near future.

The Allison Magneto-Optic Effect

In an investigation of a transmission line and spark gap system similar to that used by Professor Fred Allison, a few things have been noted which seem of some significance. The trolley arrangement has been slightly modified to form a real two-wire transmission line between the supply condenser and the terminating coil. In order to eliminate the long period oscillatory current from the line, and to obtain the high-frequency oscillations occurring in the spark gap discharge, the line and the condenser spark gap system have been made separate circuits with the line connected directly across the spark gap terminals through two small series capacitances. The capacitance on the low voltage side of the gap is paralleled by a high resistance. In this arrangement the only voltage applied to the line is that appearing across the gap terminals.

A preliminary investigation of the coils at the line terminals reveals the presence of high frequency oscillations ranging from some centimeters to a few meters in wavelength. A change in trolley position produces a marked shift in energy distribution between these high frequency components. This shift or selective effect is apparently from the low frequency to the high frequency side of the band as the line length between gap and coils is increased. These oscillations are due to the capacity between the electrodes of the gap and possibly also to phenomena of the Langmuir-Tonks type. In such a discharge one would naturally expect a broad band of frequencies.

It is futile at present to speculate upon the complete significance of these oscillations, but it is hoped that some correlation between them and the Allison minima can be obtained when more data are available. An investigation is now in progress in which an attempt will be made to calibrate the trolley system in terms of predominating frequencies and determine whether or not there is selective absorption occurring in the cell.

It might be worth while to note that an arrangement similar to the above was tried out by the writer in Professor Allison's laboratory at Auburn this summer. The minima were apparently made considerably sharper, that is more sensitive to trolley shift. Several analyses of unknowns were made with this modification and the isotopes of lead redetermined. The readings were in excellent agreement with those of Bishop, Lawrenz and Dollins.[1] It is perhaps needless to state that for this modification the nicols must be used in the parallel position and the coil fields assisting.

I am much indebted to Professor Fred Allison for the privilege of using his apparatus and for his courtesy in allowing me to rearrange it in any desired manner. I have also profited a great deal by many discussions with Professor J. W. Beams.

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Rouss Physical Laboratory,
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September 30, 1933.

[1] Bishop, Lawrenz and Dollins, Phys. Rev. **43,** 43 (1933).