LETTERS TO THE EDITOR

This section will accept reports of new work, provided these are terse and contain few figures, and especially few halftone cuts. The Editorial Board will not hold itself responsible for opinions expressed by the correspondents. Contributions to this section must reach the office of the Managing Editor not later than the 15th of the month preceding that of the issue in which the letter is to appear. No proof will be sent to the authors. The usual publication charge ($5.00 per page) will not be made and no reprints will be furnished free.

The Raman Spectra of Deutero-acetones and Methyl Alcohol-d

Raman spectra have been photographed for a series of equilibrium solutions of the several deutero-acetones produced by means of the exchange reaction of acetone with deuterium oxide and containing progressively higher deuterium fractions up to 91 percent. The results are summarized in Table I, from which the changes of frequency may be seen as a function of the isotopic composition.

As the deuterium fraction increases, the higher frequency of acetone at 2918 cm\(^{-1}\) increases slightly and then fades out, only the high probability parallel frequency at 2937 cm\(^{-1}\) appearing faintly in the most concentrated d-acetone. Simultaneously, at deuterium fraction =4 percent, a line appears at 2175 cm\(^{-1}\) and three are found in this region when D = 24 percent. The strong lines at about 2115, 2160, 2219 and 2250 cm\(^{-1}\) appear at higher deuterium concentrations, with 2113 cm\(^{-1}\) becoming the strongest line at the greatest deuterium concentration; weak lines at 2049 and 2072 cm\(^{-1}\) also appear in the D = 91 percent acetone. The 1706 cm\(^{-1}\) line, ascribed to C=O, appears quite unchanged in all the acetones. The 795 cm\(^{-1}\) line splits in the intermediate acetones to give a second line at 760 cm\(^{-1}\). This second line becomes strong, splits to give a third at about 700 cm\(^{-1}\) with the original line at 795 cm\(^{-1}\) disappearing. Finally, the 750 cm\(^{-1}\) line fades, leaving in the most concentrated d-acetone the 700 cm\(^{-1}\) as the strongest line. Lines at 531 cm\(^{-1}\) and 1069 cm\(^{-1}\) are gradually displaced toward the exciting line as the concentration of deuterium is increased.

We are attempting to interpret these results by the use of the equations of Rosenthal,\(^1\) comparing the data with frequencies calculated for the four possible isotopic methyl groups.

The line observed at 2970 cm\(^{-1}\) with ordinary acetone is at present unexplained, CH\(_3\) having theoretically only two frequencies near 3000 cm\(^{-1}\). The usual explanation of resonance degeneracy apparently is not tenable in this case. The presence of the four strong and two weak lines at 2000–2250 cm\(^{-1}\) in the acetones having the greatest deuterium fraction is also of interest, since never more than the 3 hydrogen lines from 2900–3050 cm\(^{-1}\) appear in the acetones containing little deuterium.

Strong Raman lines appeared in acetone at 1157, 1224, 1340 and 1428 cm\(^{-1}\). Lines at about these frequencies occur in the intermediate deutero-acetones and practically disappear in the 91 percent deutero-acetone. We have not tabulated these lines, however, because they may be due to excitation by the 4047 and 4078A lines of the mercury source. This point is being studied further.

The Raman spectra of methyl alcohol and methyl alcohol-d have been determined, using the mercury lines at 4358 and 2536A as exciting sources. Table II presents the lines found. The OD band occurs at 2500 cm\(^{-1}\)±10 and the OH band at 3400 cm\(^{-1}\)±20. A line at about 1375 cm\(^{-1}\) in the CH\(_2\)OD spectra and one at 115 cm\(^{-1}\) in the CH\(_3\)OH were other differences noted. The four lines between frequencies 2840 and 3000 cm\(^{-1}\) are very strong.

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4 Redlich and Forder, Naturwiss. 22, 808 (1934).