expressing in first approximation the dependence of the vibration terms upon the various quantum numbers, A being a common constant. As a consequence it is necessary to revise the values of ν^0 and of certain of the coefficients, the results being more consistent than before. Table I supercedes parts of Tables IV and V in our report. The values of x_{13} and x_{23} remain unchanged. Those of x_{12} are somewhat modified, but as before fail to agree well among themselves.

The original report also contained a regrettable error in the value of the moment of inertia of the N_2O molecule, which should have been given as 66.0×10^{-40}.

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June 30, 1932.

Raman Effect of Methyl Acetylene

The Raman spectrum of methyl acetylene ($CH_3\cdot C\vdots CH$) has been studied and ten lines have been found as shown in Table I. A mercury light source was employed in the usual way and was used both unfiltered and with $\lambda=4358$A reduced by 2 mm of a solution of iodine in carbon tetrachloride. The photographs were taken on a Steinheil spectrograph. The expected Raman frequencies of the monosubstituted acetylene $C\vdots C\cdot$ bond (2128 cm^{-1}) and the $\vdots C\cdot H$ bond (3306 cm^{-1}) were found and are in agreement with the values of Bourguel and Daure.[1] Furthermore, lines for the aliphatic $C\cdot H$ bond (2928 cm^{-1}) and the $C\cdot C$ bond (618, 931 cm^{-1}) were found for this molecule. Some lines in Table I are not yet identified, although they also appear in other hydrocarbon molecules.[1] The ten lines mentioned are quite definite, but others are possible and it is expected to extend the work by using monochromatic excitation.

TABLE I. *Raman lines in methyl acetylene.*

Frequency cm^{-1}	Intensity	Frequency cm^{-1}	Intensity
310	weak	2871	medium
618	weak	2928	strong
931	medium	3144	medium
1384	weak	3207	weak
2128	strong	3306	weak

The methyl acetylene was made available through the kindness of Dr. G. B. Heisig of this laboratory.

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[1] Bourguel and Daure, Comptes Rendus **190,** 1298 (1930); and Bull. Soc. Chim. **47/48,** 1365 (1930).

Structure of Atomic Nuclei

For some time, there has been speculation as to whether or not the atomic nucleus can be regarded as consisting of shells of protons, just as the external structure is known to consist of shells of electrons. The writer has recently pointed out[1] that the experimental evidence seems to demand a modification of this view, in that s, p, d (etc.) shells do exist, but that a closed shell of azimuthal quantum number l consists of $2l+1$ protons and $2l+1$ neutrons. It was shown that the facts are well represented for elements of mass number (M) less than 36. It is of interest to inquire if this scheme is capable of extension to elements of higher mass number.

Detailed questions of stability must be left until later, but a qualitative analogy proves to be of help. In the outer atom, the normal state with one electron missing from a closed shell is of the same symmetry character as the normal state with just one electron in the closed shell. In the p shell, for instance, the ground states are ^2P, ^3P, ^4S, ^3P, and ^2P. There is symmetry about the middle element, which corresponds to a half-completed shell. If we make the hypothesis that such a symmetry exists for nuclei, then it is to be expected that this symmetry will be of a two-dimensional character, when the number of neutrons is plotted against the number of protons (or better, when the excess of neutrons over protons is plotted against the number of protons). For the s shell, H^3 is missing, and one cannot say very much about the symmetry. For the p and d shells, symmetries of an elementary type exist. The f shell, corresponding to the mass range 37 to 64, shows some symmetry, but so many points are missing that it is difficult to decide on the location of the center of symmetry. Either $M=50$ or $M=52$ will serve the purpose, the excess of neutrons over protons being four. The g shell corresponds

[1] J. H. Bartlett Jr., Nature (in press).