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Short Communications

Molecular Structures of Dodecafluoro-Cyclohexane and Decafluoro-Cyclopentane

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The vapours of dodecafluoro-cyclohexane and decafluoro-cyclopentane have been investigated by the electron diffraction sector method. In Fig. 1 the $\frac{\sigma(r)}{r}$-curve obtained for totally fluorinated cyclohexane is reproduced. Below the distribution curve the r-values of internuclear distances which would occur in the molecule if it retained the »chair» form of the mother hydrocarbon and strictly tetrahedral angles are indicated by vertical lines. The C—C bond distance is assumed to be 1.54 Å and the C—F bond distance is that derived from the $\frac{\sigma(r)}{r}$-curve itself, 1.38 Å. It is easily recognized that the observed $\frac{\sigma(r)}{r}$-curve is explained in a satisfactory way by the assumptions just mentioned. A still better agreement seems to be obtained, however, if a minor distortion of the valency angles is assumed to take place leaving the C—C- and C—F-distances unchanged. This distortion consists in a bending of the ε—C—F-bonds away from the chief axis of the carbon ring, the bending taking place in one of the three planes of symmetry of the undistorted molecule. The symmetry of the model is thus left unchanged by the distortion. The described bending of the C—F bonds is just what might be expected, because the distance between ε—F-atoms in 1,3-position would be only 2.52 Å in the »ideal» structure, a distance smaller than we should expect to find between fluorine atoms not directly linked together.

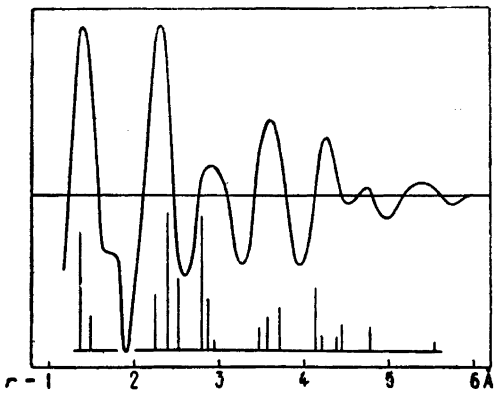

Fig. 1. $\frac{\sigma(r)}{r}$*-curve of dodecafluoro-cyclohexane.*

In Fig. 2 the observed $\frac{\sigma(r)}{r}$-curve for decafluorocyclopentane is reproduced. Here also the C—F bond distance is found equal to 1.38 Å. It seems legitimate to assume a C—C bond distance of 1.54 Å in this case also. If we further try to explain the $\frac{\sigma(r)}{r}$-curve assuming a planar carbon ring and fivefold symmetry of the molecule with valency angle F—C—F equal to 109.5°, the positions of the two first maxima are easily explained.

From Fig. 2, however, in which the r-values corresponding to this structure are

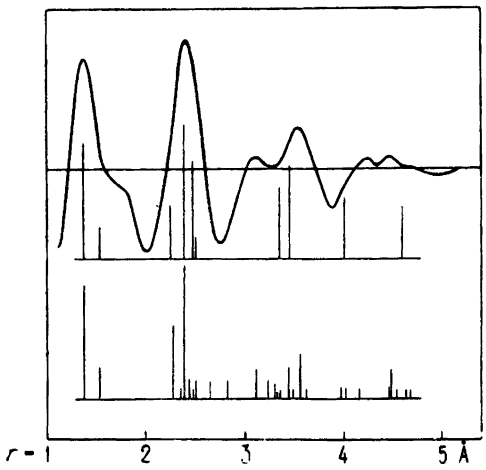

Fig. 2. $\frac{\sigma(r)}{r}$*-curve of decafluoro-cyclopentane.*

indicated in the line diagram just below the curve, it is seen that the positions of the remaining peaks are not in accordance with the pentagonal model described above. A less symmetrical structure, however, will give a satisfactory agreement with the experimental curve. We have not been able to demonstrate that the five-membered ring must necessarily be non-planar, but it seems rather probable that a deviation from a planar carbon ring is present. Models having atomic distances in agreement with the experimental curve may be obtained in different ways, all leading to more favourable F—F distances than those of the highsymmetrical model. A definitive solution of the problem can not be given at present based on the electron diffraction method. The model for instance having the internuclear distances represented by the line diagram at the bottom of Fig. 2 seems to be rather satisfactory, but other models may be regarded to be just as probable. The line diagram in the lower part of Fig. 2 corresponds to a model in which the carbon ring is non-planar, the carbon atom 1 being situated below the plane containing the carbon atoms 2, 4, 5 and the carbon atom 3 above this plane. The directions of the C—F bonds are chosen in a way which makes the average value of the shortest F—F distances greater than in the symmetrical model.

The dodecafluoro-cyclohexane used in this investigation was purchased from the Chemistry Department of Purdue University. A sample of very pure decafluoro-cyclopentane was offered us by professor G. H. Cady, Seattle, and we wish to express our gratitude to him for his kindness.

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On the Influence of pH and Inhibitors on the Ammonia and Nitrate Assimilation by Azotobacter

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Virtanen, Csáky and Rautanen [1] found in low nitrogen *Torula* yeast a relatively more rapid protein formation on nitrate feeding than on ammonia feeding. In the case of nitrate assimilation small amounts of oxime N were found, whereas no formation of oxime N could be detected when ammonia was assimilated. It could therefore be assumed that the nitrate assimilation possibly can proceed in a different way *i. e.* that it is not absolutely necessary to assume that the only way of assimilation of nitrate is the reduction to ammonia and assimilation of the latter.

In order to get some idea of the ammonia and nitrate assimilation by azotobacter, the influence of pH and some inhibitors on the assimilation of nitrate and ammonia by azotobacter has been studied. The bacteria *(Azotobacter chroococcum)* were cultivated on a nutrient medium containing salts and 0.5 % glucose [2, 3]. The same amount of N (5 mg %) was administered