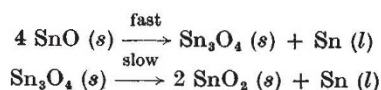


The metastable material decomposes on further heating into β -tin and stannic oxide. The kinetics of the decomposition are first order with respect to the intermediate oxide. The two reactions occurring during the disproportionation of stannous oxide are:



Differential thermal analysis measurements show that the disproportionation is indeed a two step process, both reactions being irreversible. This latter point is to be expected because stannous oxide, as a condensed phase, is itself thermodynamically unstable with respect to β -tin and stannic oxide⁶.

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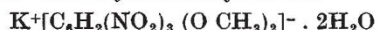
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Crystal Structure of Meisenheimer Complex

CHEMICAL and spectroscopic evidence exist for the equivalence of the attached substituent groups of Meisenheimer complexes¹, but the detailed structure of these complexes has not as yet been elucidated. We report here the structure of the 1,1-dimethoxy-2,4,6-trinitrobenzene ion. The crystal analysed was



and was obtained by recrystallization from acetonitrile. The space group and the unit cell dimensions are triclinic, $P\bar{1}$ with $a = 9.36$, $b = 10.84$, $c = 7.40 \pm 0.02$ Å, $\alpha = 87^\circ 40'$, $\beta = 106^\circ 43'$, $\gamma = 102^\circ 45' \pm 20'$, $Z = 2$, d calc = 1.65, and d obs = 1.64.

The structure was determined by a three-dimensional Patterson synthesis, and the refinement was carried out by the least squares method with isotropic temperature factors. The R -value at the present stage is 0.169 for 1,897 reflexions. The bond distances are shown in Fig. 1,

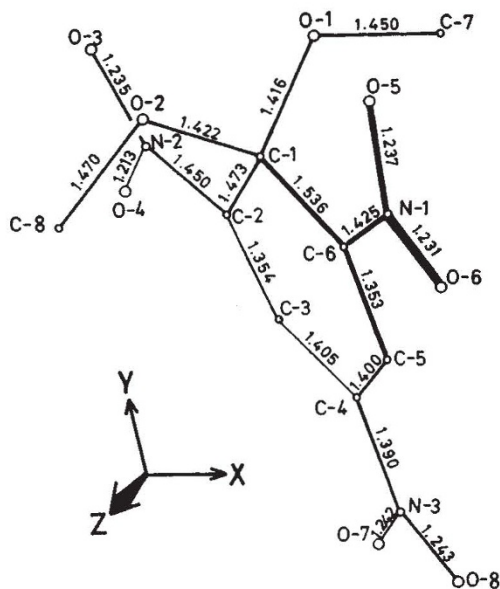


Fig. 1. Structure of Meisenheimer complex.

and the average standard deviation is 0.018 Å. It is remarkable that the two methoxy groups are attached to the benzene ring with the same bond distances. The atoms C-7, O-1, O-2 and C-8 lie almost in a plane, and this plane makes an angle of $87^\circ 50'$ with the benzene ring plane. Although the angle C-2, C-1, C-6 is $109^\circ 48'$, which is nearly equal to the tetrahedral angle, the benzene ring is still nearly planar, the largest deviation at C-2 being 0.03 Å.

Of the three nitro groups, that at the *para*-position and another at the C-1 *ortho*-position are twisted approximately 6° , while the third one at the C-6 *ortho*-position is twisted as much as $11^\circ 42'$. The difference in bond distances between C-1, C-6 and C-1, C-2 may be correlated with this difference of twisting. Except for this asymmetry all structures are nearly symmetrical; in particular, the two methoxyl groups are confirmed to be equivalent. All calculations were carried out at the Computation Centre of the University of Tokyo; the least square programme was supplied by the UNICS system.

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BIOPHYSICS

Effect of Gases on the Electrical Conductivity of β -Carotene

WE have studied the semiconductive and photoconductive properties of single crystals of β -carotene¹. During these and other studies, changes in the electrical conductivity in the presence of oxygen have been observed^{1,2}. The effect of gases on the conductivity of other organic crystals³⁻⁸ has indicated that these changes are caused by donor-acceptor interactions between the gas and the crystal. Studies of this type have been largely carried out with anthracene, which is generally regarded as an electron donor, and chloranil, an electron acceptor. β -Carotene, it has been said, should be both a good electron donor and also a good electron acceptor⁹. These properties of β -carotene are of interest in relation to Platt's theory of the role of β -carotene in the primary photosynthetic process¹⁰, and may be relevant to the mechanism of olfaction where it has been proposed that interactions between gas molecules and carotenoids may be involved¹¹⁻¹³. Here we present the results of an initial qualitative survey of the effect of various gases and vapours on the conductivity of single crystals of all *trans* β -carotene.

The methods of obtaining crystals of all *trans* β -carotene and of making conductivity measurements have been previously described¹. The studies reported here were confined to surface conductivity measurements in the *ab* plane of the crystal. 'Aquadag' was used throughout as the electrode material. The dark and photoconductivity of the crystals were measured *in vacuo* after a small amount of gas or vapour had been admitted to the dewar.

The dark conductivity of β -carotene *in vacuo* is rather low at room temperature ($\rho \sim 10^{17}$ /ohm cm). To be sure of observing both decreases and increases in conductivity most measurements were made at 70°C . Some measure-