Short Communications

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On the diffuse scattering from 1,3,5-triphenylbenzene.

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Equiscattering contours around 200 and 002 reciprocal-lattice points were plotted from a study of thermal diffuse scattering from 1,3,5-triphenylbenzene.

Recently the elastic constants of 1,3,5-triphenylbenzene have been determined from a study of diffuse-scattering regions surrounding reciprocal-lattice points (Chandra & Hemkar, 1973). Here we report information about the elastic-vibration amplitudes from the study of equidiffusion surfaces over which the diffuse intensity has a constant value.

In order to see the variation of diffuse intensity in different directions of propagation of thermal waves responsible for diffuse reflexions, equiscattering contours around the reciprocal nodes 200 and 002 were drawn following the method of Jahn (1942) and were plotted in reciprocal planes a^*b^*, a^*c^* and a^*c^*, b^*c^* respectively.

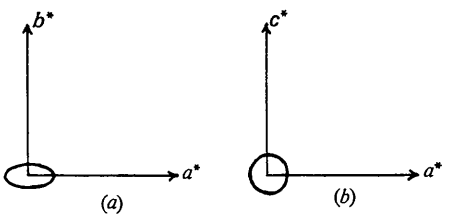

Fig. 1. Equiscattering contours around 200 in (*a*) a^*b^* and (*b*) a^*c^* reciprocal planes.

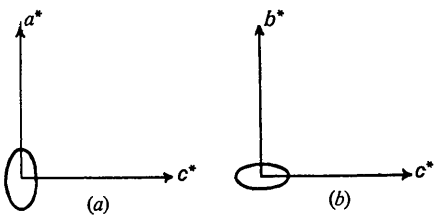

Fig. 2. Equiscattering contours around 002 in (*a*) a^*c^* and (*b*) b^*c^* reciprocal planes.

Equiscattering surfaces around the 200 node in the a^*c^* plane are circular while elliptical in the a^*b^* plane (Fig. 1) with the major axis lying parallel to the reciprocal-lattice vector corresponding to the 200 lattice point. The extension of the contour along $\mathbf{a}^*$ shows that the vibration of the longitudinal wave is higher than that of the transverse wave.

The shape of the equiscattering contours around 002 in the a^*c^* and b^*c^* planes is elliptical (Fig. 2). Their major axes are normal and parallel, respectively, to the vector corresponding to the 002 reciprocal-lattice point. Both the contours are symmetrical to the axes. The surfaces around 002 show extension along $\mathbf{a}^*$ in the a^*c^* plane (*i.e.* thermal wave vector $|\mathbf{q}|_{001} < |\mathbf{q}|_{100}$) and $\mathbf{c}^*$ in the b^*c^* plane (*i.e.* $|\mathbf{q}|_{001} > |\mathbf{q}|_{010}$), which implies that the amplitudes of vibration along these directions are large. The above inequalities are implicit in the values of experimentally determined elastic constants requiring $c_{33} > c_{55}$ and $c_{44} > c_{33}$.

It can be concluded from this that all the observations, as well as from a further analysis of the contours, are in complete agreement with the thermal theory of diffuse scattering.

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