Table 3. *Observed and calculated values of the structure factors*

hkl	$F_{obs.}$	$F_{calc.}$
020	12·8	−5·6
040	4·1	−1·7
060	0	2·6
080	10·9	11·9
0,10,0	0	−0·6
110	32·4	39·6
120	31·4	−34·5
130	23·1	22·8
140	4·9	1·1
150	7·8	−3·9
160	8·3	−6·3
170	10·0	−10·3
180	6·6	4·9
190	0	2·0
1,10,0	0	−5·0
200	16·5	−18·3
210	21·3	−21·2
220	43·3	50·2
230	7·5	−7·1
240	5·2	−2·3
250	11·5	−13·8
260	9·2	−9·4
270	6·4	−9·0
280	0	0·2
290	0	7·7
2,10,0	6·0	−5·4
310	18·3	−15·5
320	12·5	−12·3
330	9·8	−5·0
340	22·9	−24·5
350	1·9	−2·9
360	0	3·6
370	0	5·1
380	0	−5·1
390	8·0	−6·5
400	4·0	1·2
410	8·2	10·9
420	15·7	−13·6
430	22·4	−21·2
440	16·6	14·3
450	7·1	−8·1
460	0	−0·2
470	0	4·9
480	4·0	−8·2
510	8·8	−6·1
520	5·2	−3·7
530	2·5	−4·0
540	5·6	4·7
550	6·1	5·9
560	20·4	−14·3
600	7·0	−3·0
610	10·5	−16·1
620	0	−1·8
630	7·5	6·2
640	7·1	−7·8
650	0	3·6
660	5·6	4·4
670	4·0	−4·7
710	9·1	−7·2
720	10·8	9·7
730	8·4	8·0
740	2·3	−3·7
750	3·7	−4·6
800	8·6	3·9
810	12·7	12·3
820	0	2·0
830	0	1·1
840	3·2	−1·8
910	11·5	10·4
920	4·7	−4·6
930	5·9	−6·1
940	3·3	6·0
10,0,0	6·3	8·3
10,1,0	2·3	−3·3
10,2,0	5·2	4·9
11,1,0	6·4	4·1
002	17·6	19·3
004	7·8	−3·7
006	7·5	6·7
008	0	−0·2
101	4·3	1·0
$10\bar{1}$	48·3	54·5
103	24·0	−25·2
$10\bar{3}$	9·1	6·7
105	0	2·8
$10\bar{5}$	8·2	6·8
107	0	−0·7
$10\bar{7}$	0	0·4
202	12·4	−12·2
$20\bar{2}$	21·0	−23·7
204	0	1·4
$20\bar{4}$	10·1	7·5
206	0	−2·2
$20\bar{6}$	7·4	−0·6
208	0	0·6
$20\bar{8}$	4·3	−9·0
301	11·6	13·9
$30\bar{1}$	20·3	−25·5
303	6·3	−5·3
$30\bar{3}$	8·8	−9·5
305	9·3	−10·8
$30\bar{5}$	20·6	19·2
307	6·0	−6·5
$30\bar{7}$	0	−0·1
402	15·4	−16·6
$40\bar{2}$	22·6	−21·6
404	12·1	−9·2
$40\bar{4}$	4·4	−3·4
406	6·3	−5·8
$40\bar{6}$	10·2	9·9
501	9·6	−5·5
$50\bar{1}$	10·2	7·9
503	0	2·2
$50\bar{3}$	6·7	1·7
505	7·1	7·9
$50\bar{5}$	0	−2·2
507	0	−0·3
$50\bar{7}$	5·4	3·5
602	0	−0·2
$60\bar{2}$	7·1	8·9
604	12·0	11·4
$60\bar{4}$	9·2	12·6
701	11·8	−9·7
$70\bar{1}$	11·4	−11·2
703	7·4	0·6
$70\bar{3}$	9·1	−9·4
705	9·2	6·3
$70\bar{5}$	0	1·1
707	0	0
$70\bar{7}$	3·9	−2·2
802	0	−4·6
$80\bar{2}$	0	−3·3
804	9·8	10·1
$80\bar{4}$	10·6	−14·1
901	3·3	−1·3
$90\bar{1}$	15·9	14·2
903	0	−0·2
$90\bar{3}$	0	−0·2
905	3·3	0·3
$90\bar{5}$	11·5	−3·8
10,0,2	7·0	−7·8
$10,0,\bar{2}$	7·4	4·1
$11,0,\bar{1}$	10·1	10·0

Short Communications

Contributions intended for publication under this heading should be expressly so marked; they should not exceed about 500 *words; they should be forwarded in the usual way to the appropriate Co-editor; they will be published as speedily as possible; and proofs will not generally be submitted to authors. Publication will be quicker if the contributions are without illustrations.*

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X-Ray absorption in crystals set at the Bragg angle.

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In considering the intensity of reflection of X-rays from a crystal it is usually assumed that the incident beam in reaching the interior of the crystal is weakened by two effects: ordinary absorption, and the reflection of part of the beam by the upper layers of the crystal. Thus, in effect, a crystal set at the Bragg angle should show a higher apparent absorption coefficient than when off the Bragg angle (James, 1948, vol. 2, chap. 6). Some preliminary experiments in this Laboratory fail to confirm the existence of this effect.

A beam of copper $K\beta$ rays, rendered parallel and monochromatic by reflection from a cleavage plane of calcite, was diffracted by a second crystal. The second crystal was cut perpendicular to the reflecting plane so that when oriented in the reflecting position both the transmitted beam and reflected beam traversed the same amount of material.

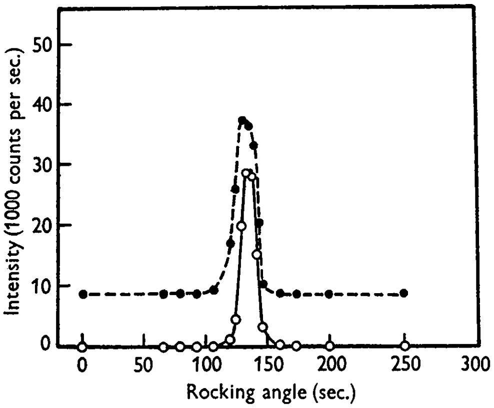

Fig. 1. Reflection from $(10\bar{1}1)$ plane in etched calcite crystal. Solid line: reflected beam; broken line: transmitted beam.

Two Geiger counters were set up; one to catch the transmitted beam and one to catch the reflected beam; and the crystal was rocked through the Bragg angle. Fig. 1 shows the intensities observed from the $(10\bar{1}1)$ plane in calcite.

These curves were obtained on a slice of calcite cut 3 mm. thick and reduced to 1 mm. by etching. The narrowness of the peak indicates that the crystal was fairly perfect. No extinction effect is observed; in fact there is an increase in the transmitted beam about equal to the intensity of the reflected beam. The slight relative shift of the beams is due to slight misalignment of the second crystal.

The homogeneity of the beams was checked by absorption in aluminum. The beam incident on the crystal contained 7 % short-wavelength radiation, the reflected beam 2·3 %. The beam transmitted within the reflection range consisted of about 20–50 % short-wavelength radiation, and the beam transmitted off the Bragg angle over 99 %! If corrected for this short-wavelength radiation, the curves in Fig. 1 would nearly coincide.

Fig. 2 shows the same effect in another slice of the same calcite crystal which was ground down from 3 to 0·7 mm. The grinding rendered the crystal quite imperfect as judged by the peak width. The same increase in intensity of the transmitted beam was found except for a small minimum in the peak. This may be an indication of the presence of two close domains in the crystal.

The increase in the transmitted intensity is small in the case of mica. A crystal of hexamethylenetetramine gave no increase. The transmitted intensity was constant within $\frac{1}{2}$ % through the whole reflection range.

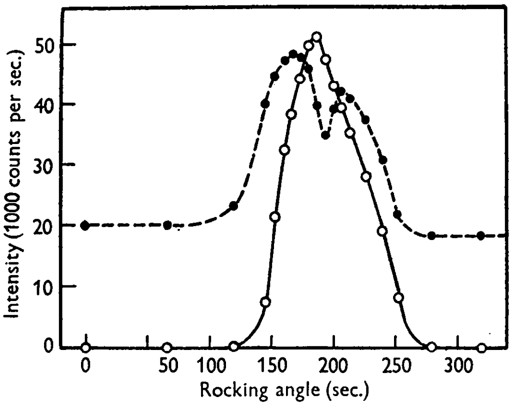

Fig. 2. Reflection from $(10\bar{1}1)$ plane in ground calcite crystal. Solid line: reflected beam; broken line: transmitted beam.

The best explanation of these data at this time is that when the Laue conditions are satisfied in a perfect crystal there is a resonance effect which decreases the effective absorption rather than increasing it as previously supposed. In a mosaic crystal this effect is not prominent. Dr F. W. Boggs of this Laboratory is considering an explanation involving wave propagation in a periodically conducting medium. The effect seems to be essentially that calculated by von Laue (1949) and investigated by Borrmann (1950) except that the curves do not have the same shape.

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The structure of potassium fluoride dihydrate.

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From the saturated aqueous solution, solid $KF.2H_2O$ forms needle-shaped crystals which are rapidly deliquescent. It was therefore necessary to carry out the diffraction studies in a dry atmosphere and to protect the crystals by a thin film of Formvar.

Observed structure factors were obtained by visual estimation of intensities from zero-, first- and second-level Weissenberg photographs around the *c* (needle) axis and a zero-level about [110], using unfiltered copper radiation. These were used without correction for absorption or