

X-ray Powder Data for Kasoite

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By

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Introduction

Kasoite is a barium silicate (BaO 25.50%) described in 1936 as a feldspar with extreme deficiency in SiO_2 from the Kaso mine, Japan by T. YOSHIMURA (1936), who concluded from the optical study that kasoite is a distinct mineral forming an isomorphous series with celsian. For its peculiar chemical composition, however, there may be possibilities that kasoite is not a feldspar or that the material is a mixture, *e. g.* perthite analogue consisting of feldspar and feldspathoid. Therefore, it is desirable to examine these points by means of X-ray, and YOSHIMURA suggested this work. This paper thus presents powder data for kasoite, which has been confirmed to be a feldspar.

Experimental

The kasoite sample examined is from the material of the original description. It forms a white compact veinlet with rhodonite, being lacking in single crystals. The powder pattern was taken with a Shimadzu X-ray diffractometer, using filtered Cu radiation ($\lambda=1.5405\text{\AA}$). Instrumental settings were: scanning speed, $1/4^\circ 2\theta$ per minute; chart speed, 5 mm per minute; full scale, 500 counts per second; time constant, 5 seconds; receiving slit, 0.1 mm. The readings of diffraction angles were corrected with an internal standard of silicon. The powder data obtained for kasoite are given in Table 1.

The powder pattern of kasoite is clearly of feldspar as compared in Fig. 1 with barium adularia (BaO 3.36%; YOSHIMURA, SHIROZU and KIMURA, 1954) and with celsian, which is artificial material obtained on heating synthetic hexacelsian (BaO 41.68%; YOSHIKI and MATSUMOTO, 1951) at 1550°C for 5 hours. Fig. 1 may indicate that kasoite is as a whole intermediate between these two feldspars as to powder pattern, and is rather close to celsian. But relative intensities of some reflections are not always intermediate.

The powder data of Table 1 for kasoite were indexed assuming kasoite to be isomorphous with celsian, and the calculations of the qualified reflections between 4\AA and 2.7\AA yielded the following cell dimensions:

$$\begin{aligned}a_0 &= 8.608\text{\AA}, \\b_0 &= 13.035\text{\AA}, \quad \beta = 115^\circ 26.7', \\c_0 &= 14.402\text{\AA}.\end{aligned}$$

The calculated spacing values of Table 1 based on this cell are in good agreement with the observed values. The cell dimensions of celsian (BaO 35.8%) given by R. E. NEWNHAM and H. D. MEGAW (1960) are: $a_0=8.627\text{\AA}$, $b_0=13.045\text{\AA}$, $c_0=14.408\text{\AA}$ $\beta=115^\circ 13'$. The dimensions of kasoite here obtained are slightly smaller than those of celsian. It may be explained primarily by the difference of their barium contents.

Thus the present results reveal that kasoite is a feldspar probably isomorphous with celsian, but afford no conclusion regarding the chemical complexity of kasoite and also regarding the probable discontinuity in the potassium-barium feldspar series.

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Table 1. X-ray powder diffraction data for Kasoite.

| <i>hkl</i> | $d_{\text{obs.}} (\text{\AA})$ | I | $Q_{\text{obs.}}$ | $Q_{\text{calc.}}$ | $d_{\text{calc.}} (\text{\AA})$ |
|----------------|--------------------------------|---------------|-------------------|--------------------|---------------------------------|
| 020] | 6.52 | 4 | .0235 | .02354 | 6.517 |
| 002] | | | | .02365 | 6.502 |
| 11 $\bar{2}$ | 5.87 | $\frac{1}{2}$ | .0290 | .02908 | 5.864 |
| 022 | 4.61 | 3 | .0471 | .04719 | 4.603 |
| 20 $\bar{2}$ | 4.23 | $\frac{1}{2}$ | .0559 | .05585 | 4.231 |
| 200 | 3.882 | 2 | .06636 | .06620 | 3.887 |
| 130 | 3.792 | 6 | .06954 | .06952 | 3.793 |
| 13 $\bar{2}$ | 3.624 | 3 | .07614 | .07617 | 3.623 |
| 22 $\bar{2}$ | 3.549 | 3 | .07939 | .07940 | 3.549 |
| 11 $\bar{4}$ | 3.471 | 7 | .08301 | .08304 | 3.470 |
| 220 | 3.338 | 10 | .08974 | .08975 | 3.338 |
| 20 $\bar{1}$ | 3.282 | 3 | .09283 | .09280 | 3.283 |
| 004 | 3.251 | 9 | .09461 | .09460 | 3.251 |
| 132 | 3.013 | 6 | .11015 | .11017 | 3.013 |
| 042 | 2.913 | 4 | .11785 | .11782 | 2.913 |
| 13 $\bar{1}$ | 2.772 | 3 | .13014 | .13012 | 2.772 |
| 22 $\bar{2}$] | 2.603 | 2 | .14758 | .14740 | 2.605 |
| 31 $\bar{4}$] | | | | .14744 | 2.604 |
| 24 $\bar{2}$ | 2.581 | 4 | .15011 | .15002 | 2.582 |
| 114 | 2.574 | 4 | .15093 | .15104 | 2.573 |
| 310 | 2.539 | 2 | .15512 | .15484 | 2.541 |
| 15 $\bar{3}$ | 2.423 | 2 | .17033 | .17034 | 2.423 |
| 33 $\bar{2}$ | 2.391 | 1 | .17492 | .17458 | 2.393 |
| 11 $\bar{6}$ | 2.329 | 2 | .18435 | .18428 | 2.329 |
| 33 $\bar{1}$ | 2.266 | $\frac{1}{2}$ | .19474 | .19452 | 2.267 |
| 134 | 2.246 | $\frac{1}{2}$ | .19824 | .19812 | 2.247 |
| 152 | 2.213 | 1 | .20419 | .20434 | 2.212 |
| 060 | 2.174 | 4 | .21157 | .21187 | 2.173 |

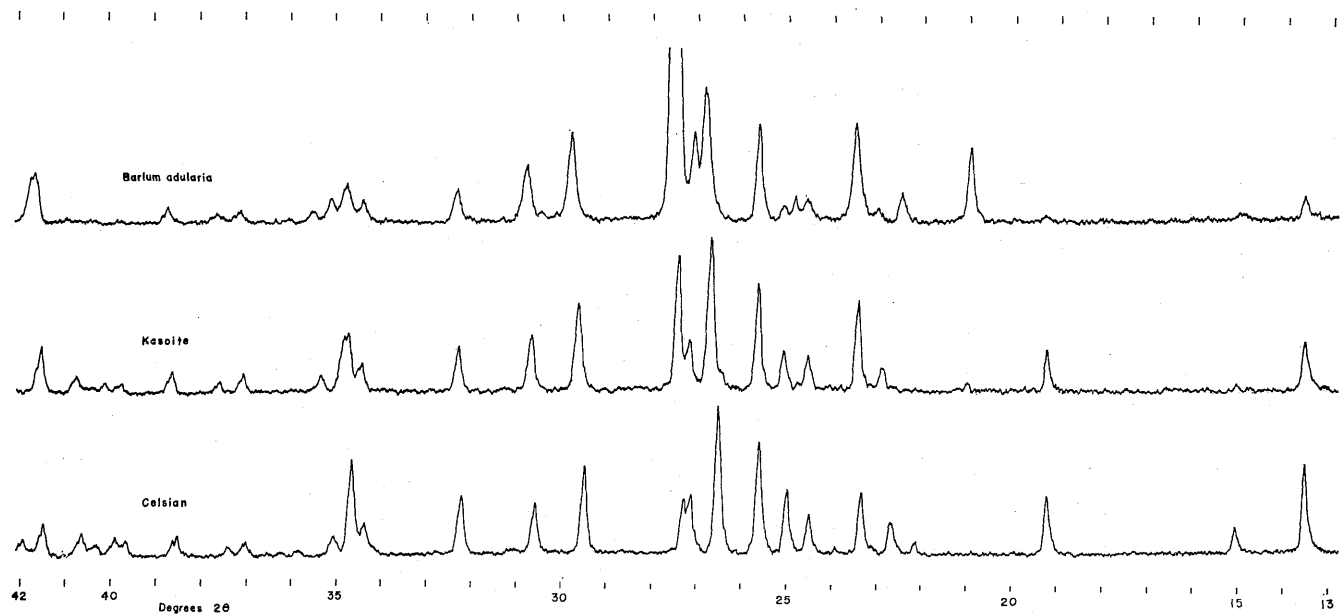


Fig. 1. X-ray powder diffraction patterns of barium feldspars.

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