plete study of the deposit suggested essentially the same conditions but, although she did not mention the chromium separately, appeared to favor the derivation of constituent elements from the original sediment. She thought the suggestion of Taber (1913) that the kyanite-bearing rock might have been formed as a result of contact metamorphism associated with intrusion of the "Columbia granite" to be an unlikely answer.

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A COMPLEX FORM OF NATURAL NEPHELINE FROM IIVAARA, FINLAND

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In a paper dealing with the petrology of the cancrinite-ijolite from the alkaline massif of Iivaara in northern Finland, Lehijärvi (1956) described a nepheline with 19.8 atomic %K/(K+Na+Ca). The same nepheline sample was also used by Smith and Sahama (1954) in developing an x-ray method for determining the composition of natural nephelines. Another sample of nepheline that, according to a personal communication of Mr. Lehijärvi, originates from an exactly similar rock specimen (this Institute collection No. 9341) from the same locality, was investigated by single crystal x-ray methods. The result of this study is briefly summarized in the following.

In addition to the strong reflections that correspond to the ordinary nepheline structure with $a_0 = 10$ Å and $c_0 = 8.4$ Å, a series of rotation and Weissenberg photographs revealed a pattern of weak extra reflections which are observable only on strongly exposed photographs. These weak reflections indicate that the ordinary nepheline cell is only a pseudo cell and that the true cell is considerably larger. Like the pseudo cell, the true cell is also hexagonal. The a-axes of the cells are at an angle of 30°. The dimensions of the true cell are: $a_0=17.4$ Å; $c_0=76$ Å ± 1 or 2%. A rotation photograph about the c-axis shows the presence or absence of the following layer lines:

Layer lines with $l=9n$ .... strong.
Layer lines with $l=9n\pm 2$ .... very weak.
Layer lines with $l\not\equiv 9n$ or $9n\pm 2$ .... absent.

As revealed by the Weissenberg photographs, the rules limiting possible reflections are:

For $(hk\bar{i}l)$ reflections: if $l=9n$ then $l-h$ and $l-k=3n$.
if $l=9n\pm 2$ then there are no restrictions.
For $(000l)$ reflections: $l=18n$.

The extra reflections of the true cell are too weak to allow a determination of the space group to be made with any certainty.

The author is indebted to Dr. J. V. Smith, of the Pennsylvania State University, for checking the measurements of the x-ray films.

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A CHART SHOWING THE SPHERE OF INFLUENCE OF ATOMS AND IONS IN MINERALS

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A chart showing both the radii and valences of the atoms and ions which enter into minerals can easily be constructed by pressing transparent colored Zip-a-tone circles onto a large size (76″×52″) periodic chart of the elements (Fig. 1). The chart is entirely visual and at a glance one can tell the valence of the ion and its relative size. It has proven to be particularly useful in teaching mineralogy and geology courses dealing with mineral formation. The chart is easily amenable to changes as the colored Zip-a-tone circles are easily replaceable.

The data for the selection of valences found in minerals were taken