Method of Recovery*

The cost of separation may be reduced somewhat by partial recovery of the solution. The following method was tried and found to recover about one-half of the solution.

The used solution is added to the washings. An excess of potassium iodide is thus introduced from the washings. This is desirable since the mercuric iodide will crystallize first out of solution unless the potassium iodide is present in slight excess of the stoichiometric proportions of the double salt. With evaporation, this double salt will be the first to crystallize out. When the solution is evaporated about half-way to dryness and permitted to cool, these crystals may be collected, the liquid being drawn off by suction. The dry crystals are re-dissolved with hot distilled water and the liquid is evaporated as in the original preparation. The resulting solution will have the correct specific gravity since it is made of the pure double salt. The purpose for evaporating only half-way to dryness is to keep the excess potassium iodide in solution. If this should crystallize out and be dissolved along wih the double salt, then the resulting solution will have too low a specific gravity.

* Procedure suggested by A. Rosenzweig, Department of Geology, Bryn Mawr College, Bryn Mawr, Pennsylvania.

THE SUPERABUNDANT INDEX IN THE HEXAGONAL BRAVAIS SYMBOL

J. D. H. Donnay, *The Johns Hopkins University, Baltimore 18, Maryland.*

Every crystallographer knows that, in the hexagonal four-index symbol referred to the Bravais axes, the sum of the first three indices is zero. This is why one of these indices, usually the third one, is often omitted altogether and replaced by a period. The general form is then symbolized $\{hk.l\}$. The period stands for $-(h+k)$.

Example: $\{21.4\}=\{21\bar{3}4\}$.

The purpose of the four-index symbol, however, is to bring out the symmetry of the form, by the permutations of the first three indices. Leaving out one of the three defeats the very purpose of the notation. The third index should, therefore, be explicitly written. Some authors represent it by the letter i, others by the same letter i surmounted by a negative sign ($\bar{i}$). This has been a source of misunderstanding.[1]

[1] Pabst, A., *Am. Mineral.*, **32,** 16–30 (1947). Professor Pabst now states (priv. comm.) that he would like to amend his text by deleting lines 15–16 and footnote 5, on page 21. His criteria are written for the general form $\{hkil\}$.

If the symbol is written $\{hkil\}$, then obviously $i=-(h+k)$. If, however, the symbol $\{hk\bar{i}l\}$ is used, then $i=h+k$. In the example given above, $\{21\bar{3}4\}$, authors of the first school will say that $i=\bar{3}$, the others will take $i=3$.

There is an advantage in using the minus sign over the i in the symbol $\{hk\bar{i}l\}$ because the form is symbolized by a face that has its first two indices positive, so that the third index is always negative. (The symbol of the form is, of course, spoken thus: "h, k, minus i, l.") This procedure has been adopted by A. F. Rogers in his first edition.[2] The same principle was followed by Kraus,[3] who used $\{hi\bar{k}l\}$, with $k=h+i$. This notation has been retained in Kraus, Hunt and Ramsdell.[4]

Lately (and here is where the trouble comes from), printers have omitted the dot over the i wherever the i is surmounted by the minus sign. This, I understand, is being done for the sake of typographical elegance! Examples of this kind of type setting are found in Rogers' third edition, in the new Dana,[5] and in my recent paper on hexagonal symbols.[6] The reader is urged to realize that $(hk\bar{\imath}l)$ stands for $(hk\bar{i}l)$, so that $i=h+k$ is still true. Likewise, in a zone symbol $[uv\bar{\jmath}w]$, the dot over the j is omitted, but $j=u+v$.

[2] Rogees, A. F., *Introduction to the Study of Minerals*, McGraw-Hill, New York. First ed. 1912 (see page 44). Third ed. 1937 (see page 76).

[3] Kraus, E. H., *Essentials of Crystallography*. Wahr, Ann Arbor, Mich., 1906. (see page 48).

[4] Kraus, E. H., Hunt, W. F., and Ramsdell, L. S., *Mineralogy*. McGraw-Hill, New York. First ed., 1920. Second ed., 1928. Third edition 1936.

[5] Palache, C., Berman, H., and Frondel, C., *Dana's System of Mineralogy*, 7th edition, vol. 1. Wiley, New York, 1944. On page 25, line 8 up, some copies show $\bar{\imath}=(h+k)$, others show $i=(h+k)$; the latter is correct.

[6] Donnay, J. D. H., *Am. Mineral.*, **32,** 52–58 (1947).