De kristalstructuur der alkaliperrhenaten en -perjodaten.

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SUMMARY.

In connection with the investigation of some *alkali-osmiamates* carried out in this laboratory, the crystal structure of a number of *perrhenates* and *periodates* was investigated.

It was found that the *„scheelite structure"*, which was already met with in the cases of $KReO_4$, $AgReO_4$, $NaIO_4$, KIO_4 and $AgIO_4$, was also present in those of $NaReO_4$ and of the NH_4- and *Rb*-salts. On the contrary, the *Cs*-salts belong to a different structure-type; the latter is, however, closely related to the „scheelite"type and can be derived from it by a slight deformation, which causes the symmetry of the latter to be changed from a *tetragonal*, to a *pseudo-tetragonal, orthorhombic* one.

$TlReO_4$ has a transition temperature at 123° C. Above this temperature, it possesses the „scheelite" structure; below this temperature, it is rhombic and isomorphous with the *Cs*-salt in the present case, the pseudo-tetragonal character of this second modification of the *Tl*-salt is, moreover, particularly clearly expressed.

The dimensions of the elementary cell of all these salts were accurately determined:

Tetragonal Salts:

	a_0(Å)	c_0(Å)
$NaReO_4$	5,362 ± 0,001	11,718 ± 0,002
NH_4ReO_4	5,871 ± 0,003	12,942 ± 0,007
$RbReO_4$	5,803 ± 0,003	13,167 ± 0,007
$TlReO_4$	5,761 ± 0,005	13,33 ± 0,01
NH_4IO_4	5,983 ± 0,003	12,790 ± 0,007
$RbIO_4$	5,874 ± 0,003	12,938 ± 0,007

Orthorhombic Salts:

	a_0(Å)	b_0(Å)	c_0(Å)
$CsReO_4$	5,737 ± 0,003	5,968 ± 0,003	14,241 ± 0,007
$TlReO_4$	5,623 ± 0,003	5,791 ± 0,003	13,295 ± 0,007
$CsIO_4$	5,838 ± 0,003	6,014 ± 0,003	14,364 ± 0,007

The spacegroup of these orthorhombic salts is V_h^{16}.

The following positions were ascribed to the *Cs*- or, as the case may be, to the *Tl*-atoms, and to the *Re*- or *I*-atoms:

4 *Cs (Tl):* $[u, \frac{1}{4}, \frac{1}{8}]$ $[\bar{u}, \frac{3}{4}, \frac{7}{8}]$ $[u+\frac{1}{2}, \frac{1}{4}, \frac{3}{8}]$ $[\frac{1}{2}-u, \frac{3}{4}, \frac{5}{8}]$.

4 *Re (I):* $[\bar{u}, \frac{1}{4}, \frac{5}{8}]$ $[u, \frac{3}{4}, \frac{3}{8}]$ $[\frac{1}{2}-u, \frac{1}{4}, \frac{7}{8}]$ $[u+\frac{1}{2}, \frac{3}{4}, \frac{1}{8}]$.

The value of the parameter u in $CsReO_4$ is: 0,042; in $TlReO_4$ it is: *0,00* and in $CsIO_4$ it is: *0,030*.

A rational explanation of the striking fact that the *Cs*-salts in the series of the perrhenates and periodates have the same structure as the (NH_4)-, *Rb*- and *Tl*-salts in the series of the osmiamates, — has been given, in which considerations about the relative deformabilities of the three kinds of complex ions more especially are brought to the fore.