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## De kristalstructuur der alkaliperrhenaten en -perjodaten.

Beintema, Jakob

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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  $123^\circ C$ . 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:*

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

### *Orthorhombic Salts:*

	$a_0(\text{\AA})$	$b_0(\text{\AA})$	$c_0(\text{\AA})$
$CsReO_4$	$5,737 \pm 0,003$	$5,968 \pm 0,003$	$14,241 \pm 0,007$
$TlReO_4$	$5,623 \pm 0,003$	$5,791 \pm 0,003$	$13,295 \pm 0,007$
$CsIO_4$	$5,838 \pm 0,003$	$6,014 \pm 0,003$	$14,364 \pm 0,007$

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:

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

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

The value of the parameter  $u$  in  $\text{CsReO}_4$  is: 0,042; in  $\text{TlReO}_4$  it is: 0,00 and in  $\text{CsIO}_4$  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  $(\text{NH}_4)$ -, *Rb*- and *Tl*-salts in the series of the osmiumates, — has been given, in which considerations about the relative deformabilities of the three kinds of complex ions more especially are brought to the fore.

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