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Preliminary Note

Structural Studies of Strontium Nitrate Tetrahydrate and Monohydrated Mercuric Oxynitrate

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Preparation of the crystals

a) Single crystals of strontium nitrate tetrahydrate, $Sr(NO_3)_2 \cdot 4H_2O$, were obtained by slow evaporation of a saturated aqueous solution. Once grown and separated from the mother liquor, the crystals become very unstable in air. They lose water to form $Sr(NO_3)_2$. To protect them, the crystals were transferred to thin-walled Lindemann glass capillary tubes together with the mother liquor which was on their surfaces. The tubes were then sealed.

b) Single crystals of monohydrated mercuric oxynitrate, $HgO \cdot Hg(NO_3)_2 \cdot H_2O$ or $HgOHNO_3$, were obtained by saturating nitric acid of sp. gr. 1.45 with mercuric oxide and then slowly evaporating the solution, as previously described[1]. The single crustals are colourless transparent monoclinic prisms, stable in air and in soluble in cold water.

Crustallographic and X-ray data

The crystal data of both compounds were obtained from oscillation and Weissenberg X-ray diffraction photographs. Nickel filtered CuKα radiation was used. The positions of the strontium and mercury atoms were determined from Patterson projections.

a) The dimensions of the unit cell of strontium nitrate tetrahydrate, which contains four formula units (calculated density is 2.27 g. cm^{-3} and the measured one is 2.26 g. cm^{-3}), are as follows:

$a = 9.27$ Å; $b = 14.17$ Å; $c = 6.34$ Å; $\beta = 91^0$.

The a : b : c ratios found in this and in previous work [2] are:

a : b : c = 0.655 : 1 : 0.448 (this work)
a : b : c = 0.6547 : 1 : 0.8976 (Groth[2])

The following systematic absences were observed:

hkl reflections, absent for h + k + l odd and

h0l reflections, absent for l (and h) odd, so that the space group is body-centered Ic or I2/c, which is equivalent to C_{2h}^6 (C2/c) or C_s^4 (Cc) if the

a axis is chosen differently, as follows:

$a = 11.12$ Å; $b = 14.17$ Å; $c = 6.34$ Å; $\beta = 123^{0}45'$.

Because we could not observe a piezoelectric effect, we concluded that the space group is C_{2h}^{6} (C2/c). The strontium atoms lie on the two-fold axes and have the position (e): 0, y, 1/4; 0, —y, 3/4 with $y = 0.216$.

b) The dimensions of the unit cell of monohydrated mercuric oxynitrate, which contains four formula units (calculated density is 5.59 g. cm^{-3}; measured density is 5.47 g. cm^{-3}) are as follows:

$a = 6.57$ Å; $b = 7.19$ Å; $c = 7{,}83$ Å; $\beta = 115^{0}40'$.

The observed systematic absences of reflections are:

h0l reflections when l is odd and

0k0 reflections when k is odd, so that the space group is C_{2h}^{5} (P2 /c). The coordinates of mercury atoms are: $x = 0$; $y = 1/8$; $z = 1/4$.

The complete crystal structure determination of both compounds is now in course.

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REFERENCES

1. J. W. Mellor, *A Comprehensive Treatise on Inorganic and Theoretical Chemistry*, Langmans, Green & Co., London, 1923. **Vol. IV,** p. 994.
2. P. Groth, *Chemische Krystallographie*, Engelman, Leipzig, 1908. **Vol. II,** p. 119.

IZVOD

Strukturna istraživanja stroncijeva nitrata tetrahidrata i bazičnog živa(II) nitrata monohidrata

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Metodom rendgenske strukturne analize određene su veličine elementarne ćelije, prostorne grupe i položaji atoma stroncija i žive.

Kristali stroncijeva nitrata tetrahidrata su monoklinskog sustava i pripadaju prostornoj grupi C_{2h}^{6} (C2/c). Dimenzije elementarne ćelije jesu: $a = 11.12$; $b = 14.17$; $c = 6.34$ Å; $\beta = 123^{0}45'$; $Z = 4$. Koordinate stroncijeva atoma određene su iz Pattersonovih projekcija i iznose: 0, y, 1/4 i 0, —y, 3/4 gdje je $y = 0{,}216$.

Kristali bazičnog živa(II) nitrata monohidrata jesu monoklinski, pripadaju prostornoj grupi C_{2h}^{5} ($P2_1/c$) i imaju dimenzije elementarne ćelije: $a = 6.57$; $b = 7.19$; $c = 7.83$ Å; $\beta = 115^{0}40'$; $Z = 4$. Koordinate živinog atoma: $x = 0$; $y = 1/8$; $z = 1/4$; određene su iz Pattersonovih projekcija.

Daljnja istraživanja struktura ovih spojeva su u toku.

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