

PECULIARITIES OF THE REACTIONS OF TRI(META-TOLYL)ANTIMONY AND TRI(ORTHO-TOLYL)ANTIMONY WITH 2-NITROBENZALDOXIME. THE MOLECULAR STRUCTURES OF BIS(2-NITROBENZALDOXIMATO)TRI(META-TOLYL)ANTIMONY, μ_2 -OXO-BIS[(2-NITROBENZALDOXIMATO)TRI(META-TOLYL)ANTIMONY] AND BIS(2-NITROBENZALDOXIMATO)TRI(ORTHO-TOLYL)ANTIMONY

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*Bis(2-nitrobenzaldoximato)tri(meta-tolyl)antimony (1), μ_2 -oxo-bis[(2-nitrobenzaldoximato)-tri(meta-tolyl)antimony] (2) and bis(2-nitrobenzaldoximato)tri(ortho-tolyl)antimony (3) have been obtained by the reactions of tri(meta-tolyl)antimony and tri(ortho-tolyl)antimony with 2-nitrobenzaldoxime in the presence of an oxidizing agent (hydrogen peroxide or *tert*-butyl hydroperoxide). Compounds 1–3 have been characterized by X-ray diffraction analysis.*

Keywords: tri(m-tolyl)antimony, tri(o-tolyl)antimony, 2-nitrobenzaldoxime, tert-butyl hydroperoxide, hydrogen peroxide, oxidizing reactions, bis(2-nitrobenzaldoximato)-tri(m-tolyl)antimony, μ_2 -oxo-bis[(2-nitrobenzaldoximato)tri(m-tolyl)antimony], bis(2-nitrobenzaldoximato)tri(o-tolyl)antimony, molecular structures, X-ray analysis.

Introduction

The oxidative synthesis is an effective single-stage way of synthesis of antimony (V) derivatives Ar_3SbX_2 . It has been found that the products of oxidative addition reactions of triarylantimony and oximes, depending on the oxime nature and the reaction conditions, are Ar_3SbX_2 or $(\text{Ar}_3\text{SbX})_2\text{O}$ (Ar = Ph, *p*-Tol, *o*-Tol; X = ONCHR, ONCRR') [1–6]. According to X-ray analysis data, the X ligands are monodentate, they form only one bond with the antimony atom through the oxygen atom. However, both types of molecules have decreased distances between the antimony atom and the iminoxy group nitrogen atoms, but it does not appreciably distort trigonal bipyramidal coordination of the central atom. By the example of derivatives containing furfuraloximate ligands it has been shown that the type of ligand coordination can be dependent on the nature of aryl radicals at the antimony atom. Thus, furfuraloxime ligands in the molecule of *bis*(μ_2 -furfuraloximato)-(μ_2 -oxo)-*bis*[triphenylantimony] are bidentate bridging ligands. These ligands are coordinated by the oxygen atom to the first antimony atom and by the nitrogen atom to the second antimony atom. This fact increases antimony coordination number to six [7]. However, the molecule of μ_2 -oxo-*bis*[(furfuraloximato)tri(*o*-tolyl)antimony] has the regular molecular structure for this type of compounds, typically with monodentate ligands [6]. 2-Oxybenzaldoxime has different coordination types and denticity in the derivatives of triphenyl- and *tris*(5-bromo-2-methoxyphenyl)bismuth [2, 8, 9].

Further investigation of the oxidative addition reactions of triarylantimony with different types of oximes and determination of the product molecular structures are of obvious chemical interest.

Thus, the reactions of tri(*o*-tolyl)- and tri(*m*-tolyl)antimony with 2-nitrobenzaldoxime in the presence of an oxidizing agent (hydrogen peroxide or *tert*-butyl hydroperoxide) and the product molecular structures are discussed at this paper.

Experimental

Synthesis of *bis*[2-nitrobenzaldoximato]tri(*m*-tolyl)antimony (1)

a) Tri(*m*-tolyl)antimony (100 mg, 0.25 mmol) and 2-nitrobenzaldoxime (42 mg, 0.25 mmol) were dissolved in the mixture of diethyl ether (25 ml) and heptane (5 mL). Then hydrogen peroxide (28 mg, 30 % aqueous, 0.25 mmol) was added. The solution was left to stand for 24 hours at 20 °C. After the solvent evaporation, the solid residue was repeatedly washed with warm toluene. The light-yellow crystals **1** (56 mg, 36 %, MP: 124 °C) were obtained from the toluene. The microcrystalline powder, poorly soluble in toluene, had MP = 247 °C.

b) Tri(*m*-tolyl)antimony (100 mg, 0.25 mmol) and 2-nitrobenzaldoxime (84 mg, 0.50 mmol) were dissolved in the mixture of diethyl ether (25 ml) and heptane (5 mL). Then hydrogen peroxide (28 mg, 30 % aqueous, 0.25 mmol) was added. The solution was left to stand for 24 hours at 20 °C. After the solvent evaporation the light-yellow crystals **1** (MP: 121 °C) were obtained; the yield was 98 mg (46 %).

IR spectrum (ν , cm^{-1}): 1609, 1585, 1557, 1522, 1476, 1450, 1402, 1377, 1348, 1302, 1207, 1163, 1123, 1099, 1040, 976, 959, 912, 885, 849, 793, 779, 743, 689, 665, 644, 577, 550, 513, 503, 449, 428.

Synthesis of μ_2 -oxo-*bis*[(2-nitrobenzaldoximato)tri(*m*-tolyl)antimony] (2)

a) Tri(*m*-tolyl)antimony (100 mg, 0.25 mmol) and 2-nitrobenzaldoxime (84 mg, 0.5 mmol) were dissolved in the mixture of diethyl ether (25 ml) and heptane (5 mL). Then *tert*-butyl hydroperoxide (32 mg, 70 % aqueous, 0.25 mmol) was added. The solution was left to stand for 24 hours at 20 °C. After the solvent evaporation the solid residue was repeatedly washed with small portions of diethyl ether. The light-yellow crystals **2** were obtained; the product yield was 122 mg (56 %), MP: 127 °C.

b) Tri(*m*-tolyl)antimony (100 mg, 0.25 mmol) and 2-nitrobenzaldoxime (42 mg, 0.25 mmol) were dissolved in the mixture of diethyl ether (25 ml) and heptane (5 mL). Then *tert*-butyl hydroperoxide (32 mg, 70 % aqueous, 0.25 mmol) was added. The solution was left to stand for 24 hours at 20 °C. After the solvent evaporation the light-yellow crystals **2** (MP: 127 °C; yield 155 mg (89 %)) were obtained.

IR spectrum (ν , cm^{-1}): 1647, 1609, 1582, 1557, 1522, 1477, 1450, 1439, 1404, 1381, 1341, 1296, 1204, 1167, 1142, 1123, 1097, 1074, 1042, 970, 947, 922, 885, 847, 779, 741, 691, 642, 575, 544, 521, 503, 478, 426.

Synthesis of *bis*[2-nitrobenzaldoximato]tri(*o*-tolyl)antimony (3)

a) Tri(*o*-tolyl)antimony (100 mg, 0.25 mmol) and 2-nitrobenzaldoxime (85 mg, 0.50 mmol) were dissolved in ether (30 mL). Then hydrogen peroxide (28 mg, 30 % aqueous, 0.25 mmol) was added. The solution was left to stand for 24 hours at 20 °C. When the solvent was evaporated, fine-crystalline precipitate was crystallized from toluene with the addition of heptane to give light-yellow crystals **3**; yield was 175 mg (94 %), MP: 181 °C.

IR spectrum (ν , cm^{-1}): 1606, 1584, 1522, 1472, 1443, 1427, 1382, 1346, 1325, 1296, 1277, 1206, 1164, 1123, 1081, 1036, 966, 955, 912, 885, 849, 787, 745, 696, 644, 578, 543, 514, 489, 436.

b) Tri(*o*-tolyl)antimony (100 mg, 0.25 mmol) and 2-nitrobenzaldoxime (85 mg, 0.50 mmol) were dissolved in the solution of benzene with addition of heptane (5:1; 30 mL). Then *tert*-butyl hydroperoxide (32 mg, 70% aqueous, 0.25 mmol) was added. The solution was left to stand for 24 hours at 20 °C. The light-yellow crystals **3** were obtained; the product yield was 184 mg (99 %), MP: 187 °C.

c) Tri(*o*-tolyl)antimony (100 mg, 0.25 mmol) and 2-nitrobenzaldoxime (42 mg, 0.25 mmol) were dissolved in the solution of benzene with addition of heptane (5:1; 30 mL). Then hydrogen peroxide (28 mg, 30% aqueous, 0.25 mmol) was added. The solution was left to stand for 24 hours at 20 °C. The solid precipitate was washed with small portions of heated toluene. The light-yellow crystals (MP: 187 °C) **3** and white fine powder (MP > 300 °C) were obtained.

d) Tri(*o*-tolyl)antimony (100 mg, 0.25 mmol) and 2-nitrobenzaldoxime (42 mg, 0.25 mmol) were dissolved in the solution of benzene with the addition of heptane (5:1; 30 mL). Then *tert*-butyl hydroperoxide (32 mg, 70 % aqueous, 0.25 mmol) was added. The solution was left to stand for 24 hours at 20 °C. The light-yellow crystals **3** (MP: 187 °C) and white fine powder (MP > 300 °C) were obtained.

IR spectra of compounds **1–3** were recorded on Shimadzu IRAffinity-1S FTIR spectrometer (KBr pellets; 4000–400 cm^{-1}).

X-ray diffraction analysis of crystalline substances **1–3** was performed on Bruker D8 QUEST automatic four-circle diffractometer (Mo K α - emission, $\lambda = 0.71073 \text{ \AA}$, graphite monochromator).

The data were collected and analyzed, the unit cell parameters were refined, and the absorption correction was applied using the *SMART* and *SAINTE-Plus* programs [10]. All calculations for structure determination and refinement were performed using the *SHELXL/PC* program [11]. Molecular structures **1–3** were determined by the direct method and refined by the least-squares method, in the anisotropic approximation for non-hydrogen atoms. The selected crystallographic data and the structure refinement results are listed in Table 1. Selected bond lengths and bond angles are summarized in Table 2.

The full tables of atomic coordinates, bond lengths, and bond angles were deposited with the Cambridge Crystallographic Data Centre (CCDC 1048763, 1048167, 1048131 for compounds **1**, **2** and **3**, respectively; deposit@ccdc.cam.ac.uk; <http://www.ccdc.cam.ac.uk>).

Table 1
Crystallographic data and the experimental and structure refinement parameters for compounds **1–3**

Parameter	Value		
	1	2	3
Empirical formula	C ₃₅ H ₃₁ N ₄ O ₆ Sb	C ₅₆ H ₅₂ N ₄ O ₇ Sb ₂	C ₃₅ H ₃₁ N ₄ O ₆ Sb
Formula weight	725.39	1136.52	725.39
<i>T</i> , K	273.15	273.15	273.15
Crystal system	Monoclinic	Triclinic	Monoclinic
Space group	P2 ₁ /n	P-1	P2 ₁ /n
<i>a</i> , Å	18.079(2)	11.3885(7)	19.7939(6)
<i>b</i> , Å	9.5431(10)	12.2767(6)	8.4059(2)
<i>c</i> , Å	20.628(2)	21.9637(13)	21.0674(6)
α , deg	90.00	99.923(3)	90.00
β , deg	112.008(4)	95.110(3)	109.6450(10)
γ , deg	90.00	107.511(3)	90.00
<i>V</i> , Å ³	3299.6(6)	2852.1(3)	3301.28(16)
<i>Z</i>	4	2	4
$\rho_{\text{(calcd.)}}$, g/cm ³	1.460	1.323	1.459
μ , mm ⁻¹	0.887	0.997	0.886
<i>F</i> (000)	1472.0	1148.0	1472.0
Crystal size, mm	0.38 × 0.21 × 0.12	0.41 × 0.24 × 0.19	0.34 × 0.19 × 0.1
θ Range of data collection, deg	4.98–47.32°	2.93–25.47°	2.63–26.45°
Range of refraction indices	20 ≤ <i>h</i> ≤ 20, -10 ≤ <i>k</i> ≤ 10, -23 ≤ <i>l</i> ≤ 23	-13 ≤ <i>h</i> ≤ 13, -14 ≤ <i>k</i> ≤ 14, -26 ≤ <i>l</i> ≤ 26	-24 ≤ <i>h</i> ≤ 24, -10 ≤ <i>k</i> ≤ 10, -25 ≤ <i>l</i> ≤ 26
Measured reflections	20432	44671	29107
Independent reflections	4898	10271	6776
<i>R</i> _{int}	0.0721	0.0817	0.0372
Refinement variables	418	628	418
<i>GOOF</i>	1.254	1.083	1.023
<i>R</i> factors for $F^2 > 2\sigma(F^2)$	<i>R</i> ₁ = 0.0795, <i>wR</i> ₂ = 0.1974	<i>R</i> ₁ = 0.0632, <i>wR</i> ₂ = 0.1443	<i>R</i> ₁ = 0.0296, <i>wR</i> ₂ = 0.0641
<i>R</i> factors for all reflections	<i>R</i> ₁ = 0.1071, <i>wR</i> ₂ = 0.2088	<i>R</i> ₁ = 0.1133, <i>wR</i> ₂ = 0.1688	<i>R</i> ₁ = 0.0444, <i>wR</i> ₂ = 0.0698
Residual electron density (min/max), e/Å ³	1.70/–0.64	1.19/–1.15	0.47/–0.31

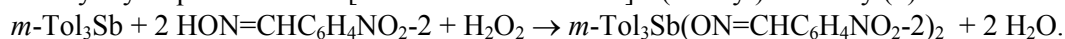
Selected bond lengths and bond angles in the structures of compounds 1–3

Bond	<i>d</i> , Å	Angle	ω, deg
1			
Sb(1)–C(1)	2.114(10)	O(1)Sb(1)O(4)	173.8(3)
Sb(1)–C(11)	2.118(10)	C(1)Sb(1)C(21)	117.9(4)
Sb(1)–C(21)	2.126(10)	C(11)Sb(1)C(21)	124.9(4)
Sb(1)–O(1)	2.076(7)	C(1)Sb(1)C(11)	117.2(4)
Sb(1)–O(4)	2.089(7)	N(1)O(1)Sb(1)	118.4(6)
O(1)–N(1)	1.377(11)	O(1)N(1)C(37)	110.8(9)
O(4)–N(3)	1.378(10)	N(3)O(4)Sb(1)	108.7(5)
N(1)–C(37)	1.260(13)	O(4)N(3)C(47)	112.0(9)
N(3)–C(47)	1.267(13)	C(1)Sb(1)O(1)	93.7(4)
Sb(1)–N(1)	2.988(8)	C(1)Sb(1)O(4)	86.1(3)
Sb(1)–N(2)	2.848(8)	C(11)Sb(1)O(1)	81.9(4)
2			
Sb(1)–C(1)	2.111(8)	O(1)Sb(1)O(2)	177.6(2)
Sb(1)–C(11)	2.100(7)	C(11)Sb(1)C(21)	122.5(3)
Sb(1)–C(21)	2.127(8)	C(1)Sb(1)C(11)	115.3(3)
Sb(1)–O(1)	1.977(5)	C(1)Sb(1)C(21)	121.5(3)
Sb(1)–O(2)	2.117(6)	N(1)O(2)Sb(1)	109.7(5)
O(2)–N(1)	1.381(8)	O(2)N(1)C(37)	111.2(7)
O(5)–N(3)	1.371(9)	Sb(1)O(1)Sb(2)	143.0(3)
N(1)–C(37)	1.213(11)	N(3)O(5)Sb(2)	109.0(5)
N(3)–C(77)	1.242(11)	O(5)N(3)C(77)	110.0(7)
Sb(2)–C(41)	2.107(7)	C(61)Sb(2)C(41)	122.7(3)
Sb(2)–C(61)	2.131(8)	C(51)Sb(2)C(41)	113.2(3)
Sb(2)–C(51)	2.117(8)	C(51)Sb(2)C(61)	123.5(4)
Sb(2)–O(1)	1.986(5)	O(1)Sb(1)C(1)	89.9(3)
Sb(2)–O(5)	2.117(6)	O(1)Sb(1)C(21)	92.1(3)
Sb(1)–N(1)	2.892(8)	O(1)Sb(2)C(61)	91.8(3)
Sb(2)–N(3)	2.871(8)	O(1)Sb(2)C(51)	89.3(3)
3			
Sb(1)–C(1)	2.124(3)	O(1)Sb(1)O(4)	172.17(7)
Sb(1)–C(11)	2.116(3)	C(1)Sb(1)C(21)	112.7(1)
Sb(1)–C(21)	2.113(3)	C(11)Sb(1)C(21)	124.9(1)
Sb(1)–O(1)	2.087(2)	C(1)Sb(1)C(11)	122.3(1)
Sb(1)–O(4)	2.086(2)	N(1)O(1)Sb(1)	114.4(1)
O(1)–N(1)	1.374(4)	O(1)N(1)C(37)	112.1(2)
O(4)–N(3)	1.377(2)	N(3)O(4)Sb(1)	111.2(1)
N(1)–C(37)	1.259(3)	O(4)N(3)C(47)	113.4(2)
N(3)–C(47)	1.258(3)	C(1)Sb(1)O(1)	93.24(9)
Sb(1)–N(1)	2.935(2)	C(1)Sb(1)O(4)	91.35(9)
Sb(1)–N(3)	2.886(2)	C(11)Sb(1)O(4)	82.94(8)

Results and Discussion

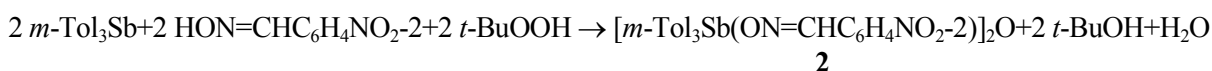
Previously it has been shown that the oxidative addition reaction of triphenyl- or tri(*p*-tolyl)antimony and oxime at the molar ratio 1:1 leads to binuclear organoantimony compound with the bridging oxygen atom with the general formula (Ar₃SbONCRR')₂O [5,6].

As it has been found out, the structure of the product of tri(*m*-tolyl)antimony reaction with 2-nitrobenzaloxime does not depend on the molar ratio of the reactants, but is determined by the oxidizing agent nature. Thus, at the molar ratio 1:2:1 or 1:1:1 the product of this reaction in the presence of *tert*-butyl hydroperoxide is *bis*[2-nitrobenzaloximate]tri(*m*-tolyl)antimony (**1**):

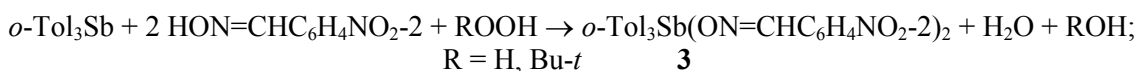


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If *tert*-butyl hydroperoxide has been used as the oxidizing agent, the interaction of tri(*m*-tolyl)antimony with 2-nitrobenzaldoxime leads to the formation of μ_2 -oxo-bis[2-nitrobenzaldoximato]tri(*m*-tolyl)antimony (**2**) both at the equimolar ratio and at the excess of oxime:



The interaction of tri(*o*-tolyl)antimony with 2-nitrobenzaldoxime, irrespective of the molar ratio and the oxidizing agent nature, goes with the formation of bis[2-nitrobenzaldoximato]tri(*o*-tolyl)antimony (**3**):



At the molar ratio 1:1:1 both compound **3** and tri(*o*-tolyl)antimony oxide, which has been separated from the main product by recrystallization from toluene, are formed.

Special experiments have shown that the nature of a solvent (hexane, diethyl ether, a mixture of benzene and heptane) does not affect the product structure.

Compounds **1–3** are crystalline substances, which are resistant to the effect of air moisture and oxygen; they are freely soluble in aromatic and aliphatic hydrocarbons.

The synthesized triarylantimony dioximates have been identified by infrared spectroscopy and X-ray analysis.

In the IR-spectra of compounds **1–3** there are intensive absorption bands, characterizing nitro group vibrations. Thus, the absorption band due to NO₂-group vibrations does not change its position, and it appears at 1522 cm⁻¹ in all spectra. The band, corresponding to NO₂-group symmetric vibrations (1348, 1344, 1346 cm⁻¹) in the spectra of **1–3**, does not shift much. The C–NO₂ vibrations are characterized by the band at 849, 847, 849 cm⁻¹ in these spectra. Note that the corresponding bands in the spectrum of pure 2-nitrobenzaldoxime are located at 1522, 1346, and 853 cm⁻¹. In the IR spectra there are bands at 449, 478 and 436 cm⁻¹ due to the Sb–C(Ar) vibration of the C₃-symmetric [12] SbC₃ fragment. The characteristic bands at 1600 cm⁻¹ (C=N bonds), 960 cm⁻¹ (N–O bonds) have also been found.

According to X-ray diffraction analysis data, the antimony atoms in the molecules of compounds **1**, **2** and **3** have distorted trigonal-bipyramidal coordination with axial oxygen atoms (Fig. 1–3). In binuclear molecule **2** Sb (1) and Sb (2) atoms are connected by a bridging oxygen atom, Sb(1)O(1)Sb(2) bond angle is equal to 143.0(3)°.

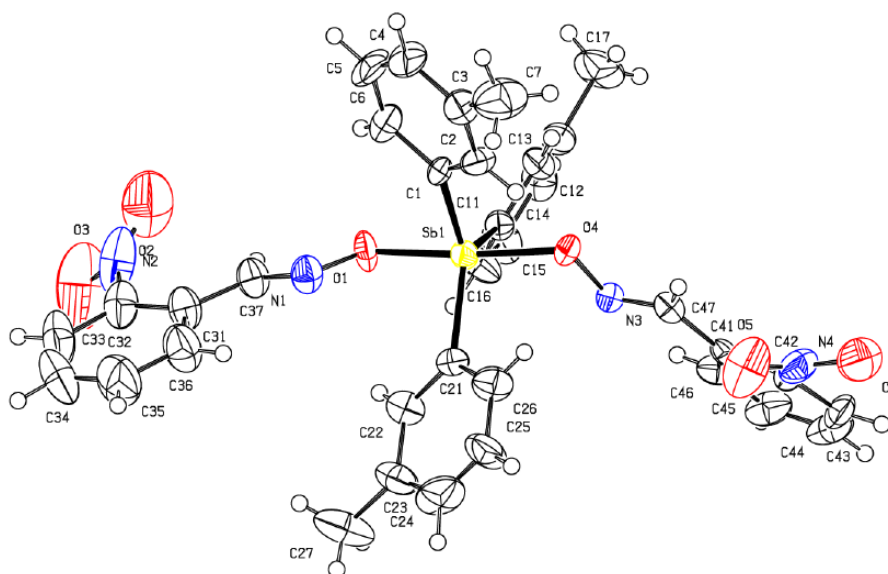


Fig. 1. The structure of compound **1**

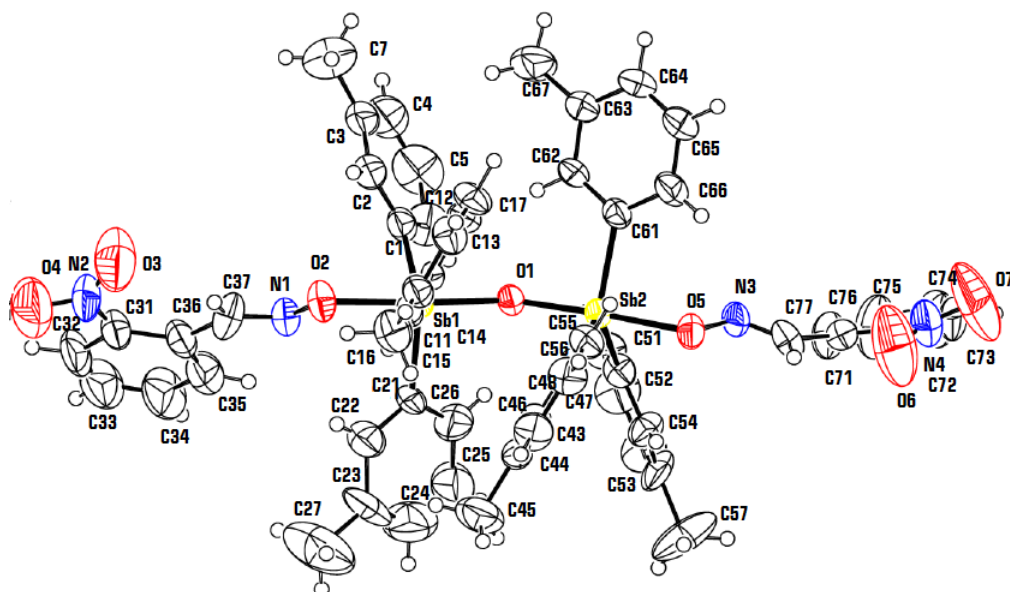


Fig. 2. The structure of compound 2

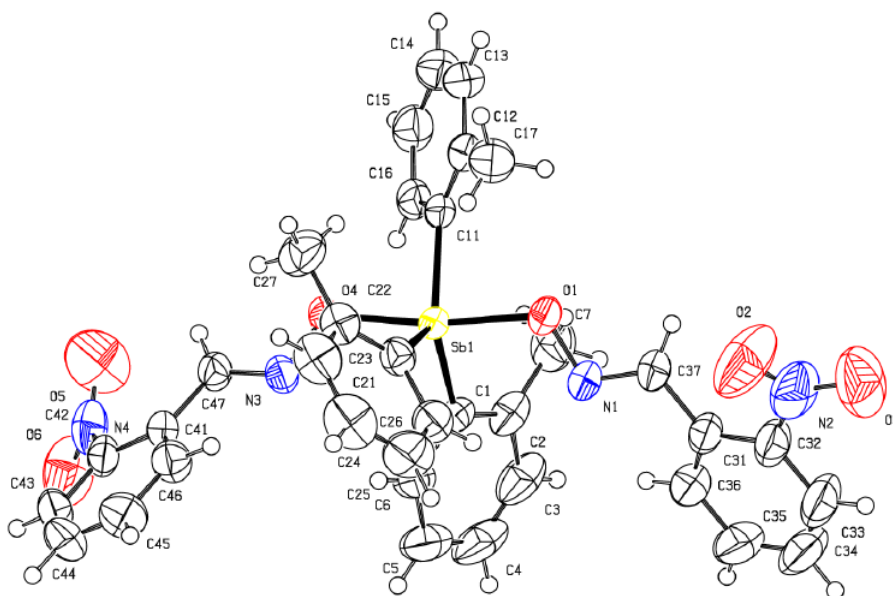


Fig. 3. The structure of compound 3

Sums of CSbC bond angles are equal to 360° (**1**), $359.3(3)^\circ$, $359.5(3)^\circ$ (**2**), $359.8(1)^\circ$ (**3**), at that the values of the individual angles differ from the theoretical angle by less than 8° . The Sb atoms are shifted from the correlated planes $[C_3]$ at 0.002 \AA (**1**), 0.091 , 0.098 \AA (**2**), 0.052 \AA (**3**). The axial OSbO angles are equal to $173.8(3)$, $177.6(2)$, $172.17(7)$ in **1–3**, respectively. The OSbC angles vary within the ranges $81.8(4)^\circ$ – $95.0(4)^\circ$ (**1**), $82.3(3)^\circ$ – $96.0(3)^\circ$, $83.2(2)^\circ$ – $96.5(3)^\circ$ (**2**), $82.94(8)^\circ$ – $93.24(9)^\circ$ (**3**).

The Sb–C bond intervals are $2.113(10)$ – $2.123(10) \text{ \AA}$ (**1**), $2.102(8)$ – $2.129(8) \text{ \AA}$, $2.106(8)$ – $2.131(8) \text{ \AA}$ (**2**), $2.113(2)$ – $2.124(3) \text{ \AA}$ (**3**). The Sb–O bond lengths in **1** ($2.078(7)$, $2.090(7) \text{ \AA}$) and **3** ($2.086(2)$, $2.087(2) \text{ \AA}$) have similar values, they are less than equatorial bond lengths. The analogous distances in molecule **2** ($2.117(6)$, $2.116(6) \text{ \AA}$) are greater than the distances in **1** and **3**. The lengths between antimony atoms and the bridging oxygen atom are equal to $1.977(5)$ and $1.987(5) \text{ \AA}$.

In molecules **1–3** the Sb \cdots N distances between Sb atom and N atoms of iminoxy groups ($2.848(8)$, $2.988(8) \text{ \AA}$ (**1**), $2.871(8)$, $2.892(8) \text{ \AA}$ (**2**), $2.886(2)$, $2.935(2) \text{ \AA}$ (**3**)) are considerably less than the sum of

Van der Waals radiuses of Sb and N atoms (3.8 Å [13]). Obviously, there is no correlation between Sb–O bond lengths and strength of Sb···N contacts. Decrease of Sb···N distances does not result in the expected N–O bond lengthening [1.377(11), 1.379(11) Å (1), 1.373(9), 1.382(8) Å (2), 1.374(4), 1.377(2) Å (3)].

The structure organization of **1–3** crystals is due to weak intermolecular O···H hydrogen bonds between oxygen atoms of nitro groups and hydrogen atoms of methyl groups or aromatic rings, as well as to C–H··· π interactions.

Conclusions

It has been found that the product of the oxidative addition reaction of tri(*m*-tolyl)antimony with 2-nitrobenzaldoxime has the structure that is determined by the oxidizing agent type. The reaction of tri(*o*-tolyl)antimony and 2-nitrobenzaldoxime proceeds with the formation of tri(*o*-tolyl)antimony dioximate, irrespective of the oxidizing agent nature and the molar ratio of the reactants.

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ОСОБЕННОСТИ ВЗАИМОДЕЙСТВИЯ ТРИ(МЕТА-ТОЛИЛ)СУРЬМЫ И ТРИ(ОРТО-ТОЛИЛ)СУРЬМЫ С 2-НИТРОБЕНЗАЛЬДОКСИМОМ. МОЛЕКУЛЯРНЫЕ СТРУКТУРЫ БИС(2-НИТРОБЕНЗАЛЬДОКСИМАТО)ТРИ(МЕТА-ТОЛИЛ)СУРЬМЫ, μ_2 -ОКСО-БИС[(2-НИТРОБЕНЗАЛЬДОКСИМАТО)ТРИ(МЕТА-ТОЛИЛ)СУРЬМЫ] И БИС(2-НИТРОБЕНЗАЛЬДОКСИМАТО)-ТРИ(ОРТО-ТОЛИЛ)СУРЬМЫ

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Взаимодействием три(мета-толил)сурьмы и три(орто-толил)сурьмы с 2-нитробензальдоксимом в присутствии окислителя (пероксида водорода или трет-бутилгидропероксида) синтезированы бис(2-нитробензальдоксимато)три(мета-толил)сурьма (1), μ_2 -оксо-бис[(2-нитробензальдоксимато)три(мета-толил)сурьма] (2) и бис(2-нитробензальдоксимато)три(орто-толил)сурьма (3). Соединения 1–3 охарактеризованы методом рентгеноструктурного анализа.

Ключевые слова: три(м-толил)сурьма, три(о-толил)сурьма, 2-нитробензальдоксим, третбутилгидропероксид, пероксид водорода, окисление, бис(2-нитробензальдоксимато)три(м-толил)сурьма, μ_2 -оксо-бис[(2-нитробензальдоксимато)три(м-толил)сурьма], бис(2-нитробензальдоксимато)три(о-толил)сурьма, молекулярные структуры, рентгеноструктурный анализ.

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Peculiarities of the reactions of tri(*meta*-tolyl)antimony and tri(*ortho*-tolyl)antimony with 2-nitrobenzaldehyde. The molecular structures of bis(2-nitrobenzaldehyde)tri(*meta*-tolyl)antimony, μ_2 -oxo-bis[(2-nitrobenzaldehyde)tri(*meta*-tolyl)antimony] and bis(2-nitrobenzaldehyde)tri(*ortho*-tolyl)antimony / V.V. Sharutin, O.K. Sharutina, E.V. Artemeva, M.S. Makerova // *Вестник ЮУрГУ. Серия «Химия».* – 2016. – Т. 8, № 2. – С. 61–69. DOI: 10.14529/chem160207

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