**Synthesis and Characterization of a-Dihydroxy- and a-Tetramethylaminoformylidene Derivatives of 1,2,3,4-Tetramethylene-3,4-Dihydroquinazolin-4-Ones**

Feruz Tukhsanova), Noryigit Musulmonov

*Samarkand State Pedagogical Institute, Samarkand, Uzbekistan*

*a)Corresponding author:* [*ftuxsanov078@gmail.com*](mailto:ftuxsanov078@gmail.com)

**Abstract:** In this study, several chemical reactions of α-dihydroxy- and α-tetramethylaminoformylidene derivatives were investigated. As a result of the synthetic procedures, 1,2,3,4-tetramethylene-3,4-dihydroquinazolin-4-ones, as well as formyl and phosphite derivatives of quinazoline and quinazolone, were obtained. The reactions were carried out under optimized conditions, and the structures of the synthesized products were confirmed using modern physicochemical analysis methods. The newly synthesized compounds were found to contain functional groups potentially responsible for pharmaceutical and biological activity.

**Keywords:** α-dihydroxy and α-thrymethylaminoformilidene - 1,2,3,4-tetramethylene-3,4-trihydroquinazolin-4-one, acylation, amination, transamination, enamine, acetone cyanohydrin, bromination.

**INTRODUCTION**

The present study focuses on the synthesis of quinazoline and its derivatives of compounds and the investigation of their properties. The aim of the work is to study of the reaction of alkylation, imination, transimination, cyanodihydrogenation, bromination of α-oxy- and α-thytramethylaminoformylidene-2,3-thrymethylene-3,4-dihydroquinazolin-4-ones.

Previously, we developed [1-3] a convenient method for the synthesis of α-oxy- and α-dimethylaminoformylidene-2,3-polymethylene-3,4-dihydroquinazolin-4-ones. It was of interest to study some chemical transformations of the above compounds based on α-oxy- and α-thytramethylaminoformylidene groups (see Fig.1).



**FIGURE 1.** Formulas of the formyl and amine-imine derivatives of synthesized quinazoline

I. х=N, n=3; II. х=O, n=1; III. х=4-NO2, n=5; IV. х=5-NO2, n=6; V. х=N; VI. х=4-NO2; VII. х=6-NO2, n=1.

α-Oxy- and α-dimethylaminoformylidene-2,3-thytramethylene-3,4-thryhydroquinazolin-4-ones can be considered as enols and enamines. They should be capable of alkylation and can also react with primary and secondary imines. Indeed, when α-oxyformylidene-2,3-polymethylene-3,4-dihydroquinazolin-4-ones interact with acetic, butyric, and benzoic anhydrides, the acylation reaction occurs readily and α-acyl-(aroyl)oxyformylidene-2,3-thytramethylene-3,4-thryhydroquinazolin-4-ones (VIIIa-g) are formed [4-8] (see Fig.2).



**FIGURE 2.** Reaction of formylidine with anhydrides

VIII а-j. b, s-j) R=CH3; b) R=C3H7; v) R=C2H5; а-в, е) Х=R, g, j) х=4-NO2; d) х=6-NO2; а-d) n=2; е) n=1; j) n=4.

In the IR spectrum of VIIIa-b, d-g, the absorption band of the ester carbonyl group appears in the region of 1760 - 1780 cm-1, and in the spectrum of VIIIc - at 1725 cm-1.

In the spectrum of compounds I-IV, the absorption band of the hydroxyl group at 3300 - 3600 cm-1 disappears.

Enamines IX a-p were synthesized by the interaction of I-IV with ammonia, primary (hydroxylimine; n-; iso-; tert-butylamines, aniline, o-toluidine, diphenylhydrazine, 2-nitrophenylhydrazine) and secondary (thrymethylamine, piperidine, morpholine) amines (see Fig.3).



**FIGURE 3.** Formulas of the formyl and amine-imine derivatives of synthesized quinazoline

IX а-р. а) R=R2=N; b) R=S, R1=OR; v) R=O, R1 =C3H7 – izo; g) R=N, R1 =C4H9 – izo; d) R=N, R1 =C4H9 – tret; е) R=P, R1 =C6H5 ; j) R=H, R1 =C6H5 – CH3-p; z) R=N, R1 =NHC6H5; i) R=H, R1 =NHC6H3 (NO2)2-2,4; k) R=R1= CH3; l) RR1=(CH2)5; m) RR1=(CH2)3O(CH2)2; h) RR1=(CH2)4; о) RR1=(CH2)2O(CH2)3; p) RR1=(CH2)6; р) RR1=(CH2)3O(CH2)3; а-m, р) X=OH, H-O) х=4-NO2; p) х=5-NO2; а-p) n=2; р) n=3.

It is known that amines and imines readily undergo transimination reactions [4-5]. It turned out that compounds V – VII react with the above amines and lead to α-disubstituted formylene derivatives IX ln-p.

The structure of the synthesized compounds was proven by elemental analysis, IR and mass spectra.

In the IR spectrum of IX a – i, absorption bands appear in the region of 3300 – 3450 cm-1, characteristic of the amino group.

In the mass spectrum of VIII, IX, there are peaks of molecular ions (18 – 100%), as well as fragments corresponding to the supposed scheme of their decomposition.

It was of interest to study some reactions of addition to the double bond of the enamine group of α-dimethylaminoformylidene-2,3 – tetramethylene – 3,4 – trihydroquinazolin-4-one (V) [5-9]. When it interacted with acetone cyanohydrin, α-tetramethylaminocyanomethyl-2,3-trimethylene-3,4-trihydroquinazolin-4-one (X) was obtained, which is hydrolyzed with concentrated hydrochloric acid to amino acid XI (see Fig.4).



**FIGURE 4.** In the mass spectrum of VIII, IX, there are peaks of molecular ions (18 – 100%), as well as fragments corresponding to the supposed scheme of their decomposition

The reaction of acetone cyanohydrin with I proceeds similarly and leads to cyanohydrin XII (see Fig.5).



**FIGURE 5.** The reaction of acetone cyanohydrin with I proceeds similarly and leads to cyanohydrin

In the IR spectrum of compounds X and XII, the nitrile group appears in the region of 2232 and 2194 cm-1, respectively, and in XI this band disappears and a new one appears at 1670 cm-1 (υC=O carbonyl group). It is known that enamines are intermediate products in the synthesis of α-dibromocarbonyl compounds /5/. Studying the dibromination of α-trimethylaminoformylidene-2,3-trimethylene-3,4-dihydroquinazolone-4 (V), we found that the reaction product is α-bromo-α-formyl-2,3-tetramethylene-3,4-trihydroquinazolin-4-one (XIII), the formation of which apparently occurs through an intermediate immonium salt (see Fig.6).



**FIGURE 6.** We found that the reaction product is α-bromo-α-formyl-2,3-tetramethylene-3,4-trihydroquinazolin-4-one (XIII), the formation of which apparently occurs through an intermediate immonium salt.

Thus, α-oxy- and – trimethylaminoformylidene groups in compounds I–VII can exhibit enol and enamine character.

They can be important intermediates for the synthesis of various heterocyclic and acid systems.

**EXPERIMENTAL PART**

IR spectra were recorded on an IV-20 spectrometr, mass spectra on an MX-1303, PMR spectra on an IMM-4H-100 (internal standard – TMS and HMDS, solvent – CH3COOH, CDCl3, deuteropyridine, scale – b).

Chemical transformations of α-hydroxy- and α-trisubstitutedaminoformylidene-2,3-tetramethylene-3,4-tetrahydroquinazolones-4.

α - acetoxyformylidene-2,3-tetramethylene-3,4-trihydroquinazolin-4-one (VIIIa). B solution of 0.15 g (0.42 mmol) of (5) in 3.44 g (35 mmol) of acetic anhydride is heated on a water bath for 1 hour. Cool, filter off the precipitated brown crystals, wash with acetic anhydride and dry. Isolate 0.075 g of VIIIa. M.p. 215 – 2180. IR spectrum: 1598 (υС=N), 1670 (υС=O) and 1772 (υСОО) cm-1. Mol. Weight 256 (mass spectrometric).

Similarly to the above, from 50 mg (0.234 mmol) of I, 35 mg of VIIIa with M.p. 214 – 2160 are obtained.

α - Butyroyloxyformylidene-1,22,3-tetramethylene-3,4-trihydroquinazolin-4-one (VIII b). C mixture of 0.13 g (0.49 mmol) of I and 1,2 g (9,2 mmol) of butyric anhydride is left at room temperature for 4-5 days. The resulting white precipitate is filtered off and washed with ether. Yield VIIIb. 50 mg, mp 314-3150C.

Similarly to the above, 20 mg (15%) of VIIIb with mp 314-3160C was synthesized from 0.1 g (0.4 mmol). IR spectrum: 1648 (υC=N), 1695 (υC=O) and 1780 (υCOO) cm-1.

α - Benzoyloxyformylidene-2,3-trimethylene-3,4-dihydroquinazolin-4-one [VIIIc]. B mixture of 0.11 g (0.48 mmol) of I and 0.47 g (2.05 mmol) of benzoic anhydride is heated at 110 – 1200 for 1 hour. The reaction mixture is cooled and treated with ether. The resulting brown precipitate is filtered off and washed with ether. Yield of VIIIc. 0.14 g, mp 211 – 214 0C. IR spectrum: 1600 (υC=N), 1672 (υC=O) and 1725 (υCOO) cm-1. VIIIg, e are obtained similarly to the above.

α–Acetoxyformylidene-6–nitro-2,3–trimethylene-3,4–dihydroquinazolin–4-one[VIII g]. Synthesized from 0.24 g (0.88 mmol) of VI in 4.13 g (40,6 mmol) of acetic anhydride. 0.2 g of VIIIg with mp 289–2910C. IR spectrum: 1615 (υС=N), 1642(υС=O) and 1680 (ester carbonyl) cm-1.

α - Acetoxyformylidene-2,3-tetramethylene-3,4-dihydroquinazolin-4-one[VIIIe]. Synthesized from 0.09 g (0.34 mmol) of II in 2.35 g (22,5 mmol) of acetic anhydride. 0.1 g of VIIIe with mp 219 – 2200C. IR spectrum: 1605 (υC=N), 1660(υC=O) and 1760 (υCOO) cm-1.

α - Aminoformylidene-1,2,3,4-tetramethylene-3,4-trihydroquinazolin-4-one[IXa]. A mixture of 0.13 g (0.49 mmol) of I and 0.54 g (2.31 mmol) of I and 4 ml of 28% ammonia solution is heated on a water bath for 1 hour. The mixture is cooled, the precipitate is filtered off, washed with water and dried. Yield 80 mg of IXa. mp 126 – 1280 (from acetone). IR spectrum: 1630 (υС=N), 1682 (υС=O) and 3400 (υNH2) cm-1.

α–Hydroxylaminoformylidene-1,2,3,4 – tetramethylene-3,4-trihydroquinazolin-4-one [IX b]. To a solution of 0.1 g (0.44 mmol) of I and 3–4 ml of alcohol, 0.14 g (4,3 mmol) of hydroxylamine is added. After keeping at room temperature for 24 hours, the reaction mixture is extracted with chloroform. The organic layer is dried with sodium sulfate and the solvent is distilled off. Yield 70 mg of IXb. mp 187–1900 (from acetone). IR spectrum: 1612 (υС=N), 1660 (υС=O) and 3315 (υNH2) cm-1.

α-Sec-butylaminoformylidene-1,2,3,4-tetramethylene-3,4-trihydroquinazolin-4-one [IX g]. A solution of 0.13 g (0.51 mmol) of V in 0.7 ml of sec-butylamine was left at room temperature for 24 hours. Ether was added to the reaction mixture, the precipitate was filtered off and washed with ether. 0.11 g of IXg was isolated, mp 150 – 1510 (from acetone).

IXv, d-m were synthesized similarly.

α –n-Butylaminoformylidene-1,2,3,4-tetramethylene-3,4-trihydroquinazolin-4-one [IX g]. From 0.2 (0.92 mmol) of VI and 0.45 ml of n-butylamine, 65 mg of IXg with mp 179 – 1810 (from acetone).

α –Tert.-butylaminoformylidene-1,2,3,4 – tetramethylene-3,4-trihydroquinazolin-4-one[IX d]. From 0.12 (0.48 mmol) of V and 0.5 ml of tert. – butylamine, 55 mg of IXd with mp 145 – 1470 (from acetone) are obtained.

α –Phenylaminoformylidene-1,2,3,4-tetramethylene-3,4-trihydroquinazolin-4-one[IXe]. From 0.1 (0.47 mmol) of V and 0.4 ml of aniline, 0.11 g of IXe with mp 205 – 2070 (from acetone) is synthesized. IR spectrum: 1608 (υС=N), 1678(υС=O) and 3320 (υNH) cm-1. Mol. Wt. 289 (mass spectrometry).

α – (p-Tolyl) aminoformylidene-1,2,3,4 – tetramethylene-3,4-dihydroquinazolin-4-one[IX g]. From 0.1 g (0.47 mmol) of V and 0.11 g (0.93 mmol) of p-toluidine, 0.11 g of IX g is obtained with mp 208 – 2100 (from acetone). IR spectrum: 1615 (υС=N), 1660 (υС=O) and 3300 – 3320 (υNH) cm-1. Mol. Wt. 303 (mass spectrometry).

α – Phenylhydrazoformylidene-1,2,3,4 – tetramethylene-3,4-dihydroquinazolin-4-one[IX s]. From 0.1 g (0.47 mmol) of V and 0.3 ml of phenylhydrazine, 54 mg of IX s with mp 221 – 2230 (from acetone) are obtained. IR spectrum: 1610 (υC=N), 1660 (υC=O) and 3280 (υNH) cm-1.

α – (2,4-Dinitrophenylhydrazino) formylidene-1,2,3,4 – tetramethylene-3,4 – dihydroquinazolin–4-one[IX i]. From 0.15 (0.7 mmol) of V and 0.13 g (0.54 mmol) of 2,4-dinitrophenylhydrazino, 70 mg of IXi with mp 238 – 2440 (from alcohol) were synthesized. IR spectrum: 1640 (υС=N), 1682 (υС=O) and 3260, 3340 - 3360 (υNH) cm-1.

α –Dimethylaminoformylidene-1,2,3,4 – tetramethylene-3,4-dihydroquinazolin-4-one[IXk]. From 0.11 (0.476 mmol) of IV and 0.35 ml of 33% aqueous dimethylamine solution, 0.13 g (95%) of IX k with mp 177 – 1790 (from acetone) were obtained. A mixed melting test with a known sample does not give depression.

α -Piperidinoformylidene-1,2,3,4 – tetramethylene-3,4-dihydroquinazolin-4-one [IXl]. A mixture of 0.095 (0.43 mmol) V and 0.83 g (9,8 mmol) of piperidine is heated at a temperature of 110-1200 for an hour, left overnight, and the excess piperidine is evaporated. The dry residue is treated with ether, the precipitate is filtered off and washed with ether. Yield 80 mg IXl. Mp. 180 - 1810 (from acetone). IR spectrum: 1610 (υС=N), 1660 (υС=O) cm-1.

IXl, l-r were synthesized similarly to the above.

α-Morpholinoformylidene-1,2,3,4 – tetramethylene-3,4-dihydroquinazolin-4-one[IX m]. From 0.12 g (0.49 mmol) of IV and 0.36 g (3.7 mmol) of morpholine, 0.14 g of IXm with mp 184 – 1860 (from acetone) was obtained. IR spectrum: 1608 (υС=N), 1660 (υС=O).

α-Piperidinoformylidene-1,2,3,4 – tetramethylene-3,4-dihydroquinazolin-4-one[IX l]. From 70 mg (0.33 mmol) of V and 0.86 g (10 mmol) of piperidine, 60 mg (74%) of IX l were obtained. After recrystallization from acetone the yield is 40 mg (41%), mp 180 – 1810 (from acetone). A mixed melting test with a known sample does not give depression.

α-Piperidinoformylidene-6-nitro-1,2,3,4 – tetramethylene-3,4 – dihydroquinazolin–4-one[IXн]. From 0.22 g (0.94 mmol) of V and 0.81 g (9,7 mmol) of piperidine 0.19 g of IX н with mp 238 – 2430 (from acetone) was synthesized. IR spectrum: 1640 (υС=N), 1680 (υС=O).

α–Morpholinoformelidene-6-nitro-1,2,3,4 – tetramethylene-3,4-dihydroquinazolin–4-one[IXo]. From 0.27 g (0.9 mmol) of VI and 0.8 g (7,1 mmol) of morpholine, 0.26 g of IXo was obtained with a mp of 257 – 2590 (from acetone). IR spectrum: 1640 (υС=N), 1688 (υС=O).

α–Piperidinoformelidene-7-nitro-1,2,3,4 – tetramethylene-3,4-dihydroquinazolin–4-one[IXi]. From 0.23 g (0.78 mmol) of V and 0.89 g (11 mmol) of piperidine, 0.17 g of IXi was obtained with a mp of 247 – 2490 (from acetone). IR spectrum: 1645 (υС=N), 1665(υС=O). Mol. Wt. 326 (mass spectrometric).

α–Morpholinoformylidene-2,3-tetramethylene-3,4-dihydroquinazolin-4-one[IX р]. From 0.1 g (0.44 mmol) of V and 0.3 g (3.4 mmol) of morpholine, 0.12 g of IXm was synthesized with mp 146 – 1480 (from acetone). IR spectrum: 1608 (υС=N), 1659(υС=O).

α–(dimethylaminocyanomethyl)- 1,2,3,4 – tetramethylene-3,4 – dihydroquinazolin–4-one[X]. A mixture of 0.56 g (2,3 mmol) of V and 1.66 g (20 mmol) of acetone cyanohydrin is maintained at room temperature for 14–18 hours, treated with ether, and the reaction product is purified by passing it through a column of aluminum oxide (eluent: chloroform). Yield 0.3 g X6. Mp 138–1400 (from hexane). IR spectrum: 1612, 1630 (υС=N), 1668 (υС=O), and 3315 (υNH2) cm-1 2222 (υСN) cm-1. Mol. Weight 268 (mass spectrometric).

α–(dimethylaminocarboxymethyl)- 1,2,3,4 – tetramethylene-3,4-dihydroquinazolin-4-one[XI]. 0.21 ml of concentrated hydrochloric acid is added dropwise to 36 mg (0.13 mmol) of X. The reaction mixture is left at room temperature for 1.9 hours, then heated on a water bath for an hour, cooled, diluted with 1 ml of water, the formed precipitate is filtered off, washed with water, and dried. 25 mg of XI are obtained. M.p. 206–2080 (from hexane). IR spectrum: 1602 (υС=N), 1680(υС=O).

α–(Oxycyanomethyl)- 1,2,3,4 – tetramethylene-3,4-dihydroquinazolin-4-one[XII]. A mixture of 0.44 g (2,15 mmol) of I and 1.8 g (21 mmol) of acetone cyanohydrin is heated for 30 minutes at a temperature of 70–80 C. The reaction mixture is cooled, dissolved in ether and hexane is added. The formed precipitate is filtered off. Yield 0.3 g of XII. Mp 306–3080 (from hexane). IR spectrum: 1618, (υС=N), 1670(υС=O) and 2204 (υCN) cm-1, 310–3600 (υOH) cm-1. Mol. Weight 241 (mass spectrometry).

α-Bromo-a-formyl-1,2,3,4 – tetramethylene-3,4-dihydroquinazolin-4-one [XIII]. To a solution of 0.12 g (0.56 mmol) of V in 4 ml of chloroform, with cooling and vigorous stirring, add dropwise a solution of 0.13 g (1.55 mmol) of bromine in 6 ml of chloroform. The reaction mixture is stirred at room temperature for 1,5 hour and left for 10 hours. The residue after distilling off the solvent is treated with water. The precipitated crystals are separated and washed with a boiling solution of acetone. 0.14 g of XV is obtained. M.p. 151 – 1520 (from acetone). IR spectrum: 1620, (υС=N), 1680 (υС=O), 670, 698 (υC-Br) cm-1.

**TABLE 3.** Summary of the results.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Source connected** | **Reaction product** | **n** | **R** | **R1** | **Vi-cold%** | **Т.pl. 0Сх** | **Rfxx** | **Found** | | | **Gross formula** | **Computed** | | |
| **C** | **H** | **N** | **C** | **H** | **N** |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| I | VIII a | 1 | CH3 | - | 58 | 214-216 | 0.63 | 65,7 | 4,7 | 11,2 | C14H12N2O3 | 65,6 | 4,7 | 10,9 |
| I | VIII b | 1 | С3H7 | - | 40 | 314-315 | - | 67,5 | 5,5 | 10,2 | C16H16N2O3 | 67,6 | 5,6 | 9,9 |
| I | VIII v | 1 | С6H5 | - | 87 | 213-215 | - | 71,8 | 4,6 | 8,6 | C19H14N2O3 | 71,7 | 4,4 | 8,8 |
| V | VIII а | 1 | CH3 | - | 67 | 215-218 | 0,62 | 65,8 | 4,5 | 11,1 | C14H12N2O3 | 65,6 | 4,7 | 10,9 |
| V | VIII b | 1 | С3H7 | - | 15 | 314-316 | - | 67,7 | 5,6 | 10,2 | C16H16N2O3 | 67,6 | 5,6 | 9,9 |
| II | VIII е | 2 | CH3 | - | 85 | 219-220 | 0,62 | 66,9 | 5,1 | 10,1 | C15H14N2O3 | 66,7 | 5,2 | 10,4 |
| VI | VIII g | 1 | CH3 | - | 83 | 289-291 | 0,60 | 55,6 | 3,6 | 14,2 | C14H11N3O5 | 55,8 | 3,7 | 13,9 |
| I | XI b | 1 | H | - | 75 | 126-128 | 0,31 | 67,1 | 5,4 | 19,4 | C12H11N3O2 | 67,6 | 4,9 | 19,2 |
| I | XI c | 1 | H | - | 45 | 187-190 | 0,02 | 62,2 | 5,2 | 18,1 | C12H11N2O2 | 62,9 | 4,8 | 18,3 |
| I | XI v | 1 | H | - | 35 | 179-181 | 0,61 | 71,0 | 7,2 | 15,8 | C16H19N3O | 71,4 | 6,8 | 15,3 |
| I | XI g | 1 | H | - | 87 | 150-151 | 0,70 | 71,5 | 6,9 | 15,7 | C16H19N3O | 71,4 | 7,1 | 15,6 |
| I | XI f | 1 | CH | - | 46 | 141-145 | 0,82 | 71,4 | 7,46 | 15,7 | C16H19N3O | 71,4 | 7,3 | 15,3 |
| I | XI l | 1 | NH | - | 81 | 202-204 | 0,04 | 74,3 | 5,2 | 14,6 | C18H15N3O | 74,7 | 5,0 | 14,1 |
| I | XI k | 1 | OH | - | 76 | 210-212 | 0,83 | 75,6 | 5,5 | 13,8 | C19H17N3O | 75,2 | 5,3 | 13,6 |
| **Source**  **connected** | **Reaction**  **product** | **n** | **R** | **R1** | **Vi-cold%** | **Т.pl. 0Сх** | **Rfxx** | **Found** | | | **Gross formula** | **Computed** | | |
| **C** | **H** | **N** | **C** | **H** | **N** |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| I | XI y | 1 | SH | - | 39 | 218-221 | 0,02 | 71,6 | 5,3 | 18,6 | C18H16N4O | 71,1 | 5,3 | 18,4 |
| I | IX k | 1 | CH3 | - | 97 | 175-178 | 0,61 | 69,2 | 6,4 | 17,6 | C14H15N3O | 69,7 | 6,3 | 17,4 |
| I | IX k | 1 | (CH2)5 | - | 65 | 180-181 | - | 72,4 | 6,6 | 15,1 | C17H19N3O | 72,6 | 6,8 | 14,9 |
| I | IX m | 1 | (CH2)2O(CH2)2 | - | 80 | 184-186 | - | 68,0 | 6,1 | 14,6 | C16H17N3O2 | 67,8 | 6,0 | 14,8 |
| V | XI l | 1 | (CH2)5 | - | 41 | 180-181 | - | 72,4 | 6,6 | 15,1 | C17H19N3O | 72,6 | 6,6 | 14,6 |
| VI | IX n | 1 | (CH2)5 | - | 74 | 238-243 | 0,90 | 62,4 | 5,6 | 17,0 | C17H18N4O3 | 62,6 | 5,5 | 17,2 |
| VI | IX о | 1 | (CH2)2O(CH2)2 | - | 87 | 257-259 | 0,80 | 58,6 | 4,7 | 16,9 | C16H16N4O4 | 58,5 | 4,9 | 17,1 |
| VII | IX p | 1 | (CH2)5 | - | 74 | 247-249 | 0,92 | 62,5 | 5,7 | 17,1 | C17H18N4O3 | 62,6 | 5,5 | 17,2 |
| II | IX р | 2 | (CH2)2O(CH2)2 | - | 92 | 146-148 | 0,67 | 68,5 | 6,3 | 14,3 | C17H19N3O2 | 68,7 | 6,4 | 14,1 |
| V | X | - | - | - | 58 | 245-248 | 0,68 | 72,1 | 4,9 | 14,5 | C23H18N4O2 | 72,3 | 4,7 | 14,7 |
| V | XII | - | - | - | 54 | 138-140 | 0,57 | 67,0 | 6,1 | 20,7 | C15H16N4O | 67,1 | 6,0 | 20,9 |
| XII | XIII | - | - | - | 78 | 206-208 | 0,54 | 70,5 | 6,5 | 16,3 | C15H17N3O | 70,6 | 6,7 | 16,5 |
| I | XIV | - | - | - | 67 | 306-308 | - | 64,9 | 4,3 | 17,6 | C13H11N3O2 | 64,7 | 4,6 | 17,4 |
| V | XV | - | - | - | 82 | 151-152 | 0,90 | 49,2 | 2,9 | 9,4 | C12H9N2O2Br | 49,1 | 3,3 | 9,3 |

***Note:*** *\*Compounds II – V, VI, VIII, IXa-z, s-r, XV were recrystallized from acetone; IX a-r from alcohol; XII, XIII from hexane; XIV from acetone – hexane.*

*\*\* For compounds; I, II, V – VIIIa, IXf, c-d, g, j, n-p, x, XV the Rf values were determined in the solvent system chloroform – methanol, 9:2 (silufol); for XIII chloroform – ether, 10:2 (silufol); IV – X chloroform (aluminum oxide); for III, VIII e, g - chloroform – ether, 2:1 (aluminum oxide); for IX p, XII - chloroform – ether, 10:1 (aluminum oxide).*

**CONCLUSION**

α-Dihydroxy- and α-tetramethylaminoformylidene-substituted 1,2,3,4-tetramethylene-3,4-dihydroisoxazolin-4-ones possess highly reactive functional groups, enabling them to participate in two main types of reactions:

**N–O bond cleavage (ring opening):** The N–O bond in the isoxazolinone ring can be cleaved through reductive or chemical methods, yielding β-diketones, β-amino-ketones, or similar carbonyl derivatives. This process is facilitated by the electronic effects of α-dihydroxy or α-tetramethylaminoformylidene substituents, providing intermediates suitable for subsequent condensation or cyclization reactions.

**Vicinal diol reactions (only in α-dihydroxy derivatives):** The vicinal diol fragment undergoes oxidative cleavage of the C–C bond in the presence of oxidizing agents (e.g., NaIO₄, Pb(OAc)₄), producing two carbonyl groups. Under acidic conditions, dehydration leads to the formation of enols or conjugated enone systems. These transformations enhance the adaptability of the substrate for aromatization, condensation, and new ring-forming reactions.

**Overall**, these two reaction pathways significantly increase the synthetic value of these compounds, making them useful intermediates for the preparation of complex heterocycles and bioactive molecules.

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