Jiří Hanusek[a]*, Pavel Rosa[b], Pavel Drabina[a] and Miloš Sedlák[a]

[a]Department of Organic Chemistry, Faculty of Chemical Technology, University of Pardubice, Nám. Čs. legií 565, 532 10 Pardubice, Czech Republic
[b]ANIVEG CZ s r.o., 8. května 165, 410 02 Lovosice, Czech Republic

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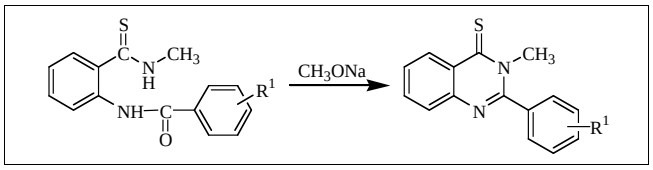

Acylation of 2-amino-*N*-methyl-thiobenzamide with substituted benzoyl chlorides has been used to synthesize the corresponding 2-benzoylamino-*N*-methylthiobenzamides. Subsequent sodium methoxide-catalyzed ring closure gives the corresponding 3-methyl-2-phenylquinazoline-4-thiones. These compounds were characterized by means of their ^{1}H- and ^{13}C-NMR spectra. The kinetics of the cyclization reaction has been followed with UV-VIS spectroscopy at 100 °C in methanolic solutions of sodium methoxide.

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Introduction.

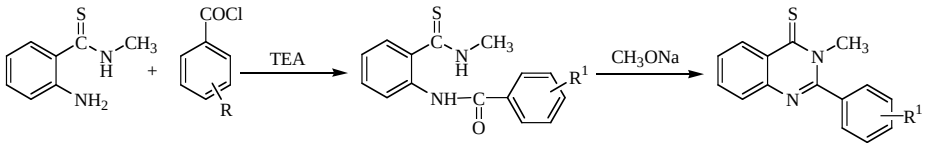
Quinazoline-4-ones and their derivatives are well known for their pharmacological activity [1]. Their synthesis mostly starts from anthranilic acid derivatives, in particular their *N*-acylamides [2,3]. The aim of the present work is to synthesize the sulfur analogues of *N*-benzoylaminoanthranilamides and to carry out their ring closure to the corresponding 2-phenyl-3-methylquinazoline-4-thiones, which could show biological activity too [4,5]. Quinazoline-4-thiones can be synthesized by several ways: *e.g.* it is possible to transform the oxygen derivative into its sulfur analogue by treating it with phosphorus pentasulfide [6] or Lawesson's reagent [7]. In some cases it is also possible to make use of the reactivity of suitably substituted isothiocyanates [8]. In our previous papers [9-11] we dealt with the synthesis, structure and reactivity of 2-benzoylaminothiobenzamides, 2-[(*N*-methyl-*N*-benzoyl)amino]thiobenzamides and products of their cyclization in both basic and acidic medium.

In present work we have extended this study to 2-benzoylamino-*N*-methyl-thiobenzamides. We have chosen the way of constructing the heterocyclic skeleton which consists in the acylation of 2-amino-*N*-methyl-thiobenzamide with substituted benzoyl chlorides and subsequent ring closure of the obtained 2-benzoylamino-*N*-methyl-thiobenzamides (**1a-f**) in sodium methoxide to give substituted 2-phenyl-3-methylquinazoline-4-thiones (**2a-f**) (Scheme I).

Results and Discussion.

The starting 2-amino-*N*-methyl-thiobenzamide was prepared by three-step synthesis from isatoic anhydride and methylamine. Resulting 2-amino-*N*-methyl-benzamide was in the second step converted to the corresponding pyridinium salt of 2-mercapto-2-thioxo-2,3-dihydro-1*H*-2λ^{5}-benzo[1.3.2]diazaphosphinine-4-thione by treatment with phosphorus pentasulfide [9], and in the third step the pyridinium salt was transformed into

Scheme I



1a-f **2a-f**

1-2	a	b	c	d	e	f
R^{1}	4-OCH_3	4-CH_3	H	4-Cl	4-NO_2	3-NO_2

the respective thioamide by our original hydrolysis method in a toluene-water system. The benzoylation of the 2-amino-*N*-methyl-thiobenzamide thus obtained was carried out by treatment with commercial benzoyl chlorides in acetone solvent. The reaction gives 2-benzoylamino-*N*-methyl-thiobenzamides (**1a-f**). The ring closure of (**1a-f**) to corresponding 2-(subst.phenyl)-3-methylquinazoline-4-thiones (**2a-f**) is achieved by refluxing in methanolic solutions of sodium methoxide (Scheme I).

In order to optimize conditions for cyclization step, the reaction of **1c** and **1d** was studied in detail using methanolic solutions of sodium methoxide in the concentration range of 0.01 – 0.35 mol·l^{-1} at 100 °C. We found, that in contrast to ring closure reactions of similar derivatives with or without methyl group at the nitrogen adjacent to benzene ring [10] an elevated temperature is needed for successful cyclization of **1a-f**. The cyclization rate has been found to depend nonlinearly on the concentration of the sodium methoxide (Figure 1).

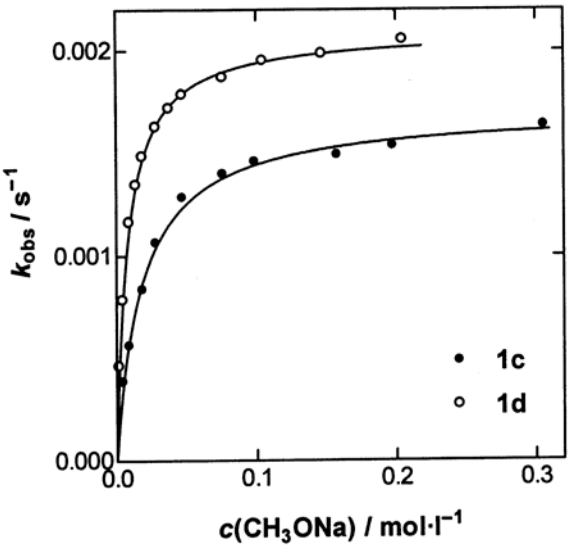


Figure 1. Dependences of k_{obs} on c(CH$_3$ONa) for cyclisation reaction of **1c** and **1d**.

From the course of experimentally found dependences it follows that in this case the reaction order is equal to one at low sodium methoxide concentrations and gradually drops to zero at higher sodium methoxide concentrations, which is characteristic of reactions with a fast pre-equilibrium followed by the rate-limiting step. The following Scheme II can be suggested for the said ring closure.

In the sodium methoxide solutions used, a fast pre-equilibrium deprotonation takes place first: a proton is split off from both the nitrogen atom adjacent to the benzene ring (the so-called blind alley) and the terminal nitrogen (CSNHCH$_3$ group). The nucleophilic terminal anion formed in the latter case attacks the carbonyl group of the benzoyl moiety to give a tetrahedral intermediate, which undergoes a proton transfer from nitrogen to oxygen (**In$_1^-$** → **In$_2^-$**) and then splits off hydroxyl anion to produce 2-phenylquinazoline-4-thione. In contrast to the similar 2-[(*N*-methyl-*N*-benzoyl)amino]thiobenzamides [10], two protons can be split off in the starting compounds **1a-f**. The proton easier to split off is at the nitrogen atom adjacent to the benzene ring (the equilibrium constant K_1), but the anion thus formed [N$^-$] cannot enter cyclization, so this is the so-called blind alley. The concentration of the reactive anion [NCH$_3^-$] formed by deprotonation of the terminal CSNHCH$_3$ group is expressed by the equilibrium constant K_2. Under presumption that $K_1 >> K_2$, the Eq. (1) which describes the reacting system can be modified to Eq. (2):

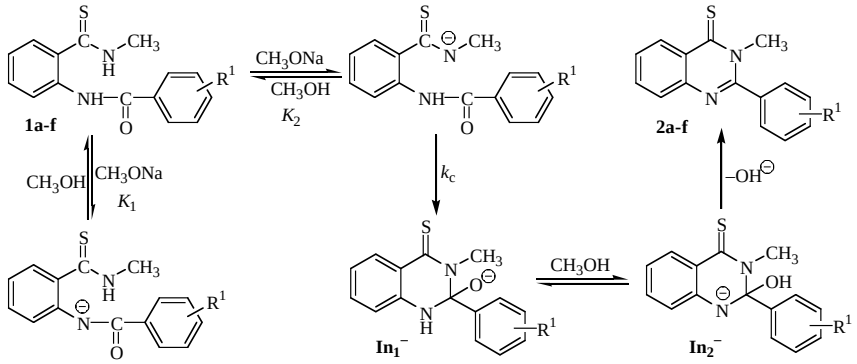
$$k_{obs} = \frac{k_c \cdot K_2 \cdot [CH_3ONa]}{1 + (K_1 + K_2) \cdot [CH_3ONa]} \qquad (1)$$

$$k_{obs} = \frac{k_c \cdot K_2 \cdot [CH_3ONa]}{1 + K_1 \cdot [CH_3ONa]} \qquad (2)$$

Optimization using Eq. (2) leads to values of parameters $k_c \cdot K_2$(**1c**) = 9.49·10^{-2} l·mol^{-1}·s^{-1}, K_1(**1c**) = 56 l·mol^{-1} and $k_c \cdot K_2$(**1d**) = 2.62·10^{-1} l·mol^{-1}·s^{-1}, K_1(**1d**) = 125 l·mol^{-1}. The values of K_1(**1c**) and K_1(**1d**) are approximately 3-5 times higher than values obtained in the case of cyclization reactions of 2-benzoylaminothiobenzamides and 2-[(*N*-methyl-*N*-benzoyl)amino]thiobenzamides [10] at 25 °C. This relatively small increase in the equilibrium constants of deprotonation is in accordance with the low temperature sensitivity of the equilibria involving the proton transfer [12]. A much larger difference has been found out in the case of kinetic parameters (the products $k_c \cdot K_2$). While the ring closure of 2-[(*N*-methyl-*N*-benzoyl)amino]thiobenzamides is very fast at the temperatures as low as 25 °C [10], the relocation of methyl group from the nitrogen atom adjacent to the benzene ring to the nitrogen atom of thioamide group results in a retardation of the reaction by several orders of magnitude. This retardation is mainly due to the decrease in the equilibrium constant K_2 (the inductive effect of methyl group lowers the acidity of thiobenzamide group by at least one order of magnitude). Besides that, steric effect of the methyl group shields the nucleophilic centre.

The cyclization of the derivatives **1a-f** can be negatively affected also by intramolecular hydrogen bond formation, which stabilizes the starting species (Figure 2).

Scheme II



The proton in hydrogen bond is bound in a relatively rigid six-member ring, which is transformed into intermediate $\mathbf{In_1^-}$ with a relatively low entropy loss. On the other hand, in the case of the derivative carrying methyl group at the nitrogen adjacent to benzene ring, where the hydrogen bond cannot be formed and the system thus has a higher number of degrees of freedom, the ring closure giving intermediate $\mathbf{In_1^-}$ is connected with a substantially larger entropy drop.

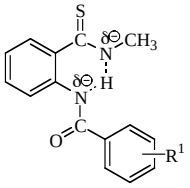


Figure 2

In our previous paper [10] we studied the kinetics and mechanism of base catalyzed cyclization giving analogous 1-methyl-2-(subst.phenyl)quinazoline-4-thiones. Studying this reaction, we found out [11] that in this case consecutive desulfurization reaction in methanolic sodium methoxide at room temperature took place leading to the corresponding quinazoline-4-one. Similar desulfurization reaction of 3-methyl-2-(subst.phenyl)quinazoline-4-thiones proceeds very slowly even at elevated temperature which is probably connected with different tautomeric forms of quinazoline-4-thione (1*H* vs. 3*H* form).

Conclusion.

The ring closure reaction of 2-benzoylamino-*N*-methylthiobenzamides (**1a-f**) in the medium of methanolic sodium methoxide gives good yields of derivatives of 3-methyl-3-phenylquinazoline-4-thione. In comparison with the previously studied ring closure reactions of analogous 2-benzoylaminothiobenzamides and 2-[(*N*-methyl-*N*-benzoyl)amino]thiobenzamides, this reaction is much slower, hence it has to be carried out at enhanced temperatures (boiling under reflux or in a sealed ampoule at 100 °C). The kinetic study carried out with two selected derivatives shows that the order of reaction with respect to methoxide anion (at its concentrations above 0.15 mol·l^{-1}) is zero: thus further increases in the methoxide concentration do not lead to any acceleration of the reaction.

EXPERIMENTAL

General.

The ^{1}H- and ^{13}C-NMR spectra were measured at 360.14 and 90.57 MHz, respectively, at 25 °C, using a Bruker AMX spectrometer in deuteriochloroform or hexadeuteriodimethyl sulphoxide (DMSO-d_6), and the chemical shifts are referenced to tetramethylsilane ($\delta(^1H) = 0$ ppm) and the solvent signal ($\delta(^{13}C) = 39.6$ ppm for DMSO-d_6 and $\delta(^{13}C) = 77.0$ ppm for $CDCl_3$). Kinetic measurements were carried out under pseudo-first-order conditions on a HP UV/VIS 8453 Diode Array apparatus. Glass ampoules were charged with solution of sodium methoxide in methanol (20 ml) in the concentration range of 0.0025 – 0.32 mol·l^{-1} and 1 ml of methanolic solution of **1c** or **1d** ($c = 1\cdot10^{-3}$ mol·l^{-1}). Sealed ampoules were placed into boiling water bath. At definite time intervals individual ampoules were cooled, opened, the solution was transferred into a cell and its absorbance was measured at 360 nm. The observed rate constants were calculated from absorbance-time (A-t) dependences using commercially available software and equation $k_{obs}\cdot t = -\ln(A_t - A_\infty)$.

Sample Experimental.

2-Amino-*N*-methyl-benzamide.

A 250-ml flask was charged with 10g (0.006 mol) of isatoic anhydride and 100 ml of water. The mixture was cooled to 2 °C and 60 ml of 20% aqueous solution of methylamine was added dropwise during 0.5 h and stirred for another 1 h at 2 °C. Excess of methylamine and 70 ml of water was removed under vacuum and separated light brown crystals were collected by filtration and recrystallized from a mixture of water and ethanol (1:1). Yield 7.4 g (80%), mp 76-78 °C (in accordance with ref. [13]). ^{1}H nmr (deuteriochloroform): δ 2.84 (dd, 3H, J = 4.8 Hz, J = 0.8

Hz, CH_3), 5.38 (bs, 2H, NH_2) 6.54 (t, J = 7.2 Hz , 1H), 6.61 (d, J = 8.2 Hz, 1H), 7.12 (t, J = 7.3 Hz, 1H), 7.26 (d, J = 7.8 Hz, 1H), 6.51 (bs, 1H, NH). ^{13}C nmr (deuteriochloroform): δ 26.1, 116.0, 116.3, 116.9, 127.0, 131.8, 148.1, 169.9.

2-Amino-*N*-methyl-thiobenzamide.

A 250-ml flask was charged with 15 g (0.1 mol) of 2-amino-*N*-methyl-benzamide, 22.3 g (0.1 mol) of phosphorus pentasulfide, and 70 mL of pyridine. The mixture was refluxed 1.5 h, whereupon it was cooled and poured onto ice water (250 ml). The separated yellow crystals of the pyridinium salt of 3-methyl-2-mercapto-2-thioxo-2,3-dihydro-1*H*-2λ^5-benzo[1.3.2]diazaphosphinine-4-thione were collected by filtration and recrystallized from a mixture of water and dimethylformamide (5:1). Yield 20 g (59%). A 500-ml flask was charged with 20 g (0.06 mol) of pyridinium salt along with water (70 ml), toluene (70 ml), and conc. hydrochloric acid (1.3 ml). The reaction mixture was refluxed until the solid portion completely dissolved and then continued for next 3 h, whereupon it was cooled to room temperature, and the separated crystals were collected by filtration. Yield: 6.3g (64%) yellow crystals, mp 96.5-98.5 °C (in accordance with ref. [14]). ^{1}H nmr (deuteriochloroform): δ 3.15 (dd, 3H, J = 4.8 Hz, J = 0.8 Hz, CH_3), 4.93 (bs, 2H, NH_2) 6.57 (d, J = 10.8 Hz , 1H), 6.63 (dt, J = 8.3 Hz, J = 1.0 Hz, 1H), 7.01 (dd, J = 9.1 Hz, J = 2.3 Hz, 1H), 7.07 (m, 1H), 8.08 (bs, 1H, NH). ^{13}C nmr (deuteriochloroform): δ 32.9, 117.7, 118.3, 126.8, 127.4, 131.1, 144.9, 200.0.

General Procedure for Preparation of 2-Benzoylamino-*N*-methylthiobenzamides (**1a-f**).

A 100-ml three-necked flask equipped with a magnetic stirrer, dropping funnel, and argon inlet was charged with 0.01 mol of 2-amino-*N*-methyl-thiobenzamide, dry acetone (35 ml), and 0.01 mol triethylamine. The solution formed was treated with 0.01 mol of the respective benzoyl chloride dissolved in acetone (10 ml), added within *ca*. 5 min. The reaction mixture was stirred under an argon atmosphere at room temperature 1 h. The separated triethylamine hydrochloride was collected by filtration, and the filtrate was evaporated in vacuum at room temperature. Product was recrystallized from ethanol.

2-(4-Methoxybenzoylamino)-*N*-methyl-thiobenzamide (**1a**).

This compound was obtained as white crystals, yield 78%, mp 213-215 °C; ^{1}H nmr (DMSO-d_6): δ 10.84 (bs, 1H, NH), 10.72 (bs, 1H, NH), 8.24 (d, J = 7.8 Hz, 1H), 7.93 (AA´XX´, 2H), 7.49-7.54 (m, 1H), 7.40 (d, J = 7.7 Hz, 1H), 7.26 (t, J = 7.6 Hz, 1H) 7.15 (AA´XX´, 2H), 3.88 (s, 3H, OCH_3), 3.19 (s, 3H, NCH_3). ^{13}C nmr (DMSO-d_6): δ 33.8, 56.4, 115.0, 123.4, 124.7, 127.3, 128.2, 130.1, 130.9, 133.7, 136.2, 163.2, 164.9, 196.4.

Anal. Calcd. for $C_{16}H_{16}N_2O_2S$: C. 63.98; H. 5.37; N. 9.33; S. 10.67. Found: C. 64.08; H. 5.43; N. 9.19; S. 10.48.

2-(4-Methylbenzoylamino)-*N*-methyl-thiobenzamide (**1b**).

This compound was obtained as white crystals, yield 82%, mp 218-220 °C; ^{1}H nmr (DMSO-d_6): δ 10.88 (bs, 1H, NH), 10.73 (bs, 1H, NH), 8.24 (d, J = 8.1 Hz, 1H), 7.86 (AA´XX´, 2H), 7.50-7.54 (m, 1H), 7.40-7.42 (m, 3H), 7.27 (t, J = 7.6 Hz, 1H), 3.19 (s, 3H, NCH_3), 2.43 (s, 3H, CH_3). ^{13}C nmr (DMSO-d_6): δ 21.1, 32.9, 122.6, 124.0, 127.3, 127.3, 129.4, 130.1, 131.6, 132.9, 135.2, 142.2, 164.5, 195.5.

Anal. Calcd. for $C_{16}H_{16}N_2OS$: C. 67.58; H. 5.67; N. 9.85; S. 11.27. Found: C. 67.61; H. 5.70; N. 9.40; S. 10.42.

2-Benzoylamino-*N*-methyl-thiobenzamide (**1c**).

This compound was obtained as white crystals, yield 62%, mp 194-195 °C; ^{1}H nmr (DMSO-d_6): δ 10.86 (bs, 2H , 2×NH), 8.21 (d, J = 8.2 Hz, 1H), 7.96 (d, J = 6.8 Hz, 2H), 7.69-7.59 (m, 3H), 7.51-7.55 (m, 1H), 7.41 (dd, J = 7.7 Hz a 1.45 Hz, 1H), 7.28 (t, J = 7.5, 1H), 3.18 (s, 3H, NCH_3). ^{13}C nmr (DMSO-d_6): δ 33.8, 123.7, 125.0, 128.2, 128.2, 129.8, 130.9, 133.0, 134.1, 135.3, 135.9, 165.5, 196.4.

Anal. Calcd. for $C_{15}H_{14}N_2OS$: C. 66.64; H. 5.22; N. 10.36; S. 11.86. Found: C. 66.36; H. 5.28; N. 10.12; S. 11.66.

2-(4-Chlorbenzoylamino)-*N*-methyl-thiobenzamide (**1d**).

This compound was obtained as light yellow crystals, yield 82%, mp 194-196 °C; ^{1}H nmr (DMSO-d_6): δ 10.80 (bs, 2H, 2×NH), 8.11 (d, J = 8.2 Hz, 1H), 7.95 (AA´XX´, 2H), 7.69 (AA´XX´, 2H), 7.50-7.55 (m, 1H), 7.41 (d, J = 7.2 Hz, 1H), 7.29 (t, J = 7.5 Hz, 1H), 3.17 (s, 3H, NCH_3). ^{13}C nmr (DMSO-d_6): δ 32.8, 123.2, 124.3, 127.3, 128.9, 129.2, 129.9, 133.2, 133.6, 134.7, 136.8, 163.6, 195.4.

Anal. Calcd. for $C_{15}H_{13}ClN_2OS$: C. 59.11; H. 4.30; N. 9.19; S. 10.52; Cl. 11.63. Found: C. 59.46; H. 4.51; N. 9.06; S. 10.35; Cl. 11.86.

2-(4-Nitrobenzoylamino)-*N*-methyl-thiobenzamide (**1e**).

This compound was obtained as yellow crystals, yield 66%, mp 204-206 °C; ^{1}H nmr (DMSO-d_6): δ 10.93 (bs, 1H, NH), 10.69 (bs, 1H, NH), 8.44 (AA´XX´, 2H), 8.16 (AA´XX´, 2H), 8.03 (d, J = 7.6 Hz, 1H), 7.54 (t, J = 7.8, 1H), 7.43 (d, J = 7.7, 1H), 7.33 (t, J = 7.5 Hz, 1H), 3.16 (s, 3H, NCH_3). ^{13}C nmr (DMSO-d_6): δ 32.9, 123.9, 125.0, 127.6, 124.0, 129.0, 130.0, 134.4, 140.2, 134.6, 149.4, 163.4, 195.6.

Anal. Calcd. for $C_{15}H_{13}N_3O_3S$: C. 57.13; H. 4.16; N. 13.33; S. 10.17. Found: C. 57.05; H. 4.13; N. 13.06; S. 10.02.

2-(3-Nitrobenzoylamino)-*N*-methyl-thiobenzamide (**1f**).

This compound was obtained as light yellow crystals, yield 63%, mp 190-191 °C; ^{1}H nmr (DMSO-d_6): δ 10.96 (bs, 1H, NH), 10.63 (bs, 1H, NH), 8.70 (s, 1H), 8.44 (d, J = 8.2 Hz, 1H), 8.31 (d, J = 7.7 Hz, 1H), 7.97 (d, J = 8.0 Hz, 1H), 7.86 (t, J = 8.0 Hz, 1H), 7.51-7.47 (m, 1H), 7.40 (d, J = 7.2 Hz, 1H), 7.28 (t, J = 7.5 Hz, 1H), 3.13 (s, 1H, NCH_3). ^{13}C nmr (DMSO-d_6): δ 33.8, 123.2, 124.9, 125.8, 127.3, 128.5, 130.8, 131.4, 134.5, 135.2, 135.6, 136.9, 148.8, 163.8, 196.6.

Anal. Calcd. for $C_{15}H_{13}N_3O_3S$: C. 57.13; H. 4.16; N. 13.33; S. 10.17. Found: C. 57.45; H. 4.25; N. 12.97; S. 9.92.

General Procedure for preparation of 2-phenyl-3-methyl-quinazoline-4-thiones (**2a-f**).

A 100-ml flask was charged with 0.02 mol of the respective thioamide **1a-f** and methanol (50 ml). The solution formed was treated with 1 mol·l^{-1} sodium methoxide (1 ml), and the reaction mixture was refluxed 2 h, whereupon it was neutralized with acetic acid to pH ~ 7 and concentrated to crystallization. The crystalline product obtained on cooling was recrystallized from ethanol.

2-(4-Methoxyphenyl)-3-methylquinazoline-4-thione (**2a**).

This compound was obtained as yellow crystals, yield 53%, mp 142-144 °C (ref. [15] gives mp. 147 °C) ^{1}H nmr (DMSO-d_6): δ

8.72 (d, J = 8.3 Hz, 1H), 7.93 (t, J = 8.2 Hz, 1H), 7.77 (d, J = 8.2 Hz, 1H), 7.73 (AA´XX´, 2H), 7.66 (t, J = 8.2 Hz, 1H), 7.15 (AA´XX´, 2H), 3.90 (s, 3H), 3.89 (s, 3H). ^{13}C nmr (DMSO-d_6): δ 43.2, 55.5, 113.9, 127.9, 128.0, 128.1, 128.3, 130.2, 130.3, 134.8, 142.3, 155.1, 160.5, 188.3.

Anal. Calcd. for $C_{16}H_{14}N_2OS$: C. 68.06; H. 5.00; N. 9.92; S. 11.35. Found: C. 68.32; H. 5.10; N. 9.99; S. 11.53.

2-(4-Methylphenyl)-3-methylquinazoline-4-thione (**2b**).

This compound was obtained as yellow crystals, yield 53%, mp 153-155 °C; ^{1}H nmr (DMSO-d_6): δ 8.73 (d, J = 8.0 Hz, 1H), 7.94 (t, J = 7.62, 1H), 7.78 (d, J = 7.9 Hz, 1H), 7.65-7.70 (m, 3H), 7.42 (AA´XX´, 2H), 3.86 (s, 3H, NCH_3), 2.46 (s, 3H, CH_3). ^{13}C nmr (DMSO-d_6): δ 21.0, 43.0, 127.9, 128.0, 128.4, 129.0, 130.2, 133.0, 134.8, 139.7, 142.2, 145.4, 155.2, 188.1.

Anal. Calcd. for $C_{16}H_{14}N_2S$: C. 72.15; H. 5.30; N. 10.52; S. 12.04. Found: C. 71.89; H. 5.20; N. 10.23; S. 12.68.

2-Phenyl-3-methylquinazoline-4-thione (**2c**).

This compound was obtained as yellow crystals, yield 60%, mp 133-135 °C (ref. [16] gives mp. 149 °C); ^{1}H nmr (DMSO-d_6): δ 8.74 (d, J = 8.3 Hz, 1H), 7.92-7.97 (m, 1H), 7.75-7.79 (m, 3H), 7.68 (t, J = 7.7 Hz, 1H), 7.60-7.63 (m, 3H), 3.85 (s, 3H, NCH_3). ^{13}C nmr (DMSO-d_6): δ 43.8, 128.9, 128.9, 129.2, 129.3, 129.4, 130.8, 131.0, 135.6, 136.7, 143.0, 156.0, 188.9.

Anal. Calcd. for $C_{15}H_{12}N_2S$: C. 71.40; H. 4.79; N. 11.10; S. 12.71. Found: C. 71.15; H. 4.95; N. 10.91; S. 12.99.

2-(4-Chlorphenyl)-3-methylquinazoline-4-thione (**2d**).

This compound was obtained as yellow crystals, yield 59%, mp 171-173 °C; ^{1}H nmr (DMSO-d_6): δ 8.74 (d, J = 8.3 Hz, 1H), 7.95 (t, J = 8.3 Hz, 1H), 7.82 (AA´XX´, 2H), 7.79 (d, J = 8.1 Hz, 1H), 7.66-7.71 (m, 3H), 3.84 (s, 3H, NCH_3). ^{13}C nmr (DMSO-d_6): δ 43.7, 129.0, 129.1, 129.5, 129.6, 131.1, 131.4, 135.5, 135.7, 135.7, 143.0, 155.1, 189.0.

Anal. Calcd. for $C_{15}H_{11}ClN_2S$: C. 62.82; H. 3.87; N. 9.77; S. 11.18; Cl. 12.36. Found: C. 63.11; H. 4.01; N. 9.66; S. 11.26; Cl. 11.96.

2-(4-nitrophenyl)-3-methylquinazoline-4-thione (**2e**).

This compound was obtained as yellow crystals, yield 53%, mp 215-218 °C; ^{1}H nmr (DMSO-d_6): δ 8.77 (d, J = 8.3 Hz), 8.46 (AA´XX´, 2H), 8.09 (AA´XX´, 2H), 7.98 (t, J = 7.6 Hz, 1H), 7.81 (d, J = 8.2 Hz, 1H), 7.73 (t, J = 7.7 Hz, 1H), 3.83 (s, 3H, NCH_3). ^{13}C nmr (DMSO-d_6): δ 42.7, 123.8, 128.2, 128.3, 128.9, 130.2, 130.2, 135.0, 141.6, 142.0, 148.2, 153.6, 188.0.

Anal. Calcd. for $C_{15}H_{11}N_3O_2S$: C. 60.59; H. 3.73; N. 14.13; S. 10.78. Found: C. 60.20; H. 3.70; N. 13.86; S. 11.10.

2-(3-Nitrophenyl)-3-methylquinazoline-4-thione (**2f**).

This compound was obtained as yellow crystals, yield 57%, mp 203-206 °C; ^{1}H nmr (DMSO-d_6): δ 8.77 (d, J = 7.8, 1H), 8.68 (s, 1H), 8.47 (dd, J = 8.3 Hz and 2.3 Hz, 1H), 8.26 (d, J = 7.7 Hz, 1H), 7.97 (t, J = 7.6 Hz, 1H), 7.92 (t, J = 8.0 Hz, 1H), 7.82 (d, J = 8.1 Hz, 1H), 7.72 (m, 1H), 3.85 (s, 3H, NCH_3). ^{13}C nmr (DMSO-d_6): δ 42.7, 123.7, 127.7, 128.1, 128.3, 128.8, 130.3, 130.3, 134.9, 135.0, 137.2, 142.0, 147.8, 153.3, 188.1.

Anal. Calcd. for $C_{15}H_{11}N_3O_2S$: C. 60.59; H. 3.73; N. 14.13; S. 10.78. Found: C. 60.40; H. 3.67; N. 14.08; S. 10.96.

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