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The reaction of selenoesters with *o*-aminobenzamide and *o*-aminothiobenzamide derivatives led to the formation of 4-hydroxy- and 4-mercaptoquinazolines. Their structures were elucidated by means of elemental analyses and spectropic data (nmr and ms).

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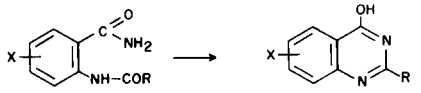
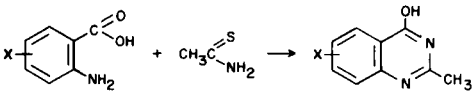
The synthesis of substituted 4-hydroxyquinazolines by the following route has been extensively studied.

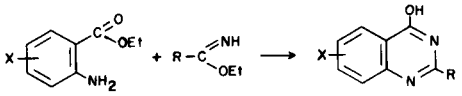


Sen and Gupta (1) have employed substituted anthranilic acid and thioacetamide for the synthesis of substituted 2-methyl-4-hydroxyquinazolines.



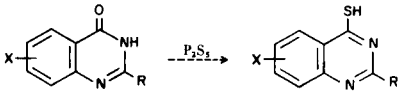
X = H, Cl, Br

Beyer and Zoellner (2) were able to obtain substituted 2-alkyl-4-hydroxyquinazolines from iminoethers and anthranilic acids.



R = alkyl, aryl X = H, NO_2, ...

Leonard and Curtin (3) and Tomisek, *et al.*, (4) have employed 2-methyl-4-quinazolone and 6-chloro-2-methyl-4-quinazolone for the synthesis of the respective 4-mercaptoquinazolines by means of phosphorus pentasulfide in refluxing xylene. The yields were rather low (27%).

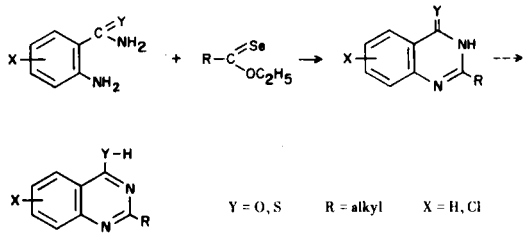


X = H, Cl R = H, alkyl

These preparations are either not generally applicable, or require restrictive conditions. The present work deals with the direct synthesis of 4-hydroxy- and 4-mercaptoquinazolines derivatives. Treatment of aliphatic selenonesters with *o*-aminobenzamide and *o*-aminothiobenzamide derivatives under the reflux conditions afford in all cases studied 4-hydroxy- and 4-mercaptoquinazolines.

The reaction of selenonesters with *o*-aminobenzamide and *o*-aminothiobenzamide derivatives provides a general method for preparing 4-hydroxy- and 4-mercaptoquinazolines for which we suggest the following scheme.

The nmr and mass spectral fragmentation of all the quinazoline derivatives formed are listed in Table I.



Y = O, S R = alkyl X = H, Cl

EXPERIMENTAL

Melting points were determined on a Kofler hotbench and on a Maquenne block apparatus. Nmr spectra were taken on a Varian spectrometer model EM-360. Line positions are given in δ scale, with TMS as internal standard. Mass spectra were taken on a Varian CH7A Mass spectrometer. Elemental analyses were performed by Dornis und Kolbe Mikroanalytisches Laboratorium, Hohenweg 17, West Germany and service Central de Microanalyse (C.N.R.S) 2, rue Henry Dunant-94320 Thiais, France.

Anthranilinonitrile and 2-amino-5-chlorobenzonitrile were purchased from commercial sources. *o*-Aminobenzamide and 2-amino-5-chlorobenzamide were obtained according to literature (5). *o*-Aminobenzthioamide and 2-amino-5-chlorobenzthioamide were prepared by the method of Fairfull and coworkers (6). The method of preparation of the selenonesters is given in reference (7).

General Synthesis of 4-Hydroxy- and 4-Mercaptoquinazolines.

In a typical example, to a solution of 1.52 g. (0.01 mole) of *o*-aminothiobenzamide in anhydrous ethanol, 1.51 g. (0.01 mole) of *o*-ethyl selenoacetate in 10 ml. of ethanol was added. The mixture was heated under reflux for 30 hours; then the suspension which resulted was filtered. Evaporation of the solvent left 0.91 g. (52%) of 2-methyl-4-mercaptoquinazoline (Table II, Experiment No. 1), m.p. 214.

In the case of the experiments carried out in pyridine, the resulting suspension was poured into cold water and after 2 days at room temperature, the quinazoline was collected by filtration or extracted with ether (3 x 75 ml.). The extracts were combined, washed with water, dried over anhydrous sodium sulfate, and the solvent removed in a rotary film evaporator.

REFERENCES AND NOTES

(1) A. B. Sen and S. K. Gupta, *J. Indian Chem. Soc.*, 39, 368 (1962).

(2) H. Beyer and H. Zoellner, *Chem. Ber.*, 86, 2199 (1963).

(3) N. J. Leonard and D. Y. Curtin, *J. Org. Chem.*, 11, 349 (1946).

(4) A. J. Tomisek and B. E. Christensen, *J. Am. Chem. Soc.*, 70, 2423 (1948).

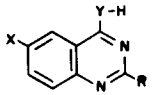
(5) J. H. Hall and M. Gisler, *J. Org. Chem.*, 41, 3769 (1976).

(6) A. E. S. Fairfull, J. L. Lowe and D. A. Peak, *J. Chem. Soc.*, 742 (1952).

(7) V. I. Cohen, *J. Org. Chem.*, 42, 2645 (1977).

Table I

The Nmr and Mass Spectral Data of 4-Hydroxy- and 4-Mercaptoquinazoline Derivatives

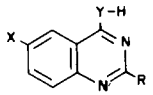


Compound No.	X	Y	R	Nmr (a)	Ms m/e (%)	Molecular Formula
1	H	S	CH_2	2.48 (3H, s); 7.34-8.02 (3H); 8.53 (1H, d)	50 (8); 75 (8); 76 (10); 88 (7); 102 (20); 143 (100); 176 (82)	$C_9H_8N_2S$ (176)
2	H	S	CH_3CH_2	1.28 (3H, t); 2.78 (2H, q); 7.35-8.05 (3H); 8.55 (1H, d)	39 (6); 50 (9); 63 (7); 69 (5); 75 (8); 76 (12); 90 (3); 95 (4); 102 (14); 110 (9); 129 (34); 135 (8); 152 (7); 157 (52); 162 (8); 189 (58); 190 (100)	$C_{11}H_{12}N_2S$ (190)
3	H	S	$CH_3(CH_2)_2$	0.93 (3H, t); 1.78 (2H, m); 2.73 (2H, t); 7.34-8.03 (3H); 8.57 (1H, d)	39 (9); 41 (22); 43 (16); 55 (10); 57 (13); 69 (7); 75 (7); 76 (8); 77 (9); 102 (20); 129 (24); 143 (7); 176 (100); 189 (29); 203 (11); 204 (54)	$C_{11}H_{12}N_2S$ (204)
4	H	S	$CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle |}{CH}}$	1.26 (6H, d); 3.15 (1H, m); 7.35-8.00 (3H); 8.53 (1H, d)	39 (10); 41 (16); 43 (9); 75 (9); 76 (11); 102 (23); 129 (45); 135 (8); 155 (9); 161 (9); 173 (10); 176 (21); 189 (100); 203 (22); 204 (94)	$C_{11}H_{12}N_2S$ (204)
5	Cl	S	CH_3	2.48 (3H, s); 7.52-8.00 (2H); 8.46 (1H, d)	42 (10); 75 (13); 100 (9); 105 (5); 110 (4); 136 (9); 177 (100); 179 (31); 210 (79); 212 (28)	$C_9H_7ClN_2S$
6	Cl	S	$CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle |}{CH}}$	1.27 (6H, d); 3.15 (1H, m); 7.53-7.90 (2H); 8.48 (1H, d)	39 (11); 41 (29); 43 (20); 69 (7); 75 (12); 100 (9); 110 (5); 119 (7); 133 (7); 136 (11); 163 (42); 165 (13); 169 (7); 189 (10); 210 (29); 212 (9); 223 (100); 225 (38); 237 (20); 238 (90); 340 (32)	$C_{11}H_{11}ClN_2S$ (238-240)
7	Cl	S	$CH_3(CH_2)_3$	0.93 (3H, t); 1.58 (4H, m); 2.75 (2H, t); 7.52-8.02 (2H); 8.50 (1H, d)	27 (9); 29 (13); 41 (23); 55 (6); 75 (6); 100 (6); 136 (5); 163 (8); 170 (7); 177 (7); 189 (4); 210 (100); 212 (40); 223 (15); 225 (6); 237 (5); 252 (24); 254 (9)	$C_{12}H_{13}ClN_2S$ (252-254)
8	H	O	$CH_3(CH_2)_2$	0.91 (3H, t); 1.73 (2H, m); 2.55 (2H, t); 7.22-7.80 (3H); 8.03 (1H, d)	31 (40); 39 (8); 41 (9); 45 (14); 46 (7); 63 (7); 64 (6); 65 (6); 77 (7); 90 (8); 92 (11); 119 (16); 120 (12); 132 (5); 180 (100); 173 (26); 187 (9); 188 (12)	$C_{11}H_{12}N_2O$ (188)
9	H	O	$CH_3(CH_2)_3$	0.91 (3H, t); 1.58 (4H, m); 2.65 (2H, t); 7.25-7.83 (3H); 8.10 (1H, d)	27 (4); 29 (3); 39 (6); 41 (5); 63 (4); 64 (3); 65 (4); 77 (4); 90 (8); 92 (7); 119 (9); 120 (9); 132 (4); 160 (100); 173 (16); 187 (8); 202 (4)	$C_{12}H_{14}N_2O$ (202)
10	Cl	O	CH_3	2.34 (3H, s); 7.45-7.90 (2H); 7.96 (1H, d)	42 (44); 63 (11); 75 (14); 110 (16); 124 (14); 125 (11); 126 (14); 152 (17); 153 (24); 154 (17); 194 (100); 196 (33)	$C_9H_7ClN_2O$ (194-196)
11	Cl	O	CH_3CH_2	1.20 (3H, t); 2.54 (2H, q); 7.43-7.89 (2H); 7.98 (1H, d)	54 (12); 63 (16); 75 (18); 90 (10); 124 (21); 126 (14); 153 (46); 155 (15); 180 (12); 207 (100); 208 (96); 209 (43); 210 (33)	$C_{10}H_9ClN_2O$ (208-210)
12	Cl	O	$CH_3(CH_2)_2$	0.95 (3H, t); 1.78 (2H, m); 2.85 (2H, t); 7.38-7.90 (2H); 8.04 (1H, d)	39 (5); 41 (12); 43 (5); 63 (7); 75 (8); 90 (5); 111 (4); 124 (10); 126 (9); 153 (14); 154 (11); 166 (5); 194 (100); 196 (34); 207 (28); 209 (8); 221 (8); 222 (13)	$C_{11}H_{11}ClN_2O$ (222)

(a) Chemical Shifts in δ; solvent DMSO-d_6.

Table II

Physical Properties and Microanalytical Data of 4-Hydroxy- and 4-Mercaptoquinazoline Derivatives



Compound No.	X	Y	R	Reaction Solvent	Time of Reflux (hours)	M.p. °C	Crystallization Solvent	Yield %	Empirical Formula		Elemental Analysis % C	H	N	S
1	H	S	CH_3	ethanol	30	214	ethanol	52	$C_9H_8N_2S$	Calcd.	61.36	4.54	15.89	18.20
										Found	61.63	4.66	15.61	18.03
2	H	S	CH_3CH_2	ethanol	30	204	ethanol	45	$C_{10}H_{10}N_2S$	Calcd.	63.15	5.25	14.72	16.85
										Found	62.84	5.34	14.79	16.75
3	H	S	$CH_3(CH_2)_2$	ethanol	30	179	ethanol	55	$C_{11}H_{12}N_2S$	Calcd.	64.70	5.87	13.71	15.70
										Found	64.40	5.75	13.66	15.79
4	H	S	$CH_3\overset{CH_3}{\underset{|}{C}}H$	pyridine	20	201	ethanol-water	60	$C_{11}H_{12}N_2S$	Calcd.	64.70	5.87	13.71	15.70
										Found	64.60	5.93	13.75	15.69
5	Cl	S	CH_3	ethanol	30	275	ethanol	46	$C_9H_7ClN_2S$	Calcd.	51.32	3.32	13.29	15.22
										Found	51.26	3.40	13.50	15.84
6	Cl	S	$CH_3\overset{CH_3}{\underset{|}{C}}H$	ethanol	30	222	*n*-butyl acetate	40	$C_{11}H_{11}ClN_2S$	Calcd.	55.36	4.60	11.73	13.43
										Found	55.44	4.63	11.73	13.50
7	Cl	S	$CH_3(CH_2)_3$	ethanol	30	191	ethanol	30	$C_{12}H_{13}ClN_2S$	Calcd.	57.04	5.14	11.08	12.69
										Found	56.70	5.10	10.94	12.48
8	H	O	$CH_3(CH_2)_2$	pyridine	25	190	*n*-butyl acetate	60	$C_{11}H_{12}N_2O$	Calcd.	70.23	6.37	14.88	
										Found	70.16	6.45	14.76	
9	H	O	$CH_3(CH_2)_3$	pyridine	30	157	*n*-butyl acetate	65	$C_{12}H_{14}N_2O$	Calcd.	71.30	6.92	13.85	
										Found	71.16	6.98	13.93	
10	Cl	O	CH_3	pyridine	20	285	*n*-butyl acetate	70	$C_9H_7ClN_2O$	Calcd.	55.56	3.59	14.39	
										Found	55.60	3.56	14.42	
11	Cl	O	CH_3CH_2	pyridine	25	276	ethanol-water	62	$C_{10}H_9ClN_2O$	Calcd.	57.58	4.31	13.42	
										Found	57.58	4.33	13.44	
12	Cl	O	$CH_3(CH_2)_2$	pyridine	25	246	ethanol	58	$C_{11}H_{11}ClN_2O$	Calcd.	59.35	4.94	12.58	
										Found	59.26	4.94	12.76	