Thiazol-4(5H)-one Derivatives in Heterocyclic Synthesis: a New Route for the Synthesis of Several New Pyrano[2,3-*d*]thiazole and Annelated Pyrazole Derivatives

J. Chem. Research (S), 1998, 730–731
J. Chem. Research (M), 1998, 3207–3223

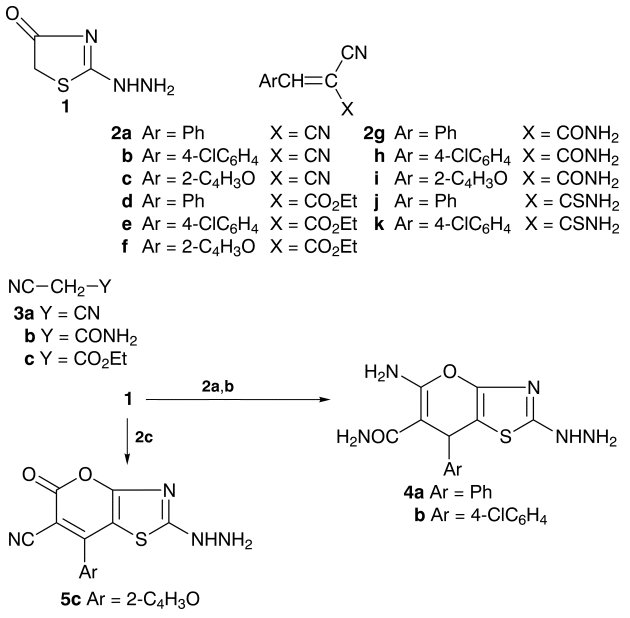
Sanaa M. Eldin

Department of Pesticidal Chemistry, National Research Center, Dokki, Giza, A. R. Egypt

2-Hydrazinothiazol-4(5H)-one (**1**) reacted with a variety of cinnamonitrile derivatives (**2**) and activated nitriles (**3**) to yield several new pyrano[2,3-*d*]thiazole and annelated pyrazoles; structures were confirmed by elemental analyses and spectral data studies.

In the last few years we have been highly interested in the chemistry of heterocyclic derivatives with expected biological activities.[16–20] The diverse biological activities reported for thiazol-4(5H)-one and its derivatives[9,11,13] prompted the interest to synthesise some new derivatives of this ring system which are required for a medicinal chemistry programme. 2-Hydrazinothiazol-4(5H)-one (**1**) seemed to be an excellent starting compound for fulfillment of this objective.

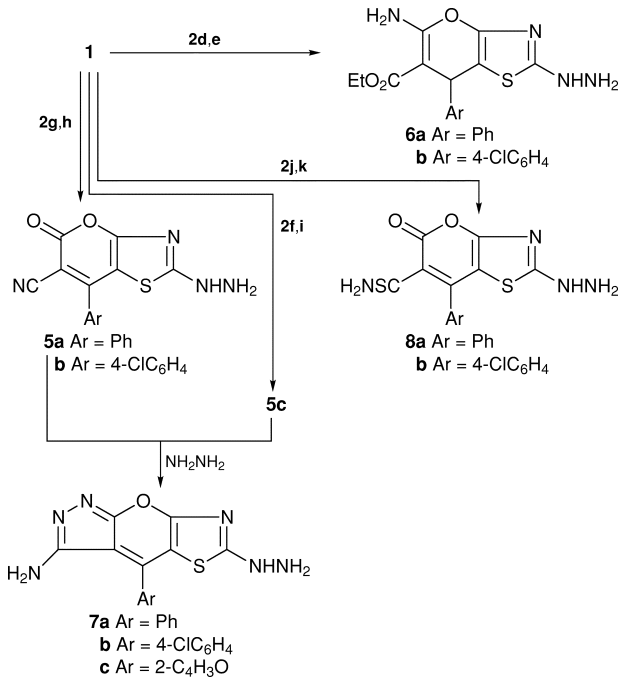
Thus, **1** reacted, in the presence of a base catalyst, with cyanocinnamonitriles (**2a**,**b**) to yield products (Scheme 1) showing no CN absorptions in their IR spectra. In addition, a singlet at δ 4.8 for pyran H-4 was revealed in their ^{1}H NMR spectra.



Scheme 1

Accordingly, these products were formulated as the carboxamidopyrano[2,3-*d*]thiazoles **4a**,**b**. In contrast to this behaviour, **1** reacted with the furylacrylonitrile derivative **2c** to give a product showing a CN absorption in its IR spectrum and no signal for pyran H-4 was detected in the ^{1}H NMR spectrum. Consequently this product could be formulated as the cyanopyrano[2,3-*d*]thiazole derivative **5c**. Moreover, the ethoxycarbonylcinnamonitriles **2d**,**e** reacted with **1** to yield the corresponding ethoxycarbonylpyrano-[2,3-*d*]thiazoles **6a**,**b** respectively (Scheme 2).

On the other hand, the carboxamidocinnamonitriles **2g**,**h** reacted with **1** to afford the corresponding cyanopyrano-[2,3-*d*]thiazoles **5a**,**b** (Scheme 2). The structures of **5a**,**b** and **6a**,**b** were confirmed on the basis of correct elemental

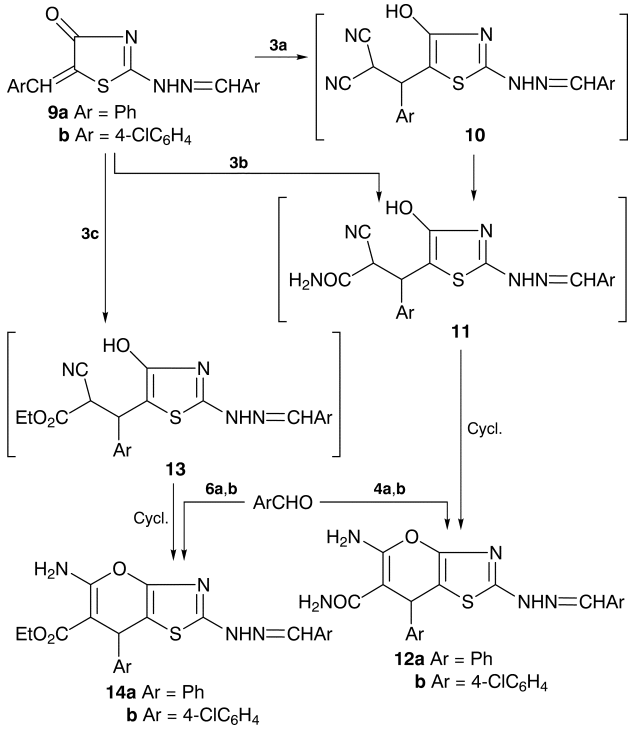


Scheme 2

analyses and spectral data studies. Moreover, reacting either **2f** or **2i** with **1** (Scheme 2) afforded the same product which was found to be identical with **5c**. Each of **5a**–**c** reacted with hydrazine hydrate (Scheme 2) to give the pyranothiazolopyrazoles **7a**–**c** respectively, the ^{1}H NMR spectra of which revealed only signals of NH, NH_2 and aromatic protons. Compound **1** reacted with aromatic aldehydes to yield the diylidenes **9a**,**b** which were used as starting materials in the remainder of the study.

Compounds **9a**,**b** reacted with malononitrile (**3a**) to yield the corresponding carboxamidopyrano[2,3-*d*]thiazoles **12a**,**b** (Scheme 3). These compounds were also authenticated by either reacting **9a**,**b** with cyanoacetamide (**3b**) or reacting **4a**,**b** with the appropriate aldehyde.

Furthermore, **9a**,**b** reacted with ethyl cyanoacetate (**3c**) to yield the ylidenes of ethoxycarbonylpyrano[2,3-*d*]thiazoles **14a**,**b** (Scheme 3). These were also authenicated by reacting each of **6a**,**b** with the appropriate aromatic aldehydes. In addition, each of **12a**,**b** or **14a**,**b** reacted with hydrazine hydrate to yield the corresponding thiazolopyranopyrazole derivatives **17a**,**b** (Scheme 4). The structures of **17a**,**b** were established based on elemental analysis, IR and ^{1}H NMR spectral data studies. Moreover, **17a**,**b** were authenticated by first reacting each of **4a**,**b** or **6a**,**b** with hydrazine hydrate to give **18a**,**b** which could then be reacted with the appropriate aromatic aldehyde to give **17a**,**b**. The structures of **18a**,**b**



Scheme 3

could, in turn, be established based on elemental and spectral data studies.

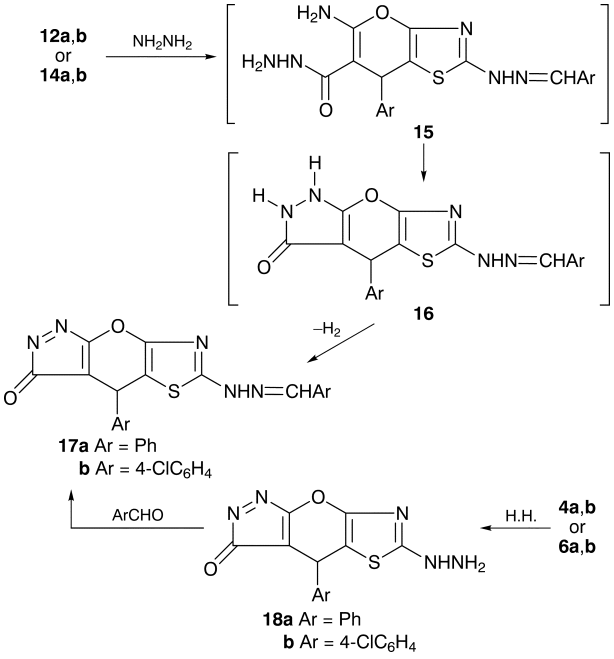
Techniques used: IR and ^{1}H NMR spectrometry

Tables: 2

Schemes: 4

References: 22

Received, 21st May 1998; Accepted, 20th August 1998
Paper E/8/03845G



Scheme 4

References cited in this synopsis

9 *Thiazole and Its Derivatives*, ed. J. V. Metzger, John Wiley, New York, 1979, vol. 39.
11 D. E. Kuhla, U.S. Pat., 3 860 718, 1975; *Chem. Abstr.*, 1975, **82**, 140133.
13 H. J. School, E. Klaule, F. Grewe and I. Hammann, *Ger. Offen.*, 1972, 2062, 348; *Chem. Abstr.*, 1977, **77**, 114391.
16 F. A. Attaby, S. M. Eldin and M. A. Razik, *Phosphorus Sulfur*, 1995, **106**, 21.
17 S. S. Ghabrial, M. Y. Zaki and S. M. Eldin, *Indian J. Chem., Sect. B*, 1994, **33**, 855.
18 F. A. Attaby, S. M. Eldin, W. M. Basyouni and M. A. Elneairy, *Phosphorus Sulfur*, 1996, **108**, 31.
19 S. S. Ghabrial and S. M. Eldin, *Egypt. J. Pharm. Sci.*, 1996, **37**, 375.
20 S. M. Eldin, S. S. Ghabrial and M. Y. Zaki, *Egypt. J. Pharm. Sci.*, 1996, **37**, 351.