USE OF *N*-BROMOSUCCINIMIDE IN THE SYNTHESIS OF HETEROCYCLIC SYSTEMS

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Abstract

N-Bromosuccinimide has been used in the synthesis of a series of imidazothiazoles. It is both quicker and more convenient to use than other reagents.

The use of α -halo ketones in the synthesis of imidazothiazoles^{1,2} has been reported in the literature. α -Halo ketones have been successfully replaced by halogens and ketones in the syntheses of the above compounds.³ The latter method avoids the use of α -halo ketones, which are difficult to obtain, yet suffers from the drawback that the procedure is cumbersome and more time consuming. (It requires about 25 hr of refluxing.) These defects have been removed in the present communication by using *N*-bromosuccinimide (NBS) in the synthesis of imidazothiazoles (2). The NBS method considerably reduces the time period (5–6 hr of refluxing) and at the same time simplifies the workup. The yields of imidazothiazoles, in general, are comparable to those in the previous methods. The NBS method might find general applicability in the syntheses of other condensed thiazoles.

2-Mercapto-2-imidazoline $(1a)^4$ was made to react with ketones in the presence of NBS in anhydrous benzene; subsequent basification with potassium carbonate yielded imidazothiazoles (2a). Similarly, 2-mercapto-4-methyl-2-imidazoline $(1b)^5$ used in place of (1a) in the above reaction gave (2b). A small amount of benzoyl peroxide was added to the reaction mixture to facilitate the synthesis of (2).

Experimental

3-p-Bromophenyl-5,6-dihydro-4H-imidazo[2,1-b]thiazole (2a; R' = p-BrC₆H₄, R'' = H)

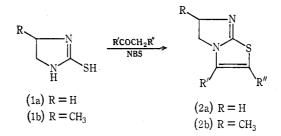
A mixture of 2-mercapto-2-imidazoline (1a) (3.06 g, 0.03 mol), *p*-bromoacetophenone (5.87 g, 0.03 mol), *N*-bromosuccinimide (5.34 g, 0.03 mol), and a small amount of benzoyl peroxide in anhydrous benzene (40 ml) was heated, under reflux, for about 6 hr on a steam bath. The solvent

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- ¹ Wilson, W., and Woodger, R., J. chem. Soc., 1955, 2943.
- ² Fefer, M., and King, L. C., J. org. Chem., 1961, 26, 828.
- ³ Chadha, V. K., Chaudhary, H. S., and Pujari, H. K., Indian J. Chem., 1970, 8, 885.
- ⁴ Allan, C. F. H., Edens, C. O., and Van Allan, J. A., Org. Synth., 1955, Coll. Vol. III, 394.
- ⁵ Johnson, T. B., and Edens, C. O., J. Am. chem. Soc., 1945, 67, 2242.

Aust. J. Chem., 1973, 26, 435-6

was distilled off and the hydrobromide thus obtained was purified (charcoal), m.p. 296° (EtOH) (lit.² 296–297°), yield 90%. The hydrobromide on neutralization with potassium carbonate gave the free base, m.p. 144–145° (EtOH) (lit.² 145–146°). The structure was confirmed by i.r. and n.m.r. spectra and elementary analysis for sulphur.



3-p-Bromophenyl-6-methyl-5,6-dihydro-4H-imidazo[2,1-b]thiazole (2b; R' = p-BrC₆H₄, R'' = H)

This compound was obtained by heating a mixture of 2-mercapto-4-methyl-2-imidazoline $(2 \cdot 30 \text{ g}, 0 \cdot 02 \text{ mol})$, *p*-bromoacetophenone $(3 \cdot 98 \text{ g}, 0 \cdot 02 \text{ mol})$, *N*-bromosuccinimide $(3 \cdot 56 \text{ g}, 0 \cdot 02 \text{ mol})$, and a small amount of benzoyl peroxide in anhydrous benzene (40 ml) following the above procedure. HBr salt, m.p. 270° (lit.³ 270°), yield 37%. The hydrobromide on neutralization with potassium carbonate gave the free base, m.p. 129° (EtOH) (lit.³ 130°). The structure was confirmed by i.r. and n.m.r. spectra and elementary analysis for sulphur.

Other results are shown in Table 1.

TABLE 1									
PREPARATION	OF IMIDAZO[2,1-b]THIAZOLES ((2)							

Ъ	R'	R″	HBr salt			Thiazole		
R			Yield	M.p.	Lit. m.p.	Yield	M.p.	Lit. m.p.
н	C ₆ H ₅	н	53%	245°	243-244° 1	40%	11 0–1 11°	111–113° 1
н	$p-ClC_6H_4$	Η	56	272	272-274 2	45	116-117	113–114 2
н	p-O ₂ NC ₆ H ₄	н	58	285	287–290 ²	48	215-216	216-218 2
н	CH ₃	C_6H_5	51	246	246–248 ¹			
н	C_6H_5	CH ₃	49	234-236	236-238 1	-	_	
CH ₃	p-ClC ₆ H ₄	Н	48	255-256	256 3			
CH ₃	p-O ₂ NC ₆ H ₄	Н	59	250 (dec.)	248-250 ³	43	212	213 ³
CH ₃	C ₆ H ₅	CH3	66	258-259	258 ³		<u> </u>	

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