SYNTHESIS OF 1,2,4-TRIAZOLO[5,1-*b*][1,3]BENZOXAZINES

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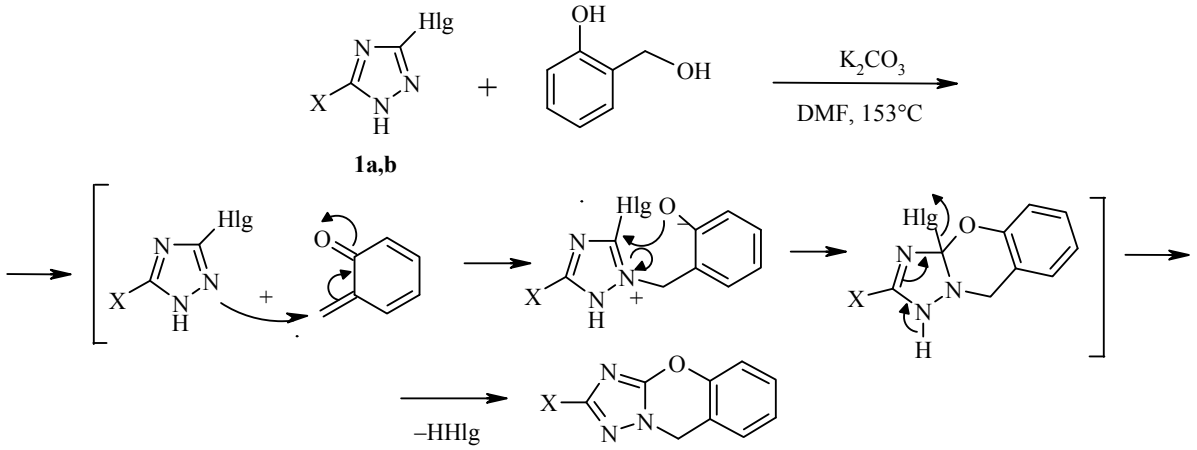
Alkylation of 1H-azoles by salicyl alcohol to give 2-(1H-azolylmethyl)phenols has been studied in some detail [1-3]. In the presence of good leaving groups in the azole molecules a subsequent cyclization of the initially formed alkylation products can occur to give azolo[1,3]benzoxazines [4]. We propose a simple, one-stage method for the preparation of the 1,2,4-triazolo[5,1-*b*][1,3]benzoxazines **2a,b** through the reaction of 3-chloro-1,2,4-triazole (**1a**) or 3,5-dibromo-1,2,4-triazole (**1b**) with salicyl alcohol in refluxing DMF in the presence of K_2CO_3.

The reaction occurs through the stage of intermediate formation of *o*-methylenequinone generated *in situ* from salicyl alcohol.

IR spectra were recorded on a Shimadzu FTIR-8400S spectrophotometer for KBr tablets. The ^{1}H NMR spectra were taken on a Bruker AM-400 (400 MHz) spectrometer using DMSO-d_6 and with TMS as internal standard. Mass spectra were recorded on a Finnigan Trace DSQ chromato-mass spectrometer with direct introduction of the sample into the ion source.



1a,b

2a,**b**

1a Hlg = Cl, **b** Hlg = Br; **1**, **2 a** X = H, **b** X = Br

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9H-[1,2,4]Triazolo[5,1-*b*][1,3]benzoxazine (2a). A mixture of 3-chloro-1,2,4-triazole (**1a**) (1.5 g, 14.5 mmol), salicyl alcohol (1.8 g, 14.5 mmol), and K_2CO_3 (4 g, 29 mmol) in DMF (15 ml) was refluxed with stirring for 3 h, cooled, poured into water (50 ml), and the precipitate formed was filtered off and recrystallized from ethanol to give compound **2a** (2.18 g, 87%) as colorless crystals, mp 140-141ºC. IR spectrum, ν, cm^{-1}: 3117 (CH triazole), 3047 (CH arom), 2920, 2851 (CH_2), 1597, 1555, 1528, 1489, 1458, 1427, 1350, 1265, 1200, 1180, 1134, 1092, 891, 779, 760, 713. ^{1}H NMR spectrum, δ, ppm: 5.37 (2H, d, CH_2); 7.24-7.30 (2H, m, H-5,7); 7.38-7.63 (2H, m, H-6,8); 7.83 (1H, s, H triazole). Mass spectrum, (EI, 70 eV), *m/z* (I_{rel}, %): 173 $[M]^+$ (72), 172 $[M-H]^+$ (100), 145 (12), 131 (23), 102 (24), 90 (26), 89 (40), 77 $[C_6H_5]^+$ (27), 63 (28), 51 (27). Found, %: C 62.20; H 4.03; N 24.22. $C_9H_7N_3O$. Calculated, %; C 62.42; H 4.07; N 24.26.

2-Bromo-9H-[1,2,4]triazolo[5,1-*b*][1,3]benzoxazine (2b) was prepared similarly to compound **2a** from 3,5-dibromo-1,2,4-triazole (**1b**) (1.5 g, 6.6 mmol), salicyl alcohol (0.82 g, 6.6 mmol), and K_2CO_3 (1.82 g, 13.2 mmol) in DMF (10 ml) as colorless crystals, mp 210-211ºC (ethanol). Yield 1.40 g (84%). IR spectrum, ν, cm^{-1}: 3047 (CH arom.), 2932 (CH_2), 1593, 1558, 1520, 1489, 1454, 1404, 1307, 1288, 1204, 1177, 1099, 899, 787, 768, 717. ^{1}H NMR spectrum, δ, ppm: 5.33 (2H, s, CH_2); 7.26-7.32 (2H, m, H-5,7); 7.39-7.44 (2H, m, H-6,8). Mass spectrum, (EI, 70 eV, for the ^{79}Br isotope), *m/z* (I_{rel}, %): 251 $[M]^+$ (100), 250 $[M-H]^+$ (73), 171 $[M-Br]^+$ (72), 119 (21), 116 (10), 104 (39), 90 (21), 89 (46), 78 (17), 77 $[C_6H_5]^+$ (33), 63 (22). Found, %: C 42.94; H 2.38; N 16.72. $C_7H_6BrN_3O$. Calculated, %: C 42.88; H 2.40; N 16.67.

REFERENCES

1. M. Wakselman, J.-C. Robert, G. Decodts, and M. Vilkas, *Bull. Soc. Chim. Fr.*, 1179 (1973).
2. V. A. Osyanin, P. P. Purygin, and Z. P. Belousova, *Izv. Vuzov. Khimiya i Khim. Tekhnol.*, 23 (2003).
3. T. R. R. Pettus and R. W. Van De Water, *Tetrahedron*, **58**, 5367 (2002).
4. N. E. Sidorina and V. A. Osyanin, *Khim. Geterotsikl. Soedin.*, 1256 (2007). [*Chem. Heterocycl. Comp.*, **43**, 1065 (2007)].