

ditions one obtains **15**. This reaction requires a base, as in the absence of dimethylamine the reaction does not proceed. However, when sodium hydroxide is substituted for dimethylamine, the reaction yields **15** and **14**. The presence of the radical scavenger, 3-*t*-butyl-4-hydroxy-5-methylphenyl sulfide, does not inhibit the reaction. When the radical initiator azobisisobutyronitrile is added in place of a base, the reaction yields only starting material. While it had been speculated that this ring closure reaction had proceeded by a radical mechanism [6], on the basis of these data, it is concluded that the reaction proceeds by a base-induced addition-elimination reaction.

EXPERIMENTAL

Melting points are uncorrected. Infrared spectra were recorded on a Perkin Elmer 1420 spectrometer. The pmr spectra were recorded on a Varian XL-300 spectrometer and are reported in the following manner: solvent, chemical shift, multiplicity, coupling constant, integration. Mass spectra were recorded on either a Finnegan 4510 EI/CI spectrometer or AEI MS-30 spectrometer using a direct insertion probe. Column chromatography was performed according to the method of Still, *et al* [7].

Experimental Procedure.

To a round bottomed flask under nitrogen containing a solution of 2-amino-4-[3,4-dichlorobenzoyl]oxazole (2.0 g, 7.8 mmoles) in *t*-butyl alcohol (20 ml) was added a 26% aqueous solution of dimethylamine (100 ml). The reaction was stirred at 25° for 4 hours and concentrated on a rotovap. A single product was detected by nmr and tlc analysis. Crystallization afforded 1.5 g of pyrimidine **12**, mp 188-189°; nmr (deuteriochloroform): δ 8.23 (d, $J = 1.5$ Hz, 1), 8.03 (dd, $J = 7, 1.5$ Hz, 1), 7.90 (s, 1), 7.37 (d, $J = 7$ Hz, 1), 3.18 (s, 6); ir (potassium bromide): 3440, 2960, 1610, 1550, 1420, 1360, 780 cm^{-1} .

Anal. Calcd. for $\text{C}_{12}\text{H}_{11}\text{Cl}_2\text{N}_3\text{O}$: C, 50.72; H, 3.90; N, 14.79. Found: C, 50.70; H, 3.86; N, 14.65.

Similarly prepared were the following compounds.

Compound 3b.

This compound had nmr (perdeuteriomethanol): δ 8.18-8.21 (m, 2), 7.99 (s, 1), 7.32-7.44 (m, 3), 4.89 (bs, 1), 3.11 (s, 6); ir (potassium bromide): 3450, 3040, 1600, 1540, 1400 cm^{-1} ; ms: $p^+ = 215$.

Anal. Calcd. for $\text{C}_{12}\text{H}_{13}\text{N}_3\text{O}$: C, 66.96; H, 6.09; N, 19.52. Found: C, 66.66; H, 6.14; N, 19.48.

Compound 2b.

This compound had nmr (deuteriochloroform): δ 9.70 (bs, 1), 7.32 (s, 1), 7.0-7.2 (m, 5), 3.09 (s, 6); ir (chloroform): 3450, 3260, 2940, 1720, 1630, 1600, 1540 cm^{-1} .

Anal. Calcd. for $\text{C}_{12}\text{H}_{13}\text{N}_3\text{O}$: 215.1058. Found: 215.1067.

Compound 6.

This compound had nmr (perdeuteriomethanol): δ 8.26 (d, $J = 4.5$ Hz, 2), 7.96 (s, 1), 6.06 (d, $J = 4.5$ Hz, 2), 4.89 (bs, 1), 3.84 (s, 3), 3.15 (s, 6); ir (potassium bromide): 3450, 2970, 1590, 1410, 1360 cm^{-1} ; ms: $p^+ = 245$.

Anal. Calcd. for $\text{C}_{13}\text{H}_{15}\text{N}_3\text{O}_2$: C, 63.66; H, 6.16; N, 17.13. Found: C, 63.52; H, 6.06; N, 16.82.

Compound 7.

This compound had nmr (deuteriochloroform): δ 7.79 (d, $J = 4$ Hz, 1), 7.40 (s, 1), 6.91 (d, $J = 4$ Hz, 1), 3.86 (s, 3), 3.10 (s, 6); ir (chloroform): 3450, 3280, 2960, 1720, 1610 cm^{-1} ; ms: $p^+ = 245$.

Anal. Calcd. for $\text{C}_{13}\text{H}_{15}\text{N}_3\text{O}_2$: C, 63.66; H, 6.16; N, 17.13. Found: C, 63.72; H, 6.05; N, 17.23.

Compound 8.

This compound had nmr (deuteriochloroform, perdeuteriomethanol): δ 8.0 (d, $J = 8$ Hz, 2), 7.8 (s, 1), 7.25 (d, $J = 8$ Hz, 2), 4.2 (bs, 1), 3.1 (s, 6); ir: (potassium bromide) 3460, 3060, 1600, 1480, 1420; ms: $p^+ = 249$.

Anal. Calcd. for $\text{C}_{12}\text{H}_{12}\text{ClN}_3\text{O}$: C, 57.72; H, 4.84; N, 16.83. Found: C, 57.36; H, 4.85; N, 16.54.

Compound 9.

This compound had nmr (perdeuteriomethanol): δ 7.8-7.9 (m, 3), 7.39-7.5 (m, 2), 3.2 (s, 6).

Anal. Calcd. for $\text{C}_{12}\text{H}_{12}\text{N}_3\text{O}$: 249.0668. Found: 249.0701.

Compound 10.

This compound had nmr (deuteriochloroform): δ 8.13 (d, $J = 4$ Hz, 2), 8.0 (s, 1), 7.24 (d, $J = 4$ Hz, 2), 4.90 (bs, 1), 3.16 (s, 6), 2.40 (s, 3); ir (potassium bromide): 3426, 3036, 1596, 1570, 1523, 1406 cm^{-1} .

Compound 11.

This compound had nmr (deuteriochloroform): δ 8.83 (d, $J = 6$ Hz, 1), 8.19 (d, $J = 6$ Hz, 1), 8.05 (s, 1), 7.05 (m, 2), 3.1 (s, 6H); ir (potassium bromide): 3450, 2920, 1600, 1420, 1320 cm^{-1} ; ms: $p^+ = 233$.

Anal. Calcd. for $\text{C}_{12}\text{H}_{12}\text{FN}_3\text{O}$: C, 61.79; H, 5.19; N, 18.02. Found: C, 61.56; H, 5.25; N, 17.81.

Compound 12.

This compound had nmr (perdeuteriomethanol): δ 8.56 (s, 1), 8.49 (d, $J = 4$ Hz, 1), 8.40 (s, 1), 7.52-7.70 (m, 2), 4.86 (bs, 1), 3.12 (s, 6); ir (potassium bromide): 3420, 2950, 1620, 1540, 1430 cm^{-1} ; ms: $p + 1 = 284$.

Anal. Calcd. for $\text{C}_{13}\text{H}_{12}\text{F}_3\text{N}_3\text{O}$: C, 55.12; H, 4.27; N, 14.83. Found: C, 54.91; H, 4.24; N, 14.80.

Compound 13.

This compound had nmr (deuteriochloroform/perdeuteriomethanol): δ 8.05 (s, 1), 7.5-7.3 (m, 3), 3.1 (s, 6); ir (chloroform): 3560, 3240, 2940, 1600, 1420; ms: $p^+ = 283$.

Anal. Calcd. for $\text{C}_{12}\text{H}_{11}\text{Cl}_2\text{N}_3\text{O}$: C, 50.72; H, 3.90; N, 14.79. Found: C, 50.91; H, 3.95; N, 14.65.

Compound 14.

This compound had nmr (deuteriochloroform): δ 8.48 (s, 1), 7.92 (d, $J = 4$ Hz, 1), 7.42 (s, 1), 7.24 (d, $J = 4$ Hz, 1), 3.20 (s, 6); ir (potassium bromide): 1627, 1601, 1563, 1539, 1474 cm^{-1} .

Anal. Calcd. for $\text{C}_{12}\text{H}_{10}\text{ClN}_3\text{O}$: C, 58.19; H, 4.07; N, 16.97. Found: C, 58.11; H, 4.05; N, 16.74.

REFERENCES AND NOTES

- [1] J. L. LaMattina and C. J. Mularski, *Tetrahedron Letters*, **25**, 2957 (1984).
- [2] For a recent related report see A. K. Sen, and D. K. Sengupta, *Indian J. Chem.*, **24B**, 535 (1985).
- [3] These compounds were prepared analogously to those in reference [1].
- [4] I. J. Turchi and M. J. S. Dewar, *Chem. Rev.*, **75**, 389 (1975).
- [5] S. B. Mahajan, S. S. Sangapure, and Y. S. Agasimrundin, *Indian J. Chem.*, **19B**, 596 (1980); G. G. DeAngelis and H.-J. Hess, U. S. Patent 3,755,583, 1973.
- [6] For a leading reference on substitution reactions of dichloropyrimidines see H. M. Bell, D. R. Carver, J. S. Hubbard, Y. P. Sachdeva, and J. F. Wolfe, *J. Org. Chem.*, **50**, 3442 (1985).
- [7] W. C. Still, M. Kahn, and A. Mitra, *J. Org. Chem.*, **43**, 2923 (1978).