Ortho Effects in 3-Methyl-5-(*o*-R-styryl)-4-aminoisoxazoles on Electron Impact. III.

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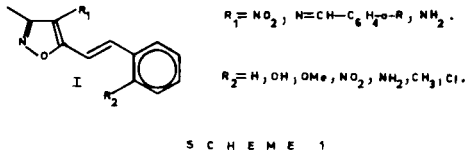
Received June 25, 1980

Electron impact mass spectra of eight of the title compounds are discussed. Based on our data a mechanism for the formation of the m/e 91 ion is proposed. Fragmentation pathways have been confirmed by measurement of the metastable peaks.

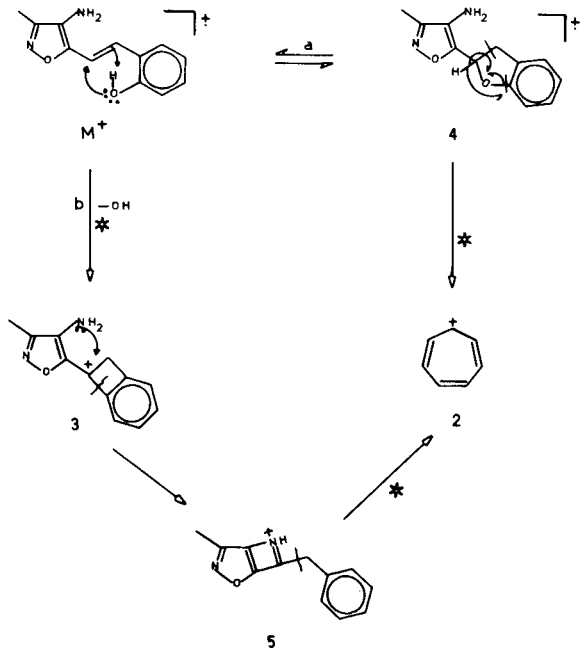
J. Heterocyclic Chem., **18**, 185 (1981).

Diarylethylene and triarylethylene analogs represent a series of compounds of considerable medicinal interest mainly as post-coital antifertility agents (3). This induces us to report the synthesis and mass spectrometry studies of a closely related family of compounds of the general structure I (4,5). In this paper we wish to report the mass spectral fragmentation patterns of 4-aminoisoxazoles I (Scheme 1; R_1 = NH_2 and R_2 = H, Me, OH, OMe, OEt, Cl, OAc, OBz).

The relative abundances of the ions are shown in the Table 1 and the proposed fragmentation patterns in Schemes 2 to 4.



SCHEME 1



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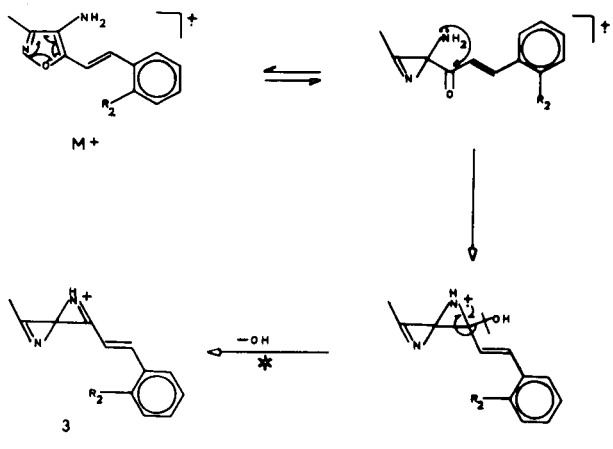

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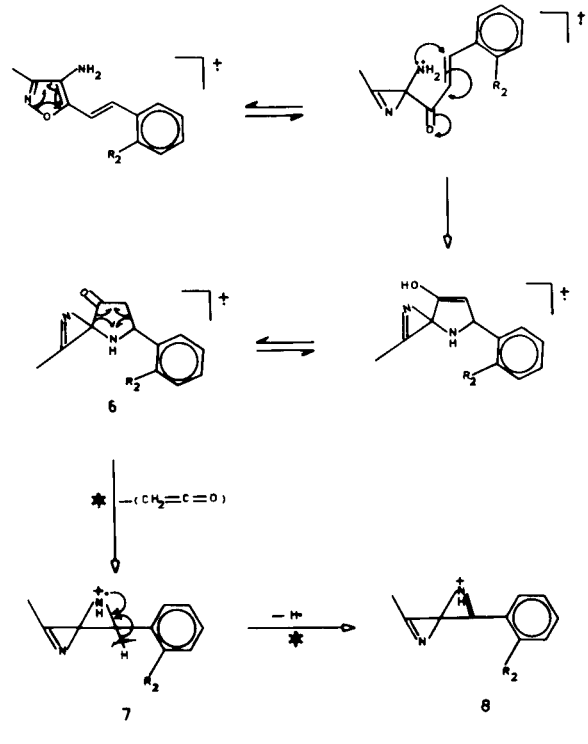

SCHEME 4

0022-152X/81/010185-03$02.25

Table 1

Relative Abundance of Principal Fragments
(Figures in parentheses indicate the nature of the ions)

m/e	Substituents on R_2: H	OH	Me	OMe	Cl
M^+	70.51	43.85	100	100	53.33
M^+-17 (3)	3.84	21.92	3.52	6.36	2.85
M^+-28	16.66	9.64	22.35	13.63	20.00
M^+-29	33.33	9.64	11.76	6.36	35.23
M^+-42 (7)	12.82	6.14	11.42	5.45	8.57
M^+-43 (8)	16.66	4.38	10.58	8.18	2.85
M^+-59	26.92	14.03	42.35	12.72	11.42
130+ R_2 (1)	100	57.01	90.58	86.36	33.33
129+ R_2	97.43	42.98	43.52	7.27	24.76
131	100	18.42	21.17	21.81	46.66
130	97.43	20.17	55.29	17.27	100
115	23.07	4.38	98.82	16.36	32.38
103	94.87	50.87	5.88	23.63	30.47
91 (2)	3.84	100	50.58	44.54	2.85
77	78.20	23.68	11.76	48.18	17.14
65	4.20	47.36	23.52	41.81	4.76
63	12.82	25.43	17.64	19.02	7.61
51	34.61	28.94	16.47	23.63	27.61

Table 2

Compound R_2	M.p. °C	Yield %	Formula	Calcd./Found C%		Calcd./Found H%		Calcd./Found N%	
OH	175	50	$C_{12}H_{12}O_2N_2$	66.66	66.64	5.59	5.58	12.96	12.94
OMe	126	47	$C_{13}H_{14}O_2N_2$	67.81	67.78	6.12	6.12	12.16	12.14
Me	105	40	$C_{13}H_{13}ON_2$	72.87	72.85	6.58	6.57	13.07	13.05
OAc	135	55	$C_{14}H_{14}O_3N_2$	65.10	65.10	5.46	5.43	10.84	10.81
OBz	180	50	$C_{19}H_{16}O_3N_2$	71.23	71.22	5.03	5.00	8.74	8.73
OEt	150	40	$C_{14}H_{16}O_2N_2$	68.83	68.81	6.60	6.60	11.46	11.44

The 4-aminoisoxazoles I are relatively stable under electron impact (see Table 1). The relative abundance of molecular ion varies from 44% of the base peak to being the base peak when R_2 = -OMe, -Me. In the case of 4-aminoisoxazoles with R_2 = Cl or H, the ion **1**, characteristic in 5-(*o*-R-styryl)isoxazoles (4,5) is the base peak.

The formation of ions **2** (the base peak) and **3**, when R_2 = OH, is mechanistically interesting. Two fragmentation pathways are envisaged for the formation of each fragment from the molecular ion; one of these invoking an *ortho*-interaction (6) of the −OH group with the stryrl unit leading to the benzodihydrofuran **4**, which by β-cleavage from oxygen of the dihydrofuran moiety produces **2** (Scheme 2, pathway a).

Expulsion of an -OH unit from the molecular ion affords **3**; the $-NH_2$ group of this ion attacks the β-carbon of a styryl moiety giving rise to **5**, which by benzylic cleavage gives **2** (Scheme 2, pathway b).

A second proposed pathway for the formation of **3**, consists in 1,2-addition of the $-NH_2$ group on the carbonyl function and loss of 17 mass units (OH) as shown in Scheme 3.

Another interesting fragmentation pattern is the loss of a ketene unit from the molecular ion, which probably proceeds through the 1,4-addition of the $-NH_2$ group to the carbonyl function, leading to the 3-oxopyrrolidine **6**, the posterior rupture of which gives rise to **7**, which in turn loses a benzylic hydrogen to give **8** (Scheme 4).

The derivatives with R_2 = -OAc, -OBz and -OEt loses characteristic fragments (7) leading to the molecular ions of the corresponding 4-aminoisoxazoles and therefore they are not discussed in detail. All fragmentation pathways are supported by the corresponding metastable transitions which are depicted by an asterisk in the Figures.

EXPERIMENTAL

The compounds have been prepared from the appropriate 4-nitroisoxazoles by tin-hydrochloric acid catalyzed reduction (8). All the compounds investigated gave satisfactory elemental analyses. Some have been reported: R_2 = H, Cl (8). The rest are described in Table 2.

The mass spectra were measured on a Hitachi-Perkin-Elmer RMU-7H double focusing mass spectrometer using the direct inlet system. The samples were recorded at an ionization chamber temperature at 190°.

REFERENCES AND NOTES

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