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Preliminary communication

NOVEL HETEROAROMATIC SILANES IN THE GAS PHASE

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Summary

The appearance of intense peaks, due to the $(P - 30)^{2+}$ ions, in the mass spectra of 8-trimethylsiloxyquinoline, 2-methyl-8-trimethylsiloxyquinoline, 2-trimethylsiloxymethylpyridine and 2-trimethylsiloxymethyl-6-methylpyridine suggests that these ions have considerable heteroaromatic character.

Our interest in the possible isolation of five coordinate trimethylsilane derivatives resulted in the preparation of the compounds 8-trimethylsiloxyquinoline (I), 2-methyl-8-trimethylsiloxyquinoline (II), 2-trimethylsiloxymethylpyridine (III) and 2-trimethylsiloxymethyl-6-methylpyridine (IV). However VTP, ^{1}H and ^{13}C NMR studies on these compounds, in a CCl_4/C_6D_6 solution, provided no evidence for these compounds being five coordinate in solution. It was therefore interesting that in their mass spectra, recorded at 70 eV, intense peaks, of the order of 10% compared to the base peak, due to the $(P - 30)^{2+}$ ions were observed. In the mass spectra of organic compounds peaks due to double charged ions rarely exceed 1-2 % of the base peak intensity [1]. However, if the molecule, or part of it is aromatic or heteroaromatic, then the possibility of the molecule or some of its fragments to sustain two positive charges is greatly increased. It has therefore been suggested that the presence of abundant double charged ions in the mass spectrum of a compound is indicative of the presence of aromatic rings or high unsaturation in the molecule or fragment [2].

The base peaks in the mass spectra of compounds I-IV were due to the $(P - \mathrm{Me})^+$ ion and each spectra also contained a peak due to the $(P - 30)^{2+}$ ion, which had an intensity of about 10% compared to the base peak.

The unusually high intensity of these double charged ions would indicate that they had considerable heteroaromatic character and we would suggest their formulation as (a) and (b) in which there is complete delocalisation over the whole structure.

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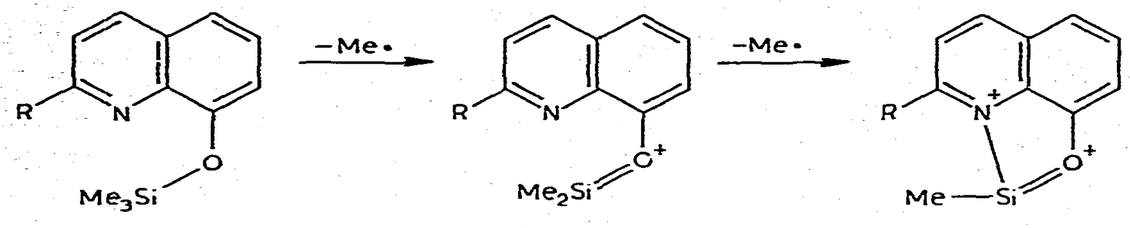
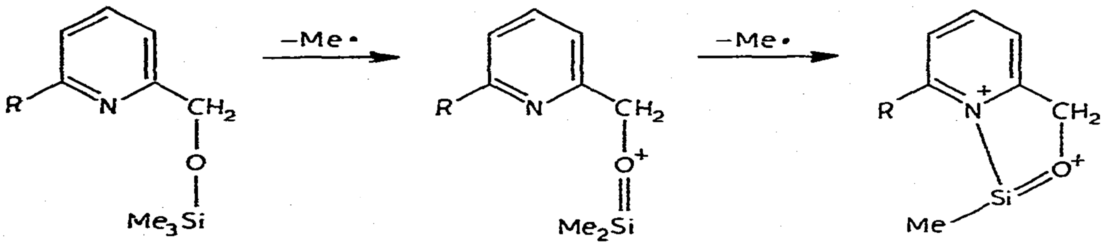


(a)



(b)

(R = H or Me)

One further interesting feature was the presence of a very broad peak, in each spectrum, which we assign to the metastable associated with the loss of Me$^+$ from these double charged ions. Details of the major ions of interest in the mass spectra of these compounds are given in Table 1.

TABLE 1

MAJOR IONS OF INTEREST IN THE TRIMETHYLSILOXY DERIVATIVES

Compound	P^+ (*m/e*)	Base (%)	Base peak (*m/e*)	$(P-30)^{2+}$ (*m/e*)	Base (%)	$(P-30)^{2+}-\text{Me}^+$	
						Calculated	Observed [a]
I	217	9.8	$P-15$	93.5	9.2	316.4	317
II	231	13.3	$P-15$	100.5	8.7	344.2	345
III	181	18.9	$P-15$	75.5	10.3	245	244.5
IV	195	39.2	$P-15$	82.5	11.4	272.7	273

[a] Centre of a broad peak.

These results prompt us to suggest that double charge ions will be observed in the mass spectra of analogous derivatives of elements from Groups III-V inclusive.

References

1 J.H. Beynon, Mass Spectrometry and Its Applications to Organic Chemistry, Elsevier Publishing Co., New York, 1960, p. 344, 401.
2 K. Biemann, Mass Spectrometry, McGraw-Hill Book Co. Inc., New York, 1962, p. 158.