A New Synthetic Route to *N*-Amino Maleimides

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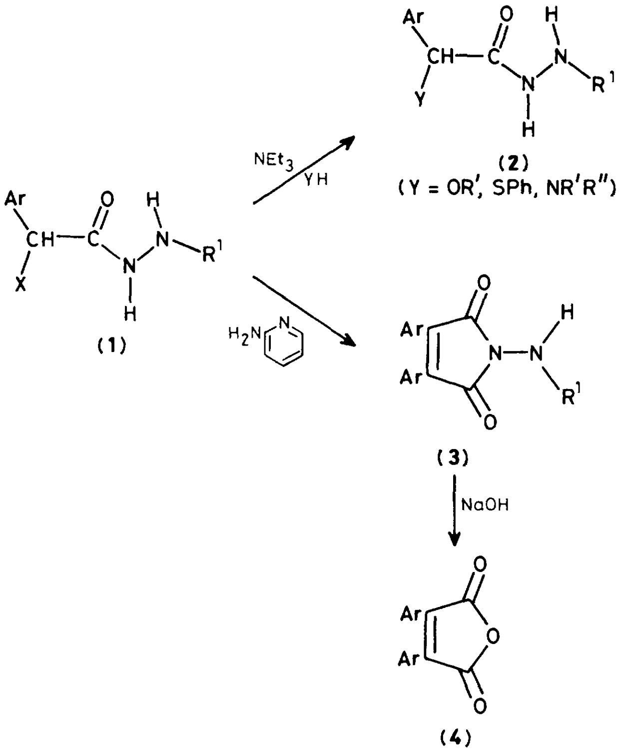
N-Amino maleimides have been obtained in good yield through the reaction of α-halohydrazides with *N*-aminopyridine.

Many α-halohydrazides (**1**), easily prepared from gem dicyano epoxides,[1] react rapidly in a basic medium with nucleophiles leading to α-substituted hydrazides (**2**) through an aziridinone intermediate[2] (Scheme 1). A different reaction is observed when the nucleophile is 2-aminopyridine. In this case, the reaction affords *N*-amino maleimides (**3**). To the best of our knowledge, the *N*-amino maleimides described previously have only been prepared from the reaction of hydrazines and maleic anhydrides.[3—7] As a consequence, their synthesis was limited by the accessibility of substituted maleic anhydrides. The *N*-amino maleimides are useful in the synthesis of pyridazine-3,6-diones, which show antibacterial and antifungal activities. They are also possible starting materials for the synthesis of substituted maleic anhydrides.

Table 1. Relevant spectroscopic data for *N*-amino maleimides (**3**).

Ar	R^1	Yield (%)	M.p./°C	^{1}H N.m.r. δ($CDCl_3$)	I.r. (CCl_4), ν/cm^{-1}
p-$NO_2C_6H_4$	CO_2Me	54	255	7.92 (m, 8H) 3.87 (s, 3H)[a]	3430s, 1790s 1760m, 1740vs
p-ClC_6H_4	CO_2Me	60	154	7.38 (m, 8H) 7.19 (s, 1H) 3.81 (s, 3H)	3435s, 1791vs 1758m, 1735vs
p-MeC_6H_4	CO_2Me	60	181	7.57 (s, 1H) 7.25 (m, 8H) 3.79 (s, 3H) 2.35 (s, 3H)	3430s, 1790s 1758m, 1732vs
Ph	CO_2Me	41	213	7.40 (m, 10H) 3,86 (s, 3H)[a]	3435s, 1795s 1757m, 1732vs
p-ClC_6H_4	COPh	59	144	8.35 (s, 1H) 7.35 (m, 13H)	3440s, 1787s 1735vs, 1710m
Ph	COPh	35	238	7.40 (m, 15H)[a]	3440s, 1790s 1732vs, 1710m

[a] ^{1}H N.m.r. in $CDCl_3$–CF_3CO_2H.



Scheme 1

N-Amino maleimides (**3**) are readily obtained according to the reaction of Scheme 1. The α-halohydrazides[1] (**1**) were reacted with three equivalents of 2-aminopyridine in boiling acetonitrile for 4 h. After cooling, the solvent was partially removed under reduced pressure, diluted, acidified, and extracted with dichloromethane (Table 1).

Structural assignments of compounds (**3**) were based on ^{1}H and ^{13}C n.m.r. and i.r. spectra (Table 1) as well as on satisfactory high resolution mass spectra and elementary analysis.

As *N*-aminomaleimides are readily hydrolysed (1 M NaOH, 1 h) the reaction also opens a new route to substituted maleic anhydrides (**4**).[8,9]

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