Tetrahedron Letters,Vol.27,No.20,pp 2263-2264,1986 0040-4039/86 $3.00 + .00
Printed in Great Britain Pergamon Journals Ltd.

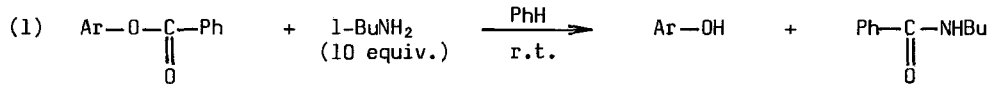
FACILE SELECTIVE AMINOLYSIS OF PHENOLIC BENZOATES WITH 1-BUTANAMINE IN BENZENE

Kevin H. Bell
Chemistry Department, University of Newcastle, N.S.W. 2308, Australia.

Abstract: 1-Butanamine in benzene at room temperature effects selective aminolysis of phenolic benzoates without affecting aliphatic benzoates

Alcohols and phenols are frequently protected as their benzoate esters. Deprotection is normally achieved by acid or base catalysed hydrolysis or ammonolysis in protic solvents.[1,2]

It has now been found that phenolic benzoates can be cleaved smoothly by aminolysis with an excess of 1-butanamine in benzene at room temperature (Eqn. 1).



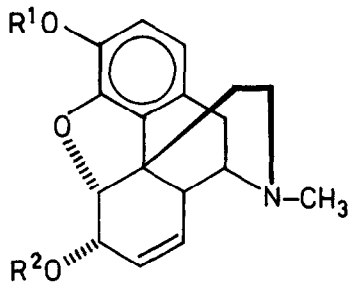
A typical procedure is as follows: 1-butanamine (3.65 g, 0.05 mol) was added to a stirred solution of 1-naphthyl benzoate (1.24 g, 0.005 mol) in benzene (20 ml) at room temperature. The reaction was monitored by t.l.c. (Eastman Silica Gel, solvent benzene, R_f benzoate 0.7, R_f N-butylbenzamide 0.25) and was complete in 2.5 h. The benzene solution was washed with cold 5 M HCl (10 ml) (the acid extracts may be retained for later recovery of 1-butanamine), then with water, and then shaken with 2.5 M NaOH (5 ml). Acidification of the alkaline extract gave 1-naphthol (0.70 g, 97%), m.p. 93-94° (lit. 94°). Evaporation of the original benzene solution gave a colourless oil, the i.r. and ^{1}H n.m.r. spectra of which were identical with those of N-butylbenzamide.

Predictably, the presence of electron-withdrawing or donating groups on the aromatic ring respectively increased or decreased the rate of aminolysis. Under the above conditions approximate reaction times for benzoates of various phenols are shown in the Table. Raising the reaction temperature to reflux effected complete cleavage of thymol benzoate after 38 h but 2,6-dimethylphenyl benzoate remained unchanged. In all cases the phenol was recovered in > 86% yield.

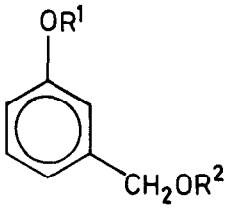
Benzoate of	Time (h)	Benzoate of	Time (h)
2-naphthol	3.5	5,6,7,8-Tetrahydro-2-naphthol	22
Phenol	5	Guaiacol	22
p-Cresol	9	p-Hydroxyacetanilide	14
o-Cresol	26	p-Chlorophenol	2
Thymol	6 days	Ethyl-p-hydroxybenzoate	0.5
2,6-Dimethylphenol	no reaction	p-Hydroxypropiophenone	0.4

In contrast to phenolic benzoates, those derived from aliphatic alcohols (ethanol, cyclohexanol, allyl alcohol, cholesterol, menthol, and codeine (1c)) were quite unaffected by 1-butanamine in benzene, either at room temperature or at reflux for 24 h.

This selectivity was demonstrated in the model compounds (1a) (morphine dibenzoate, ν_{max}[3] 1745, 1722 cm^{-1}) and (2a) (ν_{max} 1732, 1715 cm^{-1}). These yielded the corresponding monobenzoates (1b) (reaction time 36 h, yield 96%, m.p. 268-270°, lit.[4] 269-270°, ν_{max} 1716 cm^{-1}, cf. (1c) 1714 cm^{-1}) and (2b) (reaction time 4 h, yield 91%, m.p. 72-72.5°, ν_{max} 1708 cm^{-1}).



(1)



(2)

	R^1	R^2
(a)	COPh	COPh
(b)	H	COPh
(c)	CH_3	COPh

Similar selectivity has not been demonstrated in currently available methods.[1] The selectivity of this new procedure, the simple reaction conditions, and ease of product isolation combine to make it a useful addition to the existing methods.

REFERENCES AND NOTES

1. Reese, C.B., (Ch. 3) and Haslam, E., (Ch. 4) in 'Protective Groups in Organic Chemistry' (Ed. J.F.W. McOmie) (Plenum: London 1973).
2. Greene, T.W., 'Protective Groups in Organic Synthesis' Ch. 2,3 (Wiley-Interscience: New York 1981).
3. I.r. spectra were recorded on Nujol mulls. ^1H n.m.r. spectra were in agreement with proposed structures.
4. Mannich, C., and Siewert, G., Arch. Pharm. (Weinheim, Ger.) 1939, 277, 128.

(Received in UK 17 March 1986)