SYNTHESIS AND MASS SPECTRA OF AROYLBENZAMIDOXIMES

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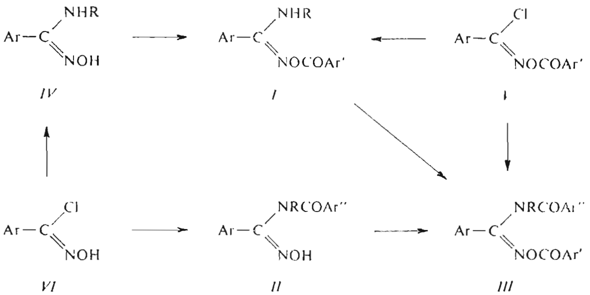
The synthesis of several O-aroylbenzamidoximes *I* and of some N-aroyl (*II*) as well as of bis(aroyl)benzamidoximes (*III*) is described and their fragmentation pattern in the mass spectra is discussed. O- and N-Aroylbenzamidoximes are distinguished on the basis of their mass spectra since the O-derivatives afford the ion corresponding to the acid $[\mathrm{ArCOOH}]^{+\cdot}$ whereas the N-derivatives the ion corresponding to the amide $[\mathrm{ArCO\overset{+}{N}H}]$.

The structure[1-3] of benzamidoximes as well as their behavior upon electron impact[4,5] have been previously investigated. On the other hand, although the acylation of benzamidoximes has been studied by several investigators[6-9], the mass spectra of O- or N-aroylbenzamidoximes and of bis(aroyl)benzamidoximes have not received proper attention. Our interest in these compounds was connected with the intention to search for analogies between familiar solution reactions of hydroxylamine derivatives and their fragmention pattern.

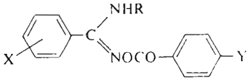
The O-aroylbenzamidoximes *I* were prepared by direct aroylation of the corresponding benzamidoximes *IV* with aroyl chlorides, which under neutral conditions or in presence of a small amount of pyridine gave the O-products. The yield in *I* is up to 90% in the reaction with *p*-nitrobenzoyl chloride which reacts even at room temperature, but it drops to ~15% with *p*-methylbenzoyl chloride which reacts only under reflux.

The structure of compounds *I* was confirmed by an independent synthesis[7] from O-aroylbenzohydroximoyl chlorides *V* and an appropriate amine, giving identical products.

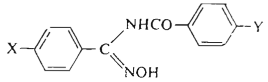
When *o*- or *p*-methoxybenzamidoxime was treated with benzoyl or *p*-nitrobenzoyl chloride, mixtures of N- and O-aroylated products were obtained. The N-aroylbenzamidoximes *II* were better prepared by treating[10] benzohydroximoyl chlorides *VI* with benzamides in the presence of sodium ethoxide. The O-aroyl derivatives *I* are easily distinguished[9,11] from their isomeric N-derivatives *II* by means of IR spectra. In particular, the former display a carbonyl absorption, $\nu(\mathrm{CO})$, at 1 720–1 740



cm^{-1}, whereas the latter at 1 660 – 1 670 cm^{-1}. Both O- and N-aroyl derivatives *I* and *II* yielded the bis(aroyl)benzamidoximes *III* with excess of aroyl chloride. These were also obtained by a reaction of O-aroylbenzohydroximoyl chlorides *V* with benzamide in the presence of sodium ethoxide. The products *III* display two carbonyl absorptions at 1 740 – 1 750 cm^{-1} (ν(CO)ester) and at 1 660 – 1 670 cm^{-1} (ν(CO)-amide).

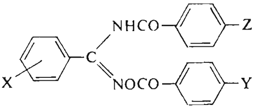


Ia, X = Y = R = H
Ib, X = R = H, Y = CH_3
Ic, X = R = H, Y = Cl
Id, X = R = H, Y = NO_2
Ie, R = Y = H, X = *p*-Cl
If, R = H, Y = CH_3, X = *p*-Cl
Ig, R = H, Y = NO_2, X = *p*-Cl
Ih, R = Y = H, X = *o*-Cl
Ii, R = H, Y = CH_3, X = *o*-Cl
Ij, R = H, Y = NO_2, X = *o*-Cl
Ik, R = Y = H, X = *p*-NO_2
Il, R = Y = H, X = *o*-NO_2
Im, R = Y = H, X = *p*-CH_3
In, R = H, Y = NO_2, X = *p*-CH_3
Io, X = Y = H, R = C_2H_5
Ip, Y = H, R = C_2H_5, X = *p*-Cl
Iq, R = C_2H_5, Y = NO_2, X = *p*-Cl
Ir, Y = H, R = C_2H_5, X = *o*-Cl
Is, R = C_2H_5, Y = NO_2, X = *o*-Cl
It, X = Y = H, R = C_6H_5
Iu, Y = H, R = C_6H_5, X = *o*-Cl
Iv, Y = NO_2, X = *o*-OCH_3; $N(C_2H_5)_2$



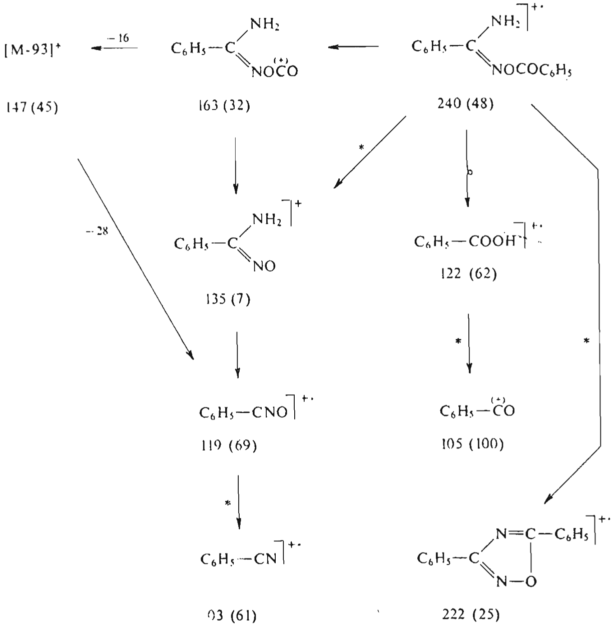
IIa, Y = H, X = OCH_3

IIb, Y = NO_2, X = Cl



IIIa, $Y = Z = NO_2$, $X = p$-Cl
IIIb, $Y = H$, $Z = NO_2$, $X = p$-Cl
IIIc, $Y = Z = NO_2$, $X = o$-Cl
IIId, $Y = H$, $Z = NO_2$, $X = m$-Cl
IIIe, $Y = Z = NO_2$, $X = p$-OCH_3
IIIf, $Y = Z = NO_2$, $X = o$-OCH_3

The analytical data, yields, and some physical characteristics of the products *I*–*III* are given in Tables I and II, whereas their mass spectra are given in Table III. Exact molecular weights for some ions of the compound *Ic* are given in Table IV.



SCHEME 1

TABLE I

Analytical data of the compounds *I*

Compound	M.p., °C[a] yield, %	IR spectrum (cm^{-1})[b] ν(C=O)	Formula (m.w.)	Calculated/Found		
				%C	% H	% N
Ia	146—148[c] 50	1 730	$C_{14}H_{12}N_2O_2$ (240·3)	—	—	—
Ib	163—165 16	1 730	$C_{15}H_{14}N_2O_2$ (254·3)	70·85 70·76	5·55 5·31	11·02 11·28
Ic	198—199[d] 40	1 725	$C_{14}H_{11}ClN_2O_2$ (274·7)	—	—	—
Id	202—203 90	1 725	$C_{14}H_{11}N_3O_4$ (285·3)	58·94 58·92	3·89 4·07	14·73 14·39
Ie	173—174[e,f] 70	1 725	$C_{14}H_{11}ClN_2O_2$ (274·7)	—	—	—
If	195—197 15	1 735	$C_{15}H_{13}ClN_2O_2$ (288·7)	62·50 62·88	4·51 4·52	9·72 9·94
Ig	184—185 90	1 720	$C_{14}H_{10}ClN_3O_4$ (319·7)	52·66 52·83	3·13 3·19	13·17 13·28
Ih	182—183 87	1 740	$C_{14}H_{11}ClN_2O_2$ (274·7)	61·31 61·48	4·01 3·79	10·22 9·83
Ii	160—162[e] 23	1 725	$C_{15}H_{13}ClN_2O_2$ (288·7)	62·50 62·43	4·51 4·46	9·72 9·34
Ij	217—218 70	1 725	$C_{14}H_{10}ClN_3O_4$ (319·7)	52·66 52·72	3·13 3·13	13·17 13·45
Ik	164—166 57	1 740	$C_{14}H_{11}N_3O_4$ (285·3)	58·94 58·48	3·89 3·51	14·73 14·68
Il	206—208 12	1 735	$C_{14}H_{11}N_3O_4$ (285·3)	58·94 58·61	3·89 3·54	14·73 14·62
Im	184—185 53	1 725	$C_{15}H_{14}N_2O_2$ (254·3)	70·85 70·49	5·55 5·24	11·02 11·15
In	180—181 47	1 725	$C_{15}H_{13}N_3O_4$ (299·8)	60·19 60·50	4·38 4·42	14·04 13·87
Io	156—158 34	1 725	$C_{16}H_{16}N_2O_2$ (268·3)	71·62 72·03	6·01 5·78	10·44 10·28
Ip	138—139 64	1 730	$C_{16}H_{15}ClN_2O_2$ (302·8)	63·58 63·42	4·97 4·87	9·27 8·99
Iq	170—171 67	1 740	$C_{16}H_{14}ClN_3O_4$ (347·8)	55·33 55·36	4·03 4·09	12·10 11·98

TABLE I
(*Continued*)

Compound	M.p., °C[a] yield,%	IR spectrum (cm^{-1})[b] ν(C=O)	Formula (m.w.)	Calculated/Found		
				% C	% H	% N
Ir	142–144 24	1 735	$C_{16}H_{15}ClN_2O_2$ (302·8)	63·58 63·94	4·97 5·06	9·27 9·16
Is	186–188 40	1 735	$C_{16}H_{14}ClN_3O_4$ (347·8)	55·33 55·38	4·03 4·02	12·10 12·28
It	171–173 22	1 730	$C_{20}H_{16}N_2O_2$ (316·3)	75·93 75·14	5·10 5·16	8·86 8·76
Iu	191–193 20	1 730	$C_{20}H_{15}ClN_2O_2$ (350·8)	68·57 68·52	4·29 4·54	8·00 8·02
Iv	165–167 10	1 730	$C_{19}H_{21}N_3O_5$ (371·4)	61·44 61·28	5·70 5·84	11·32 11·14

[a] Recrystallization solvent ethanol; [b] nujol; [c] lit.[12] 148°C; [d] lit.[3] 200°C; [e] recrystallization solvent benzene; [f] lit.[3] 175°C.

All the mass spectra of compounds *I*, *II*, *III* display the presence of the molecular ion with moderate relative intensity. The spectra of the compounds *Ia*–*In* show a peak $[M-18]^+$ with variable intensity and this loss of water from the molecular ion is usually followed by a metastable ion peak. The cyclisation reaction to yield 1,2,4-oxadiazoles is well known from the synthetic chemistry of these compounds. The peak $[M-18]^+$ is absent in the case of N-ethyl derivatives *Io*–*Is*, but it is present in N-phenyl derivatives *It*–*Iu*, a fact suggesting a participation of the phenyl *o*-hydrogens in water elimination (Scheme 1).

Very characteristic is the ion corresponding to the acid, $[ArCOOH]^{+\bullet}$, which is found with a high relative intensity (45–90%) in all spectra of the compounds *I*, except *If* (m/z 136) where its relative intensity drops to 33%. In order to find out which hydrogen is eliminated to give the acid ion, attempts were made with deuterium labelling in the N—H group for a number of the compound *I*, but unambiguous evidence in favor of a certain pathway was not obtained. The elimination of the substituent $X^\bullet$ from the nitrile ion $X—C_6H_4—CN)^{+\bullet}$ yields the ion m/z 102. The transition is in all cases followed by a metastable ion peak. The ions m/z 290/288 are due to the loss of CH_2 from the molecular ion of compounds *Ip*, *Ir*. An analogous elimination is observed in all compounds where R = $—CH_2CH_3$ (*Io*–*Is*). Typical fragmentation pathways for the compound *Ia* and *Ic* are given in Schemes 1 and 2.

Compounds *II* do not reveal the presence of the acid ion, but instead a peak corresponding to the amide fragment, $[\overset{+}{\mathrm{ArCONH}}]$. These two ions could be used for distinguishing the two isomeric compounds *I* and *II*. As an example, the mass spectra of two isomers *Ig* and *IIb* are given in Figs 1 and 2, respectively. On the other hand, the compounds *III* show peaks of both the acid and the amide ion, of which the latter appears with higher relative intensity (Fig. 3).

The aroyl ion $[\mathrm{Ar}\overset{+}{\mathrm{C}}\mathrm{O}]$ is the base peak in almost all the spectra studied. Also the ion $[\mathrm{ArCN}]^{+\bullet}$ appears with a very high intensity; in the case of *p*-chloro substituted derivatives the ion of this type competes in intensity with the aroyl ion. With much lower intensity appears the ion corresponding to the nitrile oxide $[\mathrm{ArCNO}]^{+\bullet}$. It must be noticed that there was no significant difference in the fragmentation pattern between the *ortho-* and *para*-substituted derivatives *I*, except the relative intensities of some ions.

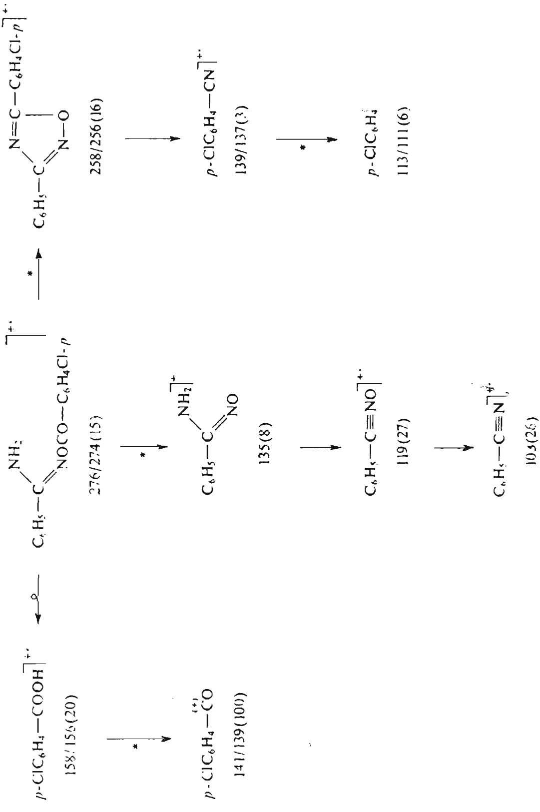
TABLE II

Analytical data of the compounds *II* and *III*

Compound	M.p., °C[a] yield, %	IR spectrum (cm^{-1})[b] ν(C=O)	Formula (m.w.)	Calculated/Found		
				% C	% H	% N
IIa	124–126[c] 20	1 670	$C_{15}H_{14}N_2O_3$ (270·3)	66·65 66·37	5·22 5·49	10·37 10·24
IIb	147–148[c] 50	1 665	$C_{14}H_{10}ClN_3O_4$ (319·7)	52·66 52·87	3·13 3·17	13·17 13·27
IIIa	174–175 70	1 725 1 670	$C_{21}H_{13}ClN_4O_7$ (468·8)	53·85 53·64	2·77 3·02	11·97 11·78
IIIb	113–114 55	1 725 1 660	$C_{21}H_{14}ClN_3O_5$ (423·8)	59·57 59·69	3·31 3·18	13·24 13·42
IIIc	220–221 82	1 730 1 675	$C_{21}H_{13}ClN_4O_7$ (468·8)	53·85 54·08	2·77 2·87	11·97 11·75
IIId	196–198 34	1 740 1 665	$C_{21}H_{14}ClN_3O_5$ (423·8)	59·57 59·34	3·31 3·47	13·24 13·27
IIIe	218–220 22	1 730 1 670	$C_{22}H_{16}N_4O_8$ (464·4)	56·90 56·85	3·47 3·76	12·07 11·89
IIIf	202–204 24	1 730 1 660	$C_{22}H_{16}N_4O_8$ (464·4)	56·90 56·68	3·47 3·17	12·07 12·31

[a] Recrystallization solvent ethanol; [b] nujol; [c] recrystallization solvent ethanol–water.

Substitution in compounds *I* offered the opportunity to examine the dependence[13] of relative intensities, related to the intensity of the molecular ion, on substituent constants. However, no correlation was obtained with the ions $[M—YC_6H_4]^{+\cdot}$ (substitution in X), or $[C_6H_5COOH]^{+\cdot}$ (substitution in Y) which satisfy the preconditions pointed out by Bursey[13], as well as with some other ions (Scheme 1).



SCHEME 2

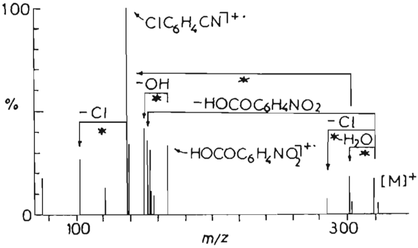


FIG. 1

Mass spectrum of O-(4'-nitrobenzoyl)-4-chlorobenzamidoxime (*Ig*)

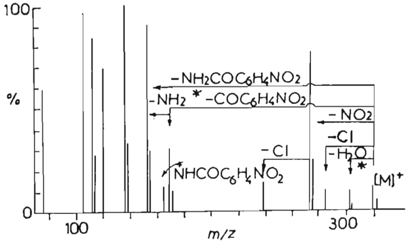


FIG. 2

Mass spectrum of N-(4'-nitrobenzoyl)-4-chlorobenzamidoxime (*IIb*)

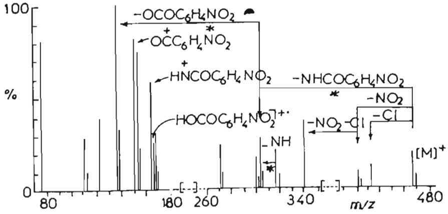


FIG. 3

Mass spectrum of N,O-bis(4'-nitrobenzoyl)-4-chlorobenzamidoxime (*IIIa*)

TABLE III

Principal fragment ions in the mass spectra of the compounds *I*, *II* and *III*

Compound	*m*/*z* (% Relative intensity)
Ia	240 (48, $M^{+\cdot}$), 222 (25), 163 (32), 147 (45), 135 (7), 122 (62), 121 (6), 119 (69), 105 (100), 103 (61), 91 (32), 77 (26), 51 (20).
Ib	254 (24, $M^{+\cdot}$), 239 (7), 236 (14), 223 (4), 163 (16), 136 (43), 119 (100), 105 (57), 103 (46), 91 (69), 77 (29), 51 (44)
Ic	276/274 (15, $M^{+\cdot}$), 258/256 (16), 245/243 (3), 223 (1), 158/156 (20), 141/139 (100), 137 (3), 135 (8), 119 (27), 113/111 (6), 104 (5), 103 (26), 91 (7), 76 (12), 50 (8)
Id	285 (53, $M^{+\cdot}$), 267 (29), 255 (5), 239 (38), 167 (91), 163 (27), 150 (85), 119 (100), 104 (93), 103 (78), 91 (40), 77 (41), 50 (28)
Ie	276/274 (35, $M^{+\cdot}$), 258/256 (3), 223 (1), 171/169 (3), 155/153 (7), 154/152 (14), 139/137 (71), 127/125 (8), 122 (21), 113/111 (8), 105 (100), 102 (17), 77 (58), 51 (18)
If	290/288 (14, $M^{+\cdot}$), 270 (2), 223 (3), 205 (<1), 171/169 (4), 155/153 (21), 139/137 (100), 136 (33), 127/125 (11), 122 (5), 119 (8), 113/111 (27), 102 (57), 75 (28), 50 (19)
Ig	321/319 (18, $M^{+\cdot}$), 303/301 (19), 284 (7), 223 (5), 167 (34), 155/153 (31), 154/152 (37), 150 (42), 139/137 (100), 127/125 (15), 122 (13), 113/111 (9), 104 (18), 102 (27). 75 (18), 50 (24)
Ih	276/274 (51, $M^{+\cdot}$), 258/256 (7), 239 (4), 171/169 (14), 155/153 (100), 139/137 (92). 127/125 (9), 122 (49), 113/111 (9), 105 (66), 102 (78), 90 (39), 50 (25)
Ii	290/288 (50, $M^{+\cdot}$), 270 (<1), 171/169 (18), 155/153 (100), 139/137 (56), 136 (50). 127/125 (27), 122 (9), 119 (27), 113/111 (49), 102 (86), 90 (47), 50 (59)
Ij	321/319 (4, $M^{+\cdot}$), 303/301 (13), 284 (2), 268 (1), 223 (<1), 167 (24), 155/153 (73). 150 (56), 139/137 (81), 138 (25), 127/125 (39), 122 (26), 113/111 (32), 104 (100), 102 (92), 90 (60), 76 (59), 50 (44)
Ik	285 (21, $M^{+\cdot}$), 267 (31), 255 (12), 239 (15), 223 (2), 208 (43), 180 (33), 164 (100). 148 (83), 136 (4), 122 (88), 118 (1), 105 (80), 102 (32), 77 (46), 51 (28)
Il	285 (14, $M^{+\cdot}$), 267 (28), 255 (4), 239 (11), 208 (36), 180 (47), 164 (100), 148 (96). 136 (2), 122 (73), 118 (1), 105 (89), 102 (35), 77 (30), 51 (36)
Im	254 (31, $M^{+\cdot}$), 239 (24), 236 (20), 223 (2), 177 (43,) 149 (15), 133 (68), 122 (41), 118 (13), 117 (100), 105 (97), 102 (61), 91 (97), 77 (77), 51 (32)
In	299 (24, $M^{+\cdot}$), 284 (16), 281 (11), 269 (19), 253 (8), 222 (7), 177 (39), 167 (76). 150 (86), 149 (32), 133 (80), 122 (39), 117 (100), 105 (2), 104 (91), 102 (14), 91 (92). 77 (35), 51 (42)
Io	268 (13, $M^{+\cdot}$), 254 (19), 240 (3), 224 (8), 191 (31), 163 (6), 122 (70), 119 (100), 105 (96), 103 (93), 91 (74), 75 (46), 50 (39)
Ip	304/302 (9, $M^{+\cdot}$), 290/288 (3), 274/272 (13), 258/256 (6), 223 (2), 155/153 (25), 154/152 (6), 139/137 (100), 127/125 (26), 122 (35), 113/111 (37), 105 (90), 102 (47). 75 (29), 51 (37)

TABLE III
(*Continued*)

Compound	m/z (% Relative intensity)
Iq	349/347 (7, $M^{+\bullet}$), 333 (1), 319 (13), 303/301 (3), 275/273 (5), 197 (26), 181 (58), 167 (97), 155/153 (95), 154/152 (37), 150 (33), 139/137 (100), 127/125 (21), 122 (28), 113/111 (85), 102 (68), 75 (61), 50 (64).
Ir	304/302 (6, $M^{+\bullet}$), 290/288 (3), 274/272 (12), 258/256 (8), 223 (1), 155/153 (100), 139/137 (96), 127/125 (28), 122 (19), 113/111 (10), 105 (87), 90 (62), 51 (60)
Is	349/347 (9, $M^{+\bullet}$), 333 (3), 319 (7), 303/301 (3), 289/287 (9), 273 (4), 197 (24), 181 (49),, 167 (99), 155/153 (100), 150 (40), 139/137 (90), 127/125 (20), 122 (37), 113/111 (8), 104 (86), 90 (39), 50 (79)
It	316 (18, $M^{+\bullet}$), 298 (13), 239 (22), 224 (54), 135 (10), 122 (33), 119 (100), 105 (99), 103 (81), 91 (37), 77 (43), 51 (20)
Iu	352/350 (13, $M^{+\bullet}$), 334/332 (11), 315 (3), 275/273 (17), 260/258 (36), 171/169 (3), 155/153 (77), 139/137 (75), 127/125 (2), 122 (36), 113/111 (9), 105 (100), 90 (28), 51 (37)
Iv	371 (4, $M^{+\bullet}$), 356 (9), 325 (4), 221 (70), 207 (10), 193 (7), 179 (11), 167 (16), 165 (28), 150 (54), 149 (47), 133 (100), 121 (2), 118 (18), 107 (89), 102 (64), 75 (41)
IIa	270 (18, $M^{+\bullet}$), 255 (5), 252 (13), 239 (19), 165 (64), 150 (9), 149 (90), 133 (100), 120 (37), 118 (3), 107 (49), 105 (40), 102 (21), 76 (52)
IIb	321/319 (12, $M^{+\bullet}$), 303/301 (9), 284 (10), 275/273 (78), 238 (14), 171/169 (31), 165 (12), 155/153 (90), 150 (17), 139/137 (100), 120 (79), 119 (4), 113/111 (84), 104 (97), 102 (46), 76 (59)
IIIa	470/468 (17, $M^{+\bullet}$), 433 (10), 424/422 (7), 341 (36), 320/318 (20), 305/303 (27), 302/300 (16), 274/272 (23), 222 (8), 170/168 (30), 167 (25), 165 (58), 155/153 (75), 150 (82), 139/137 (100), 127/125 (38), 122 (39), 119 (15), 113/111 (29), 91 (76), 76 (82)
IIIb	425/423 (22, $M^{+\bullet}$), 388 (20), 379/377 (12), 342 (28), 320/318 (17), 303/301 (9), 275/273 (25), 260/258 (46), 223 (7), 170/168 (39), 165 (29), 155/153 (66), 150 (35), 139/137 (100), 127/125 (54), 122 (32), 119 (9), 113/111 (25), 105 (89), 90 (70), 76 (40).
IIIc	470/468 (14, $M^{+\bullet}$), 433 (5), 424/422 (9), 341 (25), 320/318 (12), 305/303 (21), 302/300 (28), 274/272 (21), 222 (6), 170/168 (33), 167 (32), 165 (48), 155/153 (69), 150 (36), 139/137 (100), 127/125 (20), 122 (26), 119 (12), 113/111 (20), 91 (78), 75 (60).
IIId	425/423 (16, $M^{+\bullet}$), 388 (6), 379/377 (9), 342 (22), 320/318 (11), 303/301 (12), 275/273 (28), 260/258 (31), 223 (3), 170/168 (27), 165 (49), 155/153 (55), 150 (39), 139/137 (100), 127/125 (58), 122 (26), 119 (9), 113/111 (35), 105 (85), 90 (79), 76 (62)
IIIe	464 (17, $M^{+\bullet}$), 449 (22), 433 (10), 418 (11), 341 (15), 314 (7), 299 (27), 296 (14), 268 (37), 222 (6), 167 (15), 165 (32), 164 (30), 150 (89), 149 (79), 133 (100), 122 (29), 121 (57), 120 (10), 107 (86), 91 (62), 76 (52)
IIIf	464 (11, $M^{+\bullet}$), 449 (16), 433 (15,) 418 (9), 341 (7), 314 (14), 299 (31), 296 (23), 268 (55), 222 (11), 167 (23), 165 (65), 164 (40), 150 (75), 149 (50), 133 (100), 122 (31), 121 (47), 120 (12), 107 (80), 90 (68), 76 (83)

EXPERIMENTAL

All melting points are uncorrected and were obtained with a Kofler hot stage apparatus. The mass spectra were run at 70 eV on a RMU-6L Hitachi–Perkin–Elmer single focusing mass spectrometer using the direct insertion probe of the samples. The analyses were performed with a Perkin–Elmer Analyser, Model 240. The IR spectra were measured in Nujol with a Perkin–Elmer 297 infrared spectrophotometer.

O-Aroylbenzamidoximes *I*

An ether solution containing equivalent amounts of the amidoxime *IV* and the appropriate aroyl chloride in presence of pyridine was stirred for 2 h, eventually under reflux. Addition of water yielded the crude O-aroylbenzamidoxime *I*, which was recrystallized from the proper solvent. For the analytical data of the compounds *I* see Table I.

N-Aroylbenzamidoximes *II*

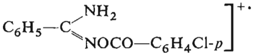
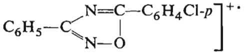
Compounds *II* were obtained by refluxing for 3 h in pyridine one equivalent of benzohydroximoyl chloride *VI* with two equivalents[9] of the appropriate benzamide in presence of sodium ethoxide. By adding water the crude N-aroylbenzamidoxime *II* was obtained, which was recrystallized from water–ethanol. For the analytical data of the compounds *II* see Table II.

Bis(aroyl)benzamidoximes *III*

a) From O-aroylbenzamidoximes *I* by refluxing for 2 h in pyridine one equivalent of *I* with two equivalents of the appropriate aroyl chloride. Addition of water yielded the crude *III*, which was recrystallized from ethanol.

TABLE IV

Exact molecular weights and elemental composition of the ions of compound *Ic*

m/z found	Elemental composition	Ion
274·0511	$C_{14}H_{11}{}^{35}ClN_2O_2$	 $\left[C_6H_5\text{—}C\begin{matrix}NH_2\\ NOCO\text{—}C_6H_4Cl\text{-}p\end{matrix}\right]^{+\cdot}$
256·0413	$C_{14}H_9{}^{35}ClN_2O$	 $\left[C_6H_5\text{—}C\begin{matrix}N{=}C\text{—}C_6H_4Cl\text{-}p\\ N\text{—}O\end{matrix}\right]^{+\cdot}$
155·9968	$C_7H_5{}^{35}ClO_2$	$p\text{-}ClC_6H_4COOH]^{+\cdot}$
138·9956	$C_7H_4{}^{35}ClO$	$p\text{-}ClC_6H_4\text{—}\overset{(+)}{CO}$
119·0371	C_7H_5NO	$C_6H_5\text{—}CNO]^{+\cdot}$
111·0030	$C_6H_4{}^{35}Cl$	$p\text{-}ClC_6H_4^+$
104·0496	C_7H_6N	$C_6H_5\text{—}\overset{(+)}{C}{=}NH$

b) From N-aroylbenzamidoximes *II* by refluxing for 5 h in pyridine equivalent amounts of *II* and of aroyl chloride. By adding water the crude *III* was obtained.

c) From O-aroylbenzohydroximoyl chlorides *V* by refluxing for 2 h in pyridine one equivalent of *V* with two equivalents of the appropriate benzamide and with sodium ethoxide. Addition of water yielded the crude *III*. For the analytical data of the compounds *III* see Table II.

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