were expressed as the fourth-degree function of ammonium halide concentration and these constants were are in Table IV.

$$\log P = A - B/(C + t) \tag{1}$$

$$A = a_0 + a_1X + a_2X^2 + a_3X^3 + a_4X^4 \tag{2}$$

$$B = b_0 + b_1X + b_2X^2 + b_3X^3 + b_4X^4 \tag{3}$$

$$C = 247.885 \tag{4}$$

Figures 4 and 5 show the smoothed vapor pressures calculated by using these equations. These smoothed vapor pressures agreed with observed ones with an accuracy of ±2.7% in the measured concentration range.

Acknowledgment

We express our gratitude to Mr. A. Shimomura for his experimental work and to Mr. A. Kurata for his useful suggestions.

Glossary

a_i	constants for eq 3
A	constant for Antoine's equation
b_i	constants for eq 4
B	constant for Antoine's equation
C	constant for Antoine's equation
P	vapor pressure, Pa
t	temperature, °C
X	weight percent concentration of ammonium halide

Greek Letter

ϵ	deviation, %

Registry No. NH_3, 7664-41-7; NH_4Br, 12124-97-9; NH_4I, 12027-06-4.

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Received October 22, 1987. Accepted March 16, 1988.

NEW COMPOUNDS

Synthesis and Insecticidal Activity of Some 2,5-(Fluoroalkoxyphenyl)-1,3,4-oxadiazoles and Their *N*,*N'*-Dibenzoylhydrazine Precursors

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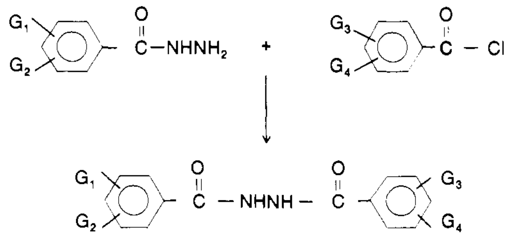
The synthesis and IR/NMR characterization of 10 2,5-(fluoroalkoxyphenyl)-1,3,4-oxadiazoles and 15 fluoroalkoxydiacylhydrazines are described. Five of the oxadiazoles and 11 of the diacylhydrazines have been screened for insecticidal activity against *Drosophila melanogaster*.

In view of the biological activity properties and the variety of other important diverse uses of many organofluoro materials (*1*, *2*) and because of our continuing interest (*3*, *4*) in the synthetic methodology of such materials, we report here the syntheses of some 2,5-(fluoroalkoxyphenyl)-1,3,4-oxadiazoles (I) and of their *N*,*N'*-dibenzoylhydrazine precursors (II). A preliminary investigation of the insecticidal activity of these compounds is also reported.

Unsymmetrical *N*,*N'*-dibenzoylhydrazines (IIa-i, G_1 = H or haloalkoxy, G_2 = haloalkoxy; G_3 = 2-Cl, G_4 = 4-Cl; Scheme I) were prepared by reaction of the corresponding substituted benzhydrazide with 2,4-dichlorobenzoyl chloride. The required benzhydrazides were obtained by reaction of hydrazine hydrate with the appropriately substituted methyl benzoates as described previously by Smith (*5*) and the requisite methyl fluo-

Scheme I



IIa-i

G_1 = H or Haloalkoxy
G_2 = Haloalkoxy
G_3 = 2-Cl
G_4 = 4-Cl

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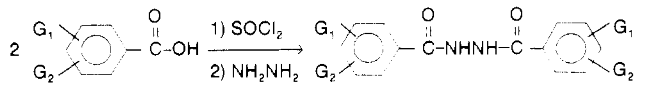
Scheme II

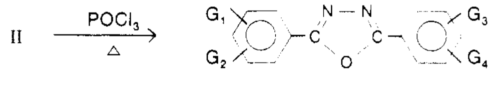


II j-o

G_1 = H or Haloalkoxy

G_2 = Haloalkoxy

Scheme III



I

I a-e: G_1 = H or Haloalkoxy
G_2 = Haloalkoxy
G_3 = 2-Cl
G_4 = 4-Cl

I j-o: G_1 = G_3 = H or Haloalkoxy
G_2 = G_4 = Haloalkoxy

roalkoxybenzoates were prepared as reported by Alperman and von Werner (*6*). The symmetrical *N*,*N'*-dibenzoylhydrazines (IIj–o, G_1 = H or haloalkoxy and G_2 = haloalkoxy; Scheme II) were prepared by reaction of 2 equiv of the appropriately substituted benzoyl chloride with hydrazine. The 2,5-disubstituted-1,3,4-oxadiazoles (I) were prepared (Scheme III) by cyclodehydration of the corresponding *N*,*N'*-dibenzoylhydrazine (II) in refluxing phosphorous oxychloride (*7*, *8*).

The structures of the compounds were confirmed by IR and NMR analyses. All compounds reported here were found to be greater than 90% pure by TLC. As reported previously (*9*) for other benzhydrazides, the benzhydrazides prepared for this study were readily soluble in 5% HCl, whereas the subsequent *N*,*N'*-dibenzoylhydrazines and oxadiazoles are insoluble. All of the hydrazines and oxadiazoles gave NMR and IR spectra characteristic of the substituent hydrohaloalkoxy groups. For example, chemical shifts of ~6–7 ppm, expected splitting patterns (*i.e.*, triplet of triplets for the H of HCF_2CF_2, doublet of triplets for the H of $HCClFCF_2$ triplet for the H of $HCCl_2CF_2$), vicinal coupling constants of ~3–4 Hz, and geminal coupling constants of ~44–54 Hz for the hydrogen of the hydrohaloalkoxy groups of all substituted dibenzoylhydrazines and oxadiazoles were in accord with the values assigned previously by other workers (*6*, *10*). In addition, all IR spectra contained strong, broad absorption at ~1100–1300 cm^{-1} characteristic of C–F stretching (*11*). Other characteristic features in the IR and NMR of all dibenzoylhydrazines and oxadiazoles included the following. *For the dibenzoylhydrazines*, strong secondary amide stretch at ~3200–3300 cm^{-1} [primary amine stretch noted at ~3400 cm^{-1} in the precursor benzhydrazides was absent], a single, strong carbonyl absorption at ~1610–1640 cm^{-1} [a second strong absorption, noted by us and by previous workers (*9*, *12*, *13*) in the same region in the precursor benzhydrazide, was absent], strong C–H bending absorptions at ~810–870, cm^{-1} due to meta- and para-disubstituted benzene rings [also observed in the precursor benzhydrazides] and absence of a broad singlet at 3.6–4.0 ppm in the NMR [observed in the precursor benzhydrazides due to the primary amine hydrogens in $CONHNH_2$]. *For the oxadiazoles*, absence of secondary amide and carbonyl stretching absorptions, the appearance of oxadiazole ring absorptions at ~970 and 1020–1030 cm^{-1} due to C–O and at ~1590 to 1610 cm^{-1} due to C=N (*14*, *15*) and strong C–H bending at ~810–870 cm^{-1} due to meta- and para-disubstituted benzene rings.

Eleven of the *N*,*N-dibenzoylhydrazines* and five of the oxadiazoles were screened for insecticidal activity at a 100 ppm level against *Drosophila melanogaster*. With one exception (compound IId), the *N*,*N'*-dibenzoylhydrazines have low to moderate activity at a 100 ppm level. However, four of the five oxadiazoles (compounds Ia–d) had a 100% total kill rate at the 100 ppm level.

Experimental Section

All melting points are uncorrected and were recorded on a Thomas-Hoover capillary melting point apparatus. IR spectra were recorded as Nujol mulls on either a Perkin Elmer Model 1420 infrared spectrometer or a Nicolet MXS FT-IR. The NMR spectra were obtained in solution (see particular compound for solvent) at 60 MHz with a Varian EM-360 spectrometer with $(CH_3)_4Si$ as internal standard.

General Procedure for Preparation of Unsymmetrical N,N'-Dibenzoylhydrazines (IIa–i, G_1 = H or Haloalkoxy, G_2 = Haloalkoxy; G_3 = 2-Cl, G_4 = 4-Cl; Scheme I). The appropriate substituted benzoic acid hydrazide (0.05 mol), sodium carbonate (0.05 mol), 60 mL of tetrahydrofuran, and 60 mL of water were added in a 250-mL, three-necked, round-bottomed flask which was equipped with a 125-mL addition funnel, reflux condenser, thermometer, and stirring bar. After dropwise addition (30 min) of 2,4-dichlorobenzoyl chloride (0.05 mol), the reaction mixture was stirred at room temperature for 1 h. The solid collected after removal (rotary evaporator) of the solvent was washed with water, dried at reduced pressure (Kugelrohr, 1 mm), and recrystallized.

The following compounds are reported in Table I: *N*-[4-(1,1,2,2-tetrafluoroethoxy)benzoyl]-*N'*-(2,4-dichlorobenzoyl)hydrazine (IIa); *N*-[4-(1,1,2-trifluoro-2-chloroethoxy)benzoyl]-*N'*-(2,4-dichlorobenzoyl)hydrazine (IIb); *N*-[4-(1,1-difluoro-2,2-dichloroethoxy)benzoyl]-*N'*-(2,4-dichlorobenzoyl)hydrazine (IIc); *N*-[3-(1,1,2,2-tetrafluoroethoxy)benzoyl]-*N'*-(2,4-dichlorobenzoyl)hydrazine (IId); *N*-[3-(1,1,2-trifluoro-2-chloroethoxy)benzoyl]-(2,4-dichlorobenzoyl)hydrazine (IIe); *N*-[3-(1,1-difluoro-2,2-dichloroethoxy)benzoyl]-*N'*-(2,4-dichlorobenzoyl)hydrazine (IIf); *N*-[3,5-bis(1,1,2,2-tetrafluoroethoxy)benzoyl]-*N'*-(2,4-dichlorobenzoyl)hydrazine (IIg); *N*-3,5-bis(1,1,2-trifluoro-2-chloroethoxy)benzoyl]-*N'*-(2,4-dichlorobenzoyl)hydrazine (IIh); *N*-[3,5-bis(1,1-difluoro-2,2-dichloroethoxy)benzoyl]-*N'*-(2,4-dichlorobenzoyl)hydrahydrazine (IIi).

General Procedure for Preparation of Symmetrical N,N'-Dibenzoylhydrazines (IIj–o, G_1 = H or Haloalkoxy and G_2 = Haloalkoxy; Scheme II). The appropriate substituted benzoic acid (0.0163 mol) and 75 mL of toluene were added in a 250-mL, three-necked, round-bottomed flask equipped with a reflux condenser and a 125-mL addition funnel. Thionyl chloride (0.0498 mol) was then added dropwise and the solution was refluxed for 72 h. After cooling to room temperature, the solvent was removed (rotary evaporator) and the IR of the residue was recorded. If O–H absorption was observed, additional thionyl chloride and solvent were added and the solution was refluxed for 24 h. The resulting benzoyl chloride was added to 75 mL of tetrahydrofuran followed by dropwise addition of aqueous sodium bicarbonate (0.0161 mol) and hydrazine (0.008 mol). After stirring for 1 h at room temperature, the solvent was removed (rotary evaporator). The resulting solid was collected, dried at reduced pressure (Kugelrohr, 1 mm), and recrystallized.

The following compounds are reported in Table II: *N*,*N'*-bis[3,3'-(1,1,2,2-tetrafluoroethoxy)benzoyl]hydrazine (IIj); *N*,-*N'*-bis[3,3'-(1,1,2-trifluoro-2-chloroethoxy)benzoyl]hydrazine (IIk); *N*,*N'*-bis[3,3'-(1,1-difluoro-2,2-dichloroethoxy)benzoyl]hydrazine (IIl); *N*,*N'*-bis[4,4'-(1,1,2-trifluoro-2-chloroethoxy)-

Table I. Properties of *unsym*-*N*,*N'*-Dibenzoylhydrazines (IIa–i)

compd. no.	yield, %	mp, °C	IR[a] ν, cm^{-1}	NMR[b] δ (J, Hz)
IIa	92	198–200	3220, 1640, 1460, 1220, 1110, 870	6.35 (tt, J_v = 4, J_g = 56, 1 H), 7.16–7.65 (m, 5 H), 8.14 (d, J = 10, 2 H)
IIb	78	198–200	3220, 1640, 1180, 1090, 1020, 850	7.10 (dt, J_v = 4, J_g = 48, 1 H), 7.33–7.65 (m, 5 H), 8.20 (d, J = 8, 2 H)
IIc	84	210–212	3220, 1645, 1250, 1170, 1020, 890	7.47–8.00 (m, 6 H), 8.40 (d, J = 8, 2 H)
IId	94	165–168	3220, 1650, 1470, 1300, 1200, 1130, 1005, 870	6.48 (tt, J_v = 4, J_g = 52, 1 H), 7.58 (d, J = 2, 3 H), 7.63 (s, 2 H), 8.00 (d, J = 2, 2 H)
IIe	96	169–171	3240, 1645, 1470, 1300, 1200, 1090, 1005, 880	6,66 (dt, J_v = 4, J_g = 50, 1 H), 7.45 (d, J = 2, 3 H), 7.59 (s, 2 H), 7.98 (t, J = 2, 2 H)
IIf	74	171–172	3300, 1640, 1590, 1275, 1120, 1000, 830	6.36 (t, J = 4, 1 H), 7.33 (d, J = 2, 3 H), 7.68 (s, 2 H), 7.93 (d, J = 2, 2 H)
IIg	93	157–161	3210, 1600, 1470, 1200, 1130, 1010, 880	6.90 (tt, J_v = 4, J_g = 52, 2 H), 7.48 (t, J = 2, 1 H), 7.69 (s, 2 H), 7.78 (s, 1 H), 8.00 (d, J = 2, 2 H)
IIh	93	110–114	3200, 1600, 1470, 1170, 1100, 1005, 870	7.20 (dt, J_v = 4, J_g = 44, 2 H), 7.28 (s, 1 H), 7.60 (m, 3 H), 7.90 (s, 2 H)
IIi	97	110–112	3200, 1600, 1470, 1160, 1100, 1000, 830	7.15 (t, J = 4, 2 H), 7.45 (t, J = 2, 1 H), 7.65 (s, 3 H), 7.93 (d, J = 2, 2 H)

[a] Recorded as Nujol mulls. All indicated absorptions were of strong to moderately strong intensity. [b] Recorded in 10% DMSO-d_6/CDCl$_3$ solution. J_v = vicinal coupling constant, J_g = geminal coupling constant, s = singlet, d = doublet, t = triplet, dt = doublet of triplets, and tt = triplet of triplets.

Table II. Properties of *sym*-*N*,*N'*-Dibenzoylhydrazines (IIj–o)

compd no.	yield, %	mp, °C	IR[a] ν, cm^{-1}	NMR[b] δ (J, Hz)
IIj	85	154–156	3220, 1610, 1580, 1210, 1110, 1000, 810	6.34 (tt, J_v = 4, J_g = 54, 2 H), 7.32–7.58 (m, 4 H), 7.74–8.08 (m, 4 H)
IIk	82	116–120	3210, 1610, 1580, 1200, 1090, 1000, 810	7.08 (dt, J_v = 4, J_g = 48, 2 H), 7.40–7.63 (7, 4 H), 7.90–8.10 (m, 4 H)
IIl	80	96–100	3300, 1640, 1580, 1310, 1170, 1070, 1000, 820	6.48 (t, J = 4, 2 H), 7.65 (s, 4 H), 8.16 (s, 4 H)
IIm	98	155–158	3240, 1600, 1650, 1270, 1170, 1080, 1010, 810	6.90 (dt, J_v = 4, J_g = 46, 2 H), 7.35 (d, J = 8, 4 H), 8.18 (d, J = 8, 4 H)
IIn	86	140–144	3210, 1630, 1580, 1300, 1200, 1130, 1000, 870	6.64 (tt, J_v = 4, J_g = 54, 4 H), 7.48 (s, 2 H), 8.09 (s, 4 H)
IIo	90	209–212	3210, 1630, 1590, 1270, 1170, 1100, 1000, 870	6.66 (dt, J_v = 4, J_g = 48, 4 H), 7.50 (s, 2 H), 8.18 (s, 4 H)

[a] See footnote *a*, Table I. [b] See footnote *b*, Table I.

Table III. Properties of 2,5-Disubstituted-1,3,4-oxadiazoles (I)

compd no.	yield, %	mp, °C	IR[a] ν, cm^{-1}	NMR[b] δ (J, Hz)
Ia	90	137–141	1590, 1040, 1010, 970	6.34 (tt, J_v = 3, J_g = 54, 1 H), 7.50 (d, J = 10, 2 H), 7.44–7.70 (m, 2 H), 8.20 (d, J = 8, 1 H), 8.29 (d, J = 10, 2 H)
Ib	89	135–139	1590, 1040, 1020, 970, 870	6.69 (dt, J_v = 3, J_g = 48, 1 H), 7.46 7.40–7.68 (m, 2 H), 8.13 (d, J = 8, 1 H) 8.20 (d, J = 8, 2 H)
Ic	93	91–94	1595, 1045, 1020, 970, 830	6.15 (t, J = 3, 1 H), 7.78 (d, J = 8, 2 H), 7.97 (s, 2 H), 8.30 (s, 1 H), 8.62 (d, J = 3, 1 H)
Id	90	69–71	1595, 1050, 1005, 930, 840	6.44 (tt, J_v = 3, J_g = 54, 1 H), 7.45–7.70 (m, 4 H), 7.98–8.21 (m, 3 H)
Ie	88	71–73	1595, 1050, 1020, 970, 850	7.30 (dt, J_v = 3, J_g = 46, 1 H), 7.55–7.84 (m, 4 H), 8.00–8.34 (m, 3 H)
Ij	80	148–151	1595, 1550, 1490, 1300, 1190, 1100, 1000, 870	6.04 (tt, J_v = 4, J_g = 54, 2 H), 7.83 (d, J = 4, 4 H), 8.21 (s, broad, 4 H)
Il	76	129–131	1590, 1550, 1380, 1260, 1150, 1080, 1000, 810	5.43 (t, J = 4, 2 H), 7.11 (m, 4 H), 7.54 (s, broad, 4 H)
Im	83	90–93	1610, 1490, 1300, 1160, 1080, 1015, 850	7.15 (dt, J_v = 4, J_g = 40, 2 H), 7.50 (d, J = 8, 4 H), 8.28 (d, J = 8, 4 H)
In	83	95–98	1550, 1380, 1300, 1190, 1110, 1000, 850	6.60 (tt, J_v = 4, J_g = 54, 4 H), 7.44 (t, J = 2, 2 H), 8.08 (d, J = 2, 4 H)
Io	89	95–96	1590, 1550, 1260, 1170, 1090, 1000, 860, 810	6.48 (dt, J_v = 4, J_g = 48, 4 H), 7.61 (s, broad, 2 H), 8.13 (s, broad, 4 H)

[a] See footnote *a*, Table I. [b] Recorded as 10% solutions in the following solvents for the compounds indicated: Unisol, Ia, Ib; trifluoroacetic acid, Ic, Ij, Il, Io; DMSO-d_6/CDCl$_3$, Id, Im, In; DMSO-d_6, Ie. See remainder of footnote *b*, Table I.

benzoyl]hydrazine (IIm); *N*,*N'*-bis[3,3',5,5'-(1,1,2,2-tetrafluoroethoxy)benzoyl]hydrazine (IIn); *N*,*N'*-bis-[3,3',5,5'-(1,1,2-trifluoro-2-chloroethoxy)benzoyl]hydrazine (IIo).

General Procedure for Preparation of 2,5-Disubstituted-1,3,4-oxadiazoles (I; Scheme III). The *N*,*N'*-dibenzoylhydrazine (0.00367 mol) and 16 mL of phosphorus oxychloride were added in a 50-mL, round-bottomed flask and the solution refluxed for 20 h. After cooling to room temperature, the solution was poured slowly with stirring into 100 mL of an ice and water mixture. The resulting precipitate was collected, dried at reduced pressure (Kugelrohr, 1 mm), and recrystallized.

The following compounds are reported in Table III: 2-[4-(1,1,2,2-tetrafluoroethoxy)phenyl]-5-(2,4-dichlorophenyl)-1,3,4-oxadiazole (Ia); 2-[4-(1,1,2-trifluoro-2-chloroethoxy)phenyl]-5-(2,4-dichlorophenyl)-1,3,4-oxadiazole (Ib); 2-[4-(1,1-difluoro-2,2-dichloroethoxy)phenyl]-5-(2,4-dichlorophenyl)-1,3,4-oxadiazole (Ic); 2-[3-(1,1,2,2-tetrafluoroethoxy)phenyl]-5-(2,4-dichlorophenyl)-1,3,4-oxadiazole (Id); 2-[3-(1,1,2-trifluoro-2-chloroethoxy)phenyl]-5-(2,4-dichlorophenyl)-1,3,4-oxadiazole (Ie); 2,5-bis-[3,3'-(1,1,2,2-tetrafluoroethoxy)phenyl]-1,3,4-oxadiazole (Ij); 2,5-bis-[3,3′-(1,1-didifluoro-2,2-dichloroethoxy)-phenyl]-1,3,4-oxadiazole (Il); 2,5-bis[4,4′-(1,1,2-trifluoro-2-chloroethoxy)phenyl]-1,3,4-oxadiazole (Im); 2,5-bis-[3,3′,5,5′-(1,1,2,2-tetrafluoroethoxy)phenyl]-1,3,4-oxadiazole (In); 2,5-bis-[3,3′,5,5′-(1,1,2-trifluoro-2-chloroethoxy)phenyl]-1,3,4-oxadiazole (Io).

General Procedure Used in the Insecticide Screen. The wild type strain *Drosophila melanogaster*, Oregon-RC, was used in the screening procedure. One hundred *Drosophila* eggs were placed in a 1 × 9 cm vial containing an 8-mL solution of the egg culture media (a standard yeast, corn meal, agar mixture) and the compound to be screened (dissolved or dispersed in soybean oil). Larvacidal kill was the difference between the number of eggs placed on the media and the number of pupae formed. Total kill was the difference between the number of eggs and the number of living adults.

Registry No. Ia, 114467-42-4; Ib, 114467-43-5; Ic, 114467-44-6; Id, 114467-45-7; Ie, 114467-46-8; Ij, 114467-47-9; Il, 114467-48-0; Im, 114467-49-1; In, 114467-50-4; Io, 114467-51-5; IIa, 114467-26-4; IIb, 114467-27-5; IIc, 114467-28-6; IId, 114467-29-7; IIe, 114467-30-0; IIf, 114467-31-1; IIg, 114467-32-2; IIh, 114467-33-3; IIi, 114467-34-4; IIj, 114467-37-7; IIj (acid), 70126-48-6; IIk, 114467-38-8; IIk (acid), 403-71-4; IIl, 114467-39-9; IIl (acid), 114467-35-5; IIm, 114467-40-2; IIm (acid), 405-43-6; IIn, 114467-41-3; IIn (acid), 70126-49-7; IIo, 114490-28-7; IIo (acid), 114467-36-6; 2,4-$Cl_2C_6H_3COCl$, 89-75-8; 4-$(CHF_2CF_2O)C_6H_4CONHNH_2$, 114467-18-4; 4-$(CHClFCF_2O)C_6H_4CONHNH_2$, 114467-19-5; 4-$(CHCl_2CF_2O)C_6H_4CONHNH_2$, 114467-20-8; 3-$(CHF_2CF_2O)C_6H_4CONHNH_2$, 114467-21-9; 3-$(CHClFCF_2O)C_6H_4CONHNH_2$, 114504-85-7; 3-$(CHCl_2CF_2O)C_6H_4CONHNH_2$, 114467-22-0; 3,5-$(CHF_2CF_2O)_2C_6H_3CONHNH_2$, 114467-23-1; 3,5-$(CHClFCF_2O)_2C_6H_3CONHNH_2$, 114467-24-2; 3,5-$(CHCl_2CF_2O)_2C_6H_3CONHNH_2$, 114467-25-3; N_2H_4, 302-01-2.

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Received for review September 14, 1987. Revised December 14, 1987. Accepted February 9, 1988.

A Convenient Synthesis of Amino-Substituted 2-Oxo-1,3,5-triazinium and 1,3,5-Oxadiazinium Salts

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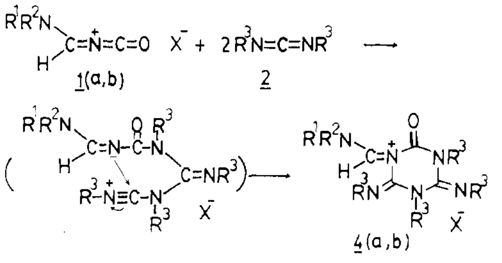
The synthesis of amino-substituted 2-oxo-1,3,5-triazinium hexachloroantimonates 4a,b and amino-substituted 1,3,5-oxadiazinium hexachloroantimonates 5a–h and their spectral data are reported.

In the past few years new classes of heterocumulenes have been synthesized and characterized by Jochims and his coworkers (*1–7*). Especially 1-oxa-3-azabutatrienium salts, **1**, show a wide range of reactivity. As part of our continuing interest in the reactions of these heterocumulenes, I herein report details of the reaction of amino substituted 1-oxa-3-azabutatrienium hexachloroantimonates **1a,b** with diisopropylcarbodiimide (**2**) and dialkylcyanamide **3a–d** to give amino-substituted 2-oxo-1,3,5-triazinium hexachloroantimonates **4a,b** and amino-substituted 1,3,5-oxadiazinium hexachloroantimonates **5a–h**, respectively, in high yields (Schemes I and II). The products are characterized by ^1H NMR, ^{13}C NMR, and IR spectroscopy.

Experimental Section

The melting points are uncorrected. Infrared spectra were recorded on a Perkin-Elmer 299 spectrophotometer. ^1H NMR (250 MHz) and ^{13}C NMR (63 MHz) spectra were determined at 303 K on a Bruker MW-250 instrument in CD_3CN with TMS as internal standard (Table I). Elemental analyses were performed by CHN-microanalyse, Fakulatat Chemie-Universitat Konstanz, FRG. The found elemental analyses for carbon, hydrogen, and nitrogen were in good agreement with those calculated and were submitted for review. All experiments were carried out with exclusion of moisture in absolute solvents.

Scheme I. Reactions of 1-Oxa-3-azabutatrienium Salts 1a,b with Diisopropylcarbodiimide (2)



1a: $R^1 = R^2 = CH_3$
1b: $R^1 = CH_3$; $R^2 = C_6H_5$
2: $R^3 = (CH_3)_2CH$
X = $SbCl_6$
4a: $R^1 = R^2 = CH_3$; $R^3 = (CH_3)_2CH$
4b: $R^1 = CH_3$; $R^2 = C_6H_5$; $R^3 = (CH_3)_2CH$

0021-9568/88/1733-0388$01.50/0