Reaction of *N*-Methylimidazole and Dimethyl Acetylenedicarboxylate in the Presence of *N*-Phenyl Carbamate under Solvent-free Conditions

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An efficient synthesis of 1,2,3-functionalized imidazoles and dimethyl-2-[(alkoxycarbonyl)-anilino]-2-butenedioate derivatives *via* one-pot reactions between *N*-methylimidazole, dimethyl acetylenedicarboxylate and *N*-phenylcarbamates under solvent-free conditions is described. The mild reaction conditions and good yields exhibit the synthetic advantage of this method.

Key words: *N*-Methylimidazole, Solvent-free, *N*-Phenylcarbamate 1,2,3-Functionalized Imidazoles

Introduction

Functionalized imidazoles are an important class of heterocyclic compounds in organic chemistry because they are common structural units in a number of natural products and pharmaceuticals and useful building blocks for the construction of various biologically active molecules and functional materials [1 – 3].

Imidazole-based drugs such as Cimetidine, Etomidate and Ketoconazole are currently in clinical use [4]. Imidazole derivatives are used for the synthesis of imidazole-tailored ionic liquids and stable nucleophilic carbenes [5 – 9]. Because of the wide range of pharmacological and biological activities, the synthesis of functionalized imidazoles has become an important target in recent years.

Here we developed an efficient one-pot route for the synthesis of 1,2,3-functionalized imidazoles and dimethyl-2-[(alkoxycarbonyl)anilino]-2-butenedioate derivatives*via* the reaction between *N*-methylimidazole (**1**), dimethyl acetylenedicarboxylate (**2**) and *N*-phenylcarbamates **3** under solvent-free conditions at room temperature (Scheme 1).

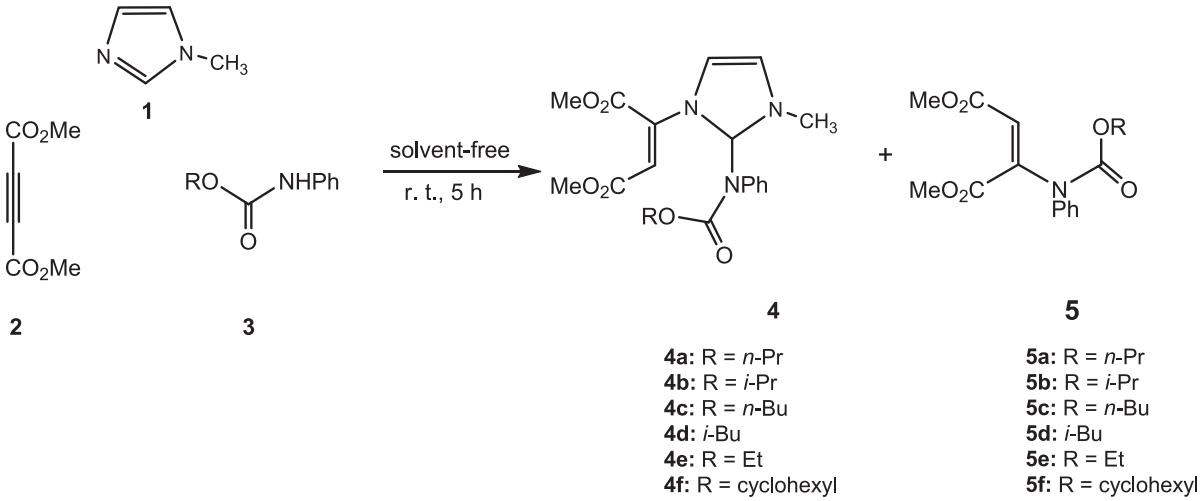
Result and Discussion

The reaction of *N*-methylimidazole (**1**), dialkyl acetylenedicarboxylates **2** and *N*-phenylcarbamates **3** proceeds smoothly under solvent-free conditions at room temperature to produce dimethyl-{3-methyl-2-[(alkoxycarbonyl)anilino]-2,3-dihydro-1*H*-imidazol-1-yl)}-2-butenedioates **4** and dimethyl-2-[(alkoxycarbonyl)anilino]-2-butenedioate derivatives **5** in 80 – 85 % yield (Scheme 1).

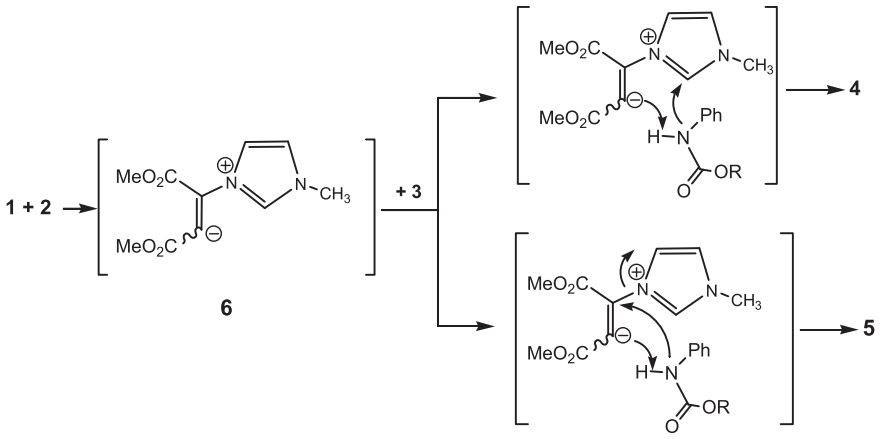
The structures of the compounds were apparent from the ^{1}H NMR, ^{13}C NMR and IR spectra. The ^{1}H NMR spectrum of **4a** exhibited all expected signals at δ = 1.04, 1.68 and 4.10 ppm for the propyl moiety, three singlet peaks at δ = 3.68, 3.77 and 3.87 ppm for NMe and two methoxy groups, a singlet at δ = 6.12 ppm for an olefinic proton, and a singlet at 7.63 ppm for a CH that is bonded to three nitrogens, along with signals for the phenyl and imidazole units at 6.96 – 7.26 ppm. The proton-decoupled ^{13}C NMR spectrum of **4a** showed 17 distinct resonances in agreement with the proposed structure.

The stereochemistry of compound **4e** has been confirmed by nuclear Overhauser effect (NOE) measurements. Thus, when the olefinic proton signal was irradiated, the signal of the imidazole H-2 was enhanced by about 21 %, while both ester-OMe signals showed no significant enhancement. The stereochemistry thus deduced was also assumed for the other derivatives of **4**.

The ^{1}H NMR spectrum of **5a** displayed five peeks at δ = 1.00, 1.63, 4.14, 3.68, 3.77, and 6.14 ppm along with characteristic multiplet signals for the phenyl moiety. The proton-decoupled ^{13}C NMR spectrum of



Scheme 1. Synthesis of compounds **4a**–**f** and **5a**–**f**.



Scheme 2. Possible mechanism for the formation of compounds **4** and **5**.

5a showed signals in agreement with the proposed structure.

The stereochemistry of compound **5e** is confirmed by nuclear Overhauser effect (NOE) measurements. Thus, when the OCH_2 protons signal was irradiated, the olefinic protons were enhanced by about 10%, while the OMe proton signal showed no significant enhancement. The stereochemistry thus deduced was also assumed for the other derivatives of **5**.

A possible mechanism for this reaction is proposed in Scheme 2. The zwitterionic intermediate **6** produced from the reaction of N-methylimidazole and dialkyl acetylenedicarboxylate is subsequently protonated by an N-phenylcarbamate **3** and then attacked by the conjugate base of the carbamate to produce **4** and **5**.

Conclusion

In conclusion we have reported a convenient one-pot route for the synthesis of 1,2,3-functionalized imidazoles and dimethyl-2-[(alkoxycarbonyl)anilino]-2-butenedioates by reaction of *N*-methylimidazole, dialkyl acetylenedicarboxylate and *N*-phenylcarbamates at solvent-free conditions and at room temperature.

Experimental

General information

Melting points were taken on a Kofler hot stage apparatus and are uncorrected. ^{1}H NMR and ^{13}C NMR spectra were obtained with a Bruker FT-500 spectrometer in

$CDCl_3$, and tetramethylsilane (TMS) was used as an internal standard. Mass spectra were recorded with a Finnigan Mat TSQ-70 spectrometer. Infrared (IR) spectra were acquired on a Nicolet Magna 550-FT spectrometer. Elemental analyses were carried out with a Perkin-Elmer model 240-C apparatus. The results of elemental analyses (C, H, N) were within ±0.4 % of the calculated values. The acetylenic ester and *N*-methylimidazole were obtained from Fluka and were used without further purification.

*General procedure for the preparation of compounds **4a–f** and **5a–f***

To a magnetically stirred mixture of an *N*-phenylcarbamate **3** (2 mmol) and dimethyl acetylenedicarboxylate (**2**, 2 mmol) was slowly added *N*-methylimidazole (**1**, 2 mmol), and the reaction mixture was stirred for 5 h at r. t. After completion of the reaction as indicated by TLC, the residue was purified by chromatography over silica gel (Merck 230 – 400 mesh) using an *n*-hexane-AcOEt mixture (6:1) as eluant to afford the pure compounds **4** and **5**.

*Dimethyl {3-methyl-2-[(propoxycarbonyl)anilino]-2,3-dihydro-1H-imidazol-1-yl}-2-butenedioate (**4a**)*

Yellow oil; yield: 0.40 g (50 %). – IR (KBr): $\nu = 1721$ (C=O), 1718 (C=O), 1706 (C=O), 2989 (CH) cm^{-1}. – ^1H NMR: $\delta = 1.04$ (t, 3 H, $^3J = 6.9$ Hz, CH_3), 1.68 (sextet, 2 H, $^3J = 6.9$ Hz, CH_2), 3.68 (s, 3 H, NCH_3), 3.77 (s, 3 H, OCH_3), 3.87 (s, 3 H, OCH_3), 4.10 (t, 2 H, $^3J = 7.0$ Hz, CH_2), 6.12 (s, 1 H, CH), 6.96 – 7.26 (m, 7 H, 7 CH), 7.63 (s, 1 H, CH) ppm. – ^{13}C NMR: $\delta = 10.3$ (Me), 23.7 (CH_2), 38.7 (NMe), 51.7 (OMe), 52.0 (OMe), 61.1 (OCH_2), 68.2 (CH), 107.7 (CH), 120.6 (CH), 123.7 (2 CH), 124.5 (CH), 128.5 (CH), 129.0 (2 CH), 137.2 (C), 147.0 (C), 154.8 (C=O), 163.3 (C=O),164.8 (C=O) ppm. – EI-MS: $m/z(\%) = 403$ (2) $[M]^+$, 226 (5), 178 (40), 144 (54), 120 (42), 43 (100). – Anal. for $C_{20}H_{25}N_3O_6$ (403.17): calcd. C 59.54, H 6.25, N 10.42; found C 59.55, H 6.23, N 10.40 %.

*Dimethyl 2-[(propoxycarbonyl)anilino]-2-butenedioate (**5a**)*

Yellow oil; yield: 0.23 g (35 %). – IR (KBr): $\nu = 1720$ (C=O), 1716 (C=O), 1696 (C=O), 2985 (CH) cm^{-1}. – ^1H NMR: $\delta = 1.00$ (t, 3 H, $^3J = 7.1$ Hz, CH_3), 1.63 (sextet, 2 H, $^3J = 6.9$ Hz, CH_2), 3.67 (s, 3 H, OCH_3), 3.76 (s, 3 H, OCH_3), 4.14 (t, 2 H, $^3J = 7.1$ Hz, CH_2), 6.14 (s, 1 H, CH), 7.28 – 7.61 (m, 5 H, 5 CH) ppm. – ^{13}C NMR: $\delta = 10.4$ (Me), 22.9 (CH_2), 52.9 (OMe), 53.1 (OMe), 68.3 (OCH_2), 107.3 (CH), 123.3 (2 CH), 124.0 (CH), 128.8 (2 CH), 128.9 (2 CH), 140.7 (C), 147.6 (C), 154.0 (C=O), 163.2 (C=O), 164.5 (C=O) ppm. – EI-MS: $m/z(\%) = 321$ (3) $[M]^+$, 178 (12), 144 (40), 43 (100). – Anal. for $C_{16}H_{19}NO_6$ (321.12): calcd. C 59.80, H 5.96, N 4.36; found C 59.83, H 5.97, N 4.35 %.

*Dimethyl {3-methyl-2-[(isopropoxycarbonyl)anilino]-2,3-dihydro-1H-imidazol-1-yl}-2-butenedioate (**4b**)*

Yellow oil; yield: 0.42 g (52 %). – IR (KBr): $\nu = 1725$ (C=O), 1705 (C=O), 2983 (CH) cm^{-1}. – ^1H NMR: $\delta = 1.23$ (d, 3 H, $^3J = 6.8$ Hz, CH_3), 1.30 (d, 3 H, $^3J = 6.9$ Hz, CH_3), 3.68 (s, 3 H, NCH_3), 3.78 (s, 3 H, OCH_3), 3.88 (s, 3 H, OCH_3), 4.13 – 4.15 (heptet, 1 H, $^3J = 6.8$ Hz, CH), 6.12 (s, 1 H, CH), 7.00 – 7.30 (m, 7 H, 7 CH), 7.67 (s, 1 H, CH) ppm. – ^{13}C NMR: $\delta = 21.5$ (2 Me), 38.5 (NMe), 51.6 (OMe), 52.1 (OMe), 61.5 (OCH_2), 68.6 (CH), 106.9 (CH), 118.1 (CH), 123.0 (2 CH), 123.5 (CH), 127.3 (2 CH), 128.8 (2 CH), 138.9 (C), 146.5 (C), 153.7 (C=O), 163.2 (C=O), 164.5 (C=O) ppm. – EI-MS: $m/z(\%) = 403$ (3) $[M]^+$, 226 (6), 178 (35), 144 (49), 120 (41), 43 (100). – Anal. for $C_{20}H_{25}N_3O_6$ (403.17): calcd. C 59.54, H 6.25, N 10.42; found C 59.55, H 6.24, N 10.44 %.

*Dimethyl 2-[(isopropoxycarbonyl)anilino]-2-butenedioate (**5b**)*

Yellow oil; yield: 0.18 g (28 %). – IR (KBr): $\nu = 1724$ (C=O), 1699 (C=O), 2987 (CH) cm^{-1}. – ^1H NMR: $\delta = 1.21$ (d, 3 H, $^3J = 6.2$ Hz, CH_3), 1.30 (d, 3 H, $^3J = 6.3$ Hz, CH_3), 3.67 (s, 3 H, OCH_3), 3.77 (s, 3 H, OCH_3), 4.14 – 4.17 (heptet, 1 H, $^3J = 7.0$ Hz, CH), 6.12 (s, 1 H, CH), 7.24 – 7.60 (m, 5 H, 5 CH) ppm. – ^{13}C NMR: $\delta = 21.0$ (2 Me), 52.9 (OMe), 53.1 (OMe), 66.7 (OCH_2), 108.1 (CH), 123.1 (2 CH), 123.8 (CH), 128.9 (2 CH), 140.0 (C), 147.6 (C), 153.5 (C=O), 163.8 (C=O), 165.0 (C=O) ppm. – EI-MS: $m/z(\%) = 321$ (5) $[M]^+$, 178 (15), 144 (54), 43 (100). – Anal. for $C_{16}H_{19}NO_6$ (321.12): calcd. C 59.80, H 5.96, N 4.36; found C 59.83, H 5.97, N 4.32 %.

*Dimethyl {3-methyl-2-[(butoxycarbonyl)anilino]-2,3-dihydro-1H-imidazol-1-yl}-2-butene-dioate (**4c**)*

Yellow oil; yield: 0.45 g (56 %). – IR (KBr): $\nu = 1722$ (C=O), 1717 (C=O), 1700 (C=O), 2982 (CH) cm^{-1}. – ^1H NMR: $\delta = 0.93$ (t, 3 H, $^3J = 7.1$ Hz, CH_3), 1.52 – 1.54 (m, 2 H, CH_2), 1.68 – 1.71 (m, 2 H, CH_2), 3.69 (s, 3 H, NCH_3), 3.78 (s, 3 H, OCH_3), 3.88 (s, 3 H, OCH_3), 4.15 (t, 2 H, $^3J = 7.0$ Hz, CH_2), 6.12 (s, 1 H, CH), 7.04 – 7.34 (m, 7 H, 7 CH), 7.61 (s, 1 H, CH), ppm. – ^{13}C NMR: $\delta = 14.1$ (Me), 22.7 (CH_2), 31.5 (CH_2), 38.5 (NMe), 51.6 (OMe), 52.1 (OMe), 61.3 (OCH_2), 68.3 (CH), 106.7 (CH), 118.0 (CH), 123.0 (2 CH), 123.5 (CH), 127.1 (CH), 128.8 (2 CH), 139.1 (C), 146.0 (C), 153.6 (C=O), 162.8 (C=O), 164.5 (C=O) ppm. – EI-MS: $m/z(\%) = 417$ (2) $[M]^+$, 226 (7), 192 (39), 144 (53), 120 (41), 57 (100). – Anal. for $C_{21}H_{27}N_3O_6$ (417.19): calcd. C 60.42, H 6.52, N 10.07; found C 60.40, H 6.54, N 10.05 %.

*Dimethyl 2-[(butoxycarbonyl)anilino]-2-butenedioate (**5c**)*

Yellow oil; yield: 0.19 g (29 %). – IR (KBr): $\nu = 1728$ (C=O), 2981 (CH) cm^{-1}. – ^1H NMR: $\delta = 0.83$ (t, 3 H, $^3J = 6.9$ Hz, CH_3), 1.48 – 1.51 (m, 2 H, CH_2), 1.58 – 1.65 (m, 2 H, CH_2), 3.68 (s, 3 H, OCH_3), 3.77 (s, 3 H, OCH_3), 4.16 (t, 2H, $^3J = 6.8$ Hz, CH_2), 6.14 (s, 1 H, CH), 7.38 – 7.59 (m, 5 H, 5 CH) ppm. – ^{13}C NMR: $\delta = 14.0$ (Me), 23.0 (CH_2), 31.4 (CH_2), 53.0 (OMe), 53.1 (OMe), 66.7 (OCH_2), 108.0 (CH), 123.0 (2 CH), 123.4 (CH), 128.7 (2 CH), 128.9 (2 CH), 138.8 (C), 147.9 (C), 153.8 (C=O), 163.5 (C=O), 165.0 (C=O) ppm. – EI-MS: $m/z(\%) = 307$ (5) $[M]^+$, 192 (15), 144 (45), 57 (100). – Anal. for $C_{17}H_{21}NO_6$ (335.13): calcd. C 60.89, H 6.31, N 4.18; found C 60.87, H 6.34, N 4.16 %.

*Dimethyl {3-methyl-2-[(isobutoxycarbonyl)anilino]-2,3-dihydro-1H-imidazol-1-yl}-2-butene-dioate (**4d**)*

Yellow oil; yield: 0.48 g (58 %). – IR (KBr): $\nu = 1726$ (C=O), 1718 (C=O), 1706 (C=O), 2984 (CH), cm^{-1}. – ^1H NMR: $\delta = 1.01$ (d, 6 H, $^3J = 6.8$ Hz, 2 CH_3), 2.35 – 2.39(m, 1 H, CH), 3.69 (s, 3 H, NCH_3), 3.78 (s, 3 H, OCH_3), 3.88 (s, 3 H, OCH_3), 4.11 (d, 1 H, $^3J = 6.9$ Hz, CH), 6.12 (s, 1 H, CH), 7.04 – 7.34 (m, 7 H, 7 CH), 7.65 (s, 1 H, CH) ppm. – ^{13}C NMR: $\delta = 17.7$ (Me), 17.9 (Me), 21.7 (CH), 37.1 (NMe), 51.9 (OMe), 52.0 (OMe), 58.5 (OCH_2), 67.1 (CH), 106.7 (CH), 118.0 (CH), 123.0 (2 CH), 123.5 (CH), 127.1 (CH), 128.8 (2 CH), 139.1 (C), 146.0 (C), 154.5 (C=O), 162.5 (C=O), 163.2 (C=O) ppm. – EI-MS: $m/z(\%) = 417$ (5) $[M]^+$, 226 (9), 192 (36), 144 (48), 120 (42), 57 (100). – Anal. for $C_{21}H_{27}N_3O_6$ (417.19): calcd. C 60.42, H 6.52, N 10.07; found C 60.41, H 6.53, N 10.09 %.

*Dimethyl 2-[(isobutoxycarbonyl)anilino]-2-butenedioate (**5d**)*

Yellow oil; yield: 0.18 g (27 %). – IR (KBr): $\nu = 1730$ (C=O), 2985 (CH) cm^{-1}. – ^1H NMR: $\delta = 0.99$ (d, 6 H, $^3J = 7.2$ Hz, 2 CH_3), 2.31 – 1.34 (m, 1 H, CH), 3.68 (s, 3 H, OCH_3), 3.77 (s, 3 H, OCH_3), 4.14 (d, 1 H, $^3J = 6.8$ Hz, CH), 6.14 (s, 1 H, CH), 7.36 – 7.64 (m, 5 H, 5 CH) ppm.– ^{13}C NMR: $\delta = 18.0$ (2 Me), 21.7 (CH), 50.7 (OMe), 51.8 (OMe), 58.6 (OCH_2), 68.80 (CH), 108.0 (CH), 123.0 (2 CH), 123.4 (CH), 128.0 (2CH), 138.8 (C), 147.9 (C), 156.5 (C=O), 163.2 (C=O), 165.0 (C=O) ppm. – EI-MS: $m/z(\%) = 335$ (2) $[M]^+$, 192 (157), 144 (47), 57 (100). – Anal. for $C_{17}H_{21}NO_6$ (335.13): calcd. C 60.89, H 6.31, N 4.18; found C 60.91, H 6.30, N 4.20 %.

*Dimethyl {3-methyl-2-[(ethoxycarbonyl)anilino]-2,3-dihydro-1H-imidazol-1-yl}-2-butene-dioate (**4e**)*

Yellow oil; yield: 0.44 g (57 %). –IR (KBr): $\nu = 1721$ (C=O), 1716 (C=O), 1696 (C=O), 2986 (CH) cm^{-1}. – ^1H NMR: $\delta = 1.25$ (t, 3 H, $^3J = 6.8$ Hz, CH_3), 3.68 (s, 3 H, NCH_3), 3.77 (s, 3 H, OCH_3), 3.87 (s, 3 H, OCH_3), 4.13 (q, 2 H, $^3J = 7.0$ Hz, CH_2), 6.12 (s, 1 H, CH), 6.98 – 7.24 (m, 3 H, 7 CH), 7.63 (s, 1 H, CH) ppm. – ^{13}C NMR: $\delta = 13.5$ (Me), 37.7 (NMe), 50.6 (OMe), 50.7 (OMe), 60.1 (OCH_2), 67.1 (CH), 106.7 (CH), 118.0 (CH), 122.3 (2 CH), 123.5 (CH), 127.2 (CH), 128.0 (2 CH), 137.5 (C), 146.0 (C), 153.8 (C=O), 162.2 (C=O), 163.7 (C=O) ppm. – EI-MS: $m/z(\%) = 389$ (2) $[M]^+$, 226 (8), 164 (41), 144 (52), 120 (40), 29 (100). – Anal. for $C_{19}H_{23}N_3O_6$ (389.16): calcd. C 58.60, H 5.95, N 10.79; found C 58.61, H 5.94, N 10.81 %.

*Dimethyl 2-[(ethoxycarbonyl)anilino]-2-butenedioate (**5e**)*

Yellow oil; yield: 0.17 g (28 %). – IR (KBr): $\nu = 1732$ (C=O), 1710 (C=O), 2990 (CH) cm^{-1}. – ^1H NMR: $\delta = 1.22$ (t, 3 H, $^3J = 6.8$ Hz, CH_3), 3.67 (s, 3 H, OCH_3), 3.76 (s, 3 H, OCH_3), 4.22 (q, 2 H, $^3J = 6.9$ Hz, CH_2), 6.14 (s, 1 H, CH), 7.27 – 7.61 (m, 5 H, 5 CH) ppm. – ^{13}C NMR: $\delta = 13.1$ (Me), 51.8 (OMe), 51.9 (OMe), 60.0 (OCH_2), 108.0 (CH), 123.0 (2 CH), 127.8 (CH), 127.9 (2 CH), 137.4 (C), 146.6 (C), 153.1 (C=O), 162.5 (C=O), 164.0 (C=O) ppm. – EI-MS: $m/z(\%) = 307$ (2) $[M]^+$, 164 (17), 144 (43), 29 (100). – Anal. for $C_{15}H_{17}NO_6$ (307.16): calcd. C 58.63, H 5.58, N 4.56; found C 58.62, H 5.59, N 4.54 %.

*Dimethyl {3-methyl-2-[(cyclohexyloxycarbonyl)anilino]-2,3-dihydro-1H-imidazol-1-yl}-2-butenedioate (**4f**)*

Yellow oil; yield: 0.49 g (55 %). – IR (KBr): $\nu = 1722$ (C=O), 1715 (C=O), 1696 (C=O), 2983 (CH) cm^{-1}. – ^1H NMR: $\delta = 1.58 – 1.63$ (m, 2 H, CH_2), 1.72 – 1.76 (m, 4 H, 2 CH_2), 1.92 – 1.96 (m, 4 H, 2 CH_2), 3.69 (s, 3 H, NCH_3), 3.78 (s, 3 H, OCH_3), 3.88 (s, 3 H, OCH_3), 4.12 – 4.16 (m, 1 H, CH), 6.11 (s, 1 H, CH), 7.00 – 7.26 (m, 7 H, 7 CH), 7.64 (s, 1 H, CH) ppm. – ^{13}C NMR: $\delta = 23.4$ (2 CH_2), 25.3 (CH_2), 31.2 (2CH_2), 37.3 (NMe), 50.8 (OMe), 51.9 (OMe), 60.1 (CH), 67.5 (CH), 107.0 (CH), 118.3 (CH), 122.5 (2 CH), 123.7 (CH), 128.7 (2 CH), 137.8 (C), 146.8 (C), 154.2 (C=O), 162.5 (C=O), 163.7 (C=O) ppm. – EI-MS: $m/z(\%) = 443$ (3) $[M]^+$, 226 (7), 164 (45), 218 (48), 120 (36), 83 (100). – Anal. for $C_{23}H_{29}N_3O_6$ (443.21): calcd. C 62.29, H 6.59, N 9.47; found C 62.31, H 6.56, N 9.45 %.

*Dimethyl 2-[(cyclohexyloxycarbonyl)anilino]-2-butenedioate (**5f**)*

Yellow oil; yield: 0.20 g (28 %). – IR (KBr): $\nu =$ 1726(C=O), 1712 (C=O), 2984 (CH) cm^{-1}. – ^1H NMR: $\delta = 1.52 – 1.56$ (m, 2 H, CH_2), 1.65 – 1.70 (m, 4 H, 2 CH_2), 1.86 – 1.91 (m, 4 H, 2 CH_2), 3.68 (s, 3 H, OCH_3), 3.77 (s, 3 H, OCH_3), 4.11 – 4.14 (m, 1 H, CH), 6.14 (s, 1 H, CH), 7.33 – 7.61 (m, 5 H, 5 CH) ppm. – ^{13}C NMR: $\delta = 23.2$ (2 CH_2), 25.1 (CH_2), 31.0 (2 CH_2), 50.7 (OMe), 51.8 (OMe),

59.6 (CH), 68.7 (CH), 108.0 (CH), 123.3 (2 CH), 127.7 (CH), 128.2 (2 CH), 140.0 (C), 147.2 (C), 154.5 (C=O), 163.0 (C=O), 164.7 (C=O) ppm. – EI-MS: $m/z(\%) = 361$ (3) $[M]^+$, 218(19), 144 (36), 83 (100). – Anal. for $C_{19}H_{23}NO_6$ (361.15): calcd. C 63.15, H 6.41, N 3.88; found C 63.13, H 6.43, N 3.86 %.

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