Lipase catalyzed solvent-free amidation of phenolic acids

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Supplementary Information

Supplementary Information

Full experimental detail and ^1H & ^{13}C NMR, IR and Elemental analysis characterization of all the forty-two compounds (**9a-9f**, **10a-10f**, **11a-11f**, **12a-12f**, **13a-13f**, **14a-14f** and **15a-15f**) and copies of ^1H and ^{13}C NMR spectra of compounds (**9a**, **10a**, **10b**, **10d**, **10e**, **10f**, **11c**, **11d**, **11e**, **12e**, **13d**, **13e**, **13f**, **14b**, **14c**, **14d**, **14e**, **14f**, **15d** and **15e**).

General procedure for the preparation of n-alkyl substituted phenolic acid amides

Equimolar amounts of different chain length amines and phenolic acids, along with *Candida antarctica* lipase enzyme (10% of the total amount of the reactants) were taken in a 250 mL, two necked round-bottom flask with a magnetic bar (to facilitate stirring) and was then heated in an oil bath at 60–90 °C. One neck of the round bottom flask was attached to a pump under vacuum and the other was punctured with a needle to regulate the pressure inside the round-bottom flask. The different reactions were allowed to proceed for 16–20 hours. The formation of products was confirmed by Thin Layer Chromatography (TLC) in ethyl acetate: hexane (2:8) solvent system. After completion, the reaction was quenched by adding dichloromethane (DCM), followed by filtration to remove the enzyme. The solvent DCM was then evaporated off in a rotary evaporator. The different phenolic acids based amides synthesized were purified by column chromatography to afford the pure amides in 75.6-83.5 % yield.

N-propyl-salicylamide (**9a**)

The title compound was prepared in accordance to the *general procedure above* from 2.13g (0.036 moles) of propylamine and 5g (0.036 moles) of salicylic acid, along with 0.713g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography and was obtained as a reddish brown coloured viscous liquid, after purification by column chromatography by eluting with 2% ethyl acetate in

hexane in 81.4% yield, R_f : 0.46 (ethyl acetate: hexane, 2:8). IR (Nujol) cm^{-1} : 1643 (CO stretching, amide I band), 1557 (N-H bending, amide II band), 1261 (C-N stretching, amide III band), 3403 (N-H stretching). ^1H NMR (400 MHz, DMSO): δ 0.93 (3H, t, $J=7.6$, H-3'), 1.59–1.68 (2H, m, H-2'), 2.81 (2H, t, $J=7.6$, H-1'), 6.71 (1H, d, $J=8.4$, H-3''), 7.20–7.22 (2H, dd, $J=8.8$ & 2.1 and $J=8.4$ & 2.1 each, H-4'' & H-5''), 7.74 (1H, d, $J=7.6$, H-6'') and 8.31 (1H, s, N-H). ^{13}C NMR (75.5 MHz, DMSO): δ 111.1 (C-3'), 24.5 (C-2'), 42.7 (C-1'), 116.5 (C-1''), 119.0 (C-3''), 119.3 (C-5''), 129.6 (C-6''), 131.7 (C-4''), 161.7 (C-2'') and 172.7 (C-1). Analyzed for molecular formula $\text{C}_{10}\text{H}_{13}\text{NO}_2$: C, 67.02; H, 7.31; N, 7.82. Found: C, 67.23; H, 7.26; N, 7.69.

N-hexyl-salicylamide (9b)^[1]

The title compound was prepared in accordance to the *general procedure* above from 3.66g (0.036 moles) of hexylamine and 5g (0.036 moles) of salicylic acid, along with 0.866g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography and was obtained as a reddish brown coloured viscous liquid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 80.4% yield, R_f : 0.49 (ethyl acetate: hexane, 2:8). IR (Nujol) cm^{-1} : 1644 (CO stretching, amide I band), 1559 (N-H bending, amide II band), 1259 (C-N stretching, amide III band), 3408 (N-H stretching). ^1H NMR (400 MHz, DMSO): δ 0.85 (3H, t, $J=7.2$, H-6'), 1.21–1.51 (8H, m, H-2', H-3', H-4' and H-5'), 2.76 (2H, t, $J=7.6$, H-1'), 6.74 (1H, d, $J=8.0$, H-3''), 7.21–7.24 (2H, dd, $J=8.4$ & 2.0 and $J=8.6$ & 2.1 each, H-4'' & H-5''), 7.72 (1H, d, $J=7.6$, H-6'') and 8.26 (1H, s, N-H). ^{13}C NMR (75.5 MHz, DMSO): δ 14.3 (C-6'), 22.5, 26.3, 29.4, 31.7 (C-2', C-3', C-4' & C-5'), 43.1 (C-1'), 116.2 (C-1''), 119.1 (C-3''), 119.3 (C-5''), 129.9 (C-6''), 131.4 (C-4''), 162.7 (C-2'') and 173.0 (C-1). Analyzed for molecular formula $\text{C}_{13}\text{H}_{19}\text{NO}_2$: C, 70.56; H, 8.65; N, 6.33. Found: C, 70.43; H, 8.21; N, 6.37.

N-heptyl-salicylamide (9c)^[2]

The title compound was prepared in accordance to the *general procedure above* from 4.14g (0.036 moles) of heptylamine and 5g (0.036 moles) of salicylic acid, along with 0.914g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography and was obtained as a reddish brown coloured viscous liquid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 81.3% yield, R_f : 0.47 (ethyl acetate: hexane, 2:8). IR (Nujol) cm⁻¹: 1647 (CO stretching, amide I band), 1558 (N-H bending, amide II band), 1254 (C-N stretching, amide III band), 3404 (N-H stretching). ¹HNMR (400 MHz, DMSO): δ 0.94 (3H, t, J=7.2, H-7'), 1.20–1.58 (10H, m, H-2', H-3', H-4', H-5' and H 6'), 2.81 (2H, t, J=7.6, H-1'), 6.78 (1H, d, J=8.0, H-3''), 7.25-7.31 (2H, dd, J=8.0 & 2.0 and J= 8.2 & 2.2 each, H-4'' & H-5''), 7.75 (1H, d, J=7.6, H-6'') and 8.24 (1H, s, N-H). ¹³C NMR (75.5 MHz, DMSO): δ 14.3 (C-7'), 22.5, 26.3, 29.2, 29.4, 31.0(C-6', C-5', C-4', C-3' & C-2'), 43.1 (C-1'), 116.3 (C-1''), 119.1 (C-3''), 119.5 (C-5''), 129.4 (C-6''), 131.6 (C-4''), 160.9 (C-2'') and 172.6 (C-1). Analyzed for molecular formula C₁₄H₂₁NO₂: C, 71.46; H, 8.99; N, 5.95. Found: C, 70.45; H, 8.85; N, 6.01.

N-undecyl-salicylamide (9d)^[2]

The title compound was prepared in accordance to the *general procedure above* from 6.15g (0.036 moles) of undecylamine and 5g (0.036 moles) of salicylic acid, along with 1.115g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography and was obtained as a dark brown coloured viscous liquid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 78.2% yield, R_f : 0.45 (ethyl acetate: hexane, 2:8). IR (Nujol) cm⁻¹: 1646 (CO

stretching, amide I band), 1561 (N-H bending, amide II band), 1253 (C-N stretching, amide III band), 3410 (N-H stretching). ^1H NMR (400 MHz, DMSO): δ 0.83 (3H, t, $J=6.4$, H-11'), 1.20–1.59 (18H, m, H-2', H-3', H-4', H-5' H-6', H-7', H-8', H-9' and H-10'), 2.80 (2H, t, $J=7.6$, H-1'), 6.70 (1H, d, $J=8.4$, H-3''), 7.25-7.29 (2H, dd, $J=8.0$ & 2.1 and $J= 8.2$ & 2.0 each, H-4'' & H-5''), 7.72 (1H, d, $J=8$, H-6'') and 8.26 (1H, s, N-H). ^{13}C NMR (75.5 MHz, DMSO): δ 14.1 (C-11'), 22.4, 22.5, 22.7, 26.3, 26.8, 27.5, 29.0, 29.3, 29.4, 30.8 (C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 43.1 (C-1'), 116.3 (C-1''), 119.3 (C-3''), 120.3 (C-5''), 130.1 (C-6''), 131.4 (C-4''), 162.7 (C-2'') and 173.1 (C-1). Analyzed for molecular formula $\text{C}_{18}\text{H}_{29}\text{NO}_2$: C, 74.18; H, 10.03; N, 4.81. Found: C, 74.15; H, 10.21; N, 4.62.

N-hexadecyl-salicylamide (9e)^[3]

The title compound was prepared in accordance to the *general procedure above* from 8.69g (0.036 moles) of propylamine and 5g (0.036 moles) of salicylic acid, along with 1.369g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography and was obtained as a dark brown coloured solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 81.4% yield, R_f : 0.46 (ethyl acetate: hexane, 2:8). IR (Nujol) cm^{-1} : 1644 (CO stretching, amide I band), 1560 (N-H bending, amide II band), 1255 (C-N stretching, amide III band), 3405 (N-H stretching). ^1H NMR (400 MHz, DMSO): δ 0.84 (3H, t, $J=7.2$, H-16'), 1.21–1.57 (28H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14' and H-15'), 2.78 (2H, t, $J=7.6$, H-1'), 6.75 (1H, d, $J=8.0$, H-3''), 7.25-7.30 (2H, dd, $J=8.0$ & 2.1 and $J= 8.0$ & 2.0 each, H-4'' & H-5''), 7.75 (1H, d, $J=7.6$, H-6'') and 8.22 (1H, s, N-H). ^{13}C NMR (75.5 MHz, DMSO): δ 14.3 (C-16'), 20.2, 20.3, 20.5, 22.4, 22.5, 22.7, 26.3, 26.8, 27.5, 29.0, 29.3, 29.4, 29.5, 30.8 (C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-

2'), 42.7 (C-1'), 116.5 (C-1''), 119.0 (C-3''), 119.3 (C-5''), 129.6 (C-6''), 131.7 (C-4''), 161.7 (C-2'') and 172.1 (C-1). Analyzed for molecular formula $C_{23}H_{39}NO_2$: C, 76.40; H, 10.87; N, 3.87. Found: C, 76.39; H, 10.42; N, 3.94.

N-octadecyl-salicylamide (9f)^[2]

The title compound was prepared in accordance to the *general procedure above* from 9.70g (0.036 moles) of octadecylamine and 5g (0.036 moles) of salicylic acid, along with 1.470g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography and was obtained as a light brown coloured solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 82.5% yield, R_f: 0.49 (ethyl acetate: hexane, 2:8). IR (Nujol) cm^{-1} : 1645 (CO stretching, amide I band), 1559 (N-H bending, amide II band), 1260 (C-N stretching, amide III band), 3402 (N-H stretching). ¹H NMR (400 MHz, DMSO): δ 0.85 (3H, t, J=7.2, H-18'), 1.20–1.61 (3H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14', H-15', H-16' and H-17'), 2.80 (2H, t, J=7.6, H-1'), 6.78 (1H, d, J=7.6, H-3''), 7.21–7.27 (2H, dd, J=8.8 & 2.1 and J= 8.4 & 2.1 each, H-4'' & H-5''), 7.73 (1H, d, J=8.0, H-6'') and 8.23 (1H, s, N-H). ¹³C NMR (75.5 MHz, DMSO): δ 14.3 (C-18'), 20.2, 20.3, 20.5, 22.4, 22.5, 22.7, 26.3, 26.8, 27.5, 29.0, 29.3, 29.4, 29.5, 30.1, 30.8, 31.0, (C-17', C-16', C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 42.7 (C-1'), 116.2 (C-1''), 119.4 (C-3''), 119.7 (C-5''), 129.9 (C-6''), 131.5 (C-4''), 162.1 (C-2'') and 172.1 (C-1). Analyzed for molecular formula $C_{25}H_{43}NO_2$: C, 77.07; H, 11.12; N, 3.60. Found: C, 76.99; H, 11.15; N, 3.63.

N-propyl-3-hydroxycinnamamide (10a)

The title compound was prepared in accordance to the *general procedure above* from 1.77g (0.030 moles) of propylamine and 5g (0.030 moles) of 3-hydroxy cinnamic acid, along with 0.670g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography and was obtained as a dark brown coloured solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 81.2% yield, R_f : 0.47 (ethyl acetate: hexane, 2:8). IR (Nujol) cm⁻¹: 1650 (CO stretching, amide I band), 1572 (N-H bending, amide II band), 1243 (C-N stretching, amide III band), 3258 (N-H stretching). ¹HNMR (400 MHz, DMSO): δ 0.81 (3H, t, J=6.8, H-3'), 1.56–1.67 (2H, m, H-2'), 3.19 (2H, t, H-1'), 4.80 (1H, s, Ar-OH); 6.35 (1H, d, J=15.6, H-2), 6.68 (1H, s, H-2''), 6.75 (1H, dd, J=7.6 & 2.0, H-5''), 6.94 (1H, d, J=8.0, H-4''), 7.16 (1H, d, J=7.6, H-6''), 7.24 (1H, d, J=15.6, H-3) and 8.17 (1H, s, N-H). ¹³C NMR (75.5 MHz, DMSO): δ 14.3 (C-3'), 23.5 (C-2'), 42.5 (C-1'), 114.2(C-4''), 115.7 (C-2''), 118.7 (C-2), 119.1 (C-6''), 129.0 (C-5''), 136.0 (C-1''), 139.6 (C-3), 158.7 (C-3'') and 170.7 (C-1). Analyzed for molecular formula C₁₂H₁₅NO₂: C, 70.22; H, 7.37; N, 6.82. Found: C, 70.15; H, 7.42; N, 6.97.

N-hexyl-3-hydroxycinnamamide (10b)

The title compound was prepared in accordance to the *general procedure above* from 3.03g (0.030 moles) of hexylamine and 5g (0.030 moles) of 3-hydroxy cinnamic acid, along with 0.803g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography and was obtained as a light yellow coloured crystals, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 79.3% yield, R_f : 0.48 (ethyl acetate: hexane, 2:8). IR (Nujol) cm⁻¹: 1644 (CO stretching, amide I band), 1575 (N-H bending, amide II band), 1240 (C-N stretching, amide III band), 3259 (N-H stretching). ¹HNMR (400 MHz, DMSO): δ 0.86 (3H, t, J=7.2, H-6'), 1.20–

1.55 (8H, m, H-2', H-3', H-4' and H-5'), 2.73 (2H, t, J=7.6, H-1'), 5.02 (1H, s, Ar-OH); 6.36 (1H, d, J=16, H-2), 6.74 (1H, s, H-2''), 6.78 (1H, dd, J=8.0 & 2.0, H-5''), 6.95 (1H, d, J=7.6, H-4''), 7.14 (1H, d, J=7.6, H-6''), 7.24 (1H, d, J=16, H-3) and 8.18 (1H, s, N-H). ¹³C NMR (75.5 MHz, DMSO): δ 14.3 (C-6'), 22.4, 26.7, 29.3, 31.6 (C-2', C-3', C-4' & C-5'), 42.8 (C-1'), 114.8 (C-4''), 115.2 (C-2''), 118.5 (C-2), 120.1 (C-6''), 129.8 (C-5''), 136.6 (C-1''), 139.5 (C-3), 158.3 (C-3'') and 170.4 (C=O). Analyzed for molecular formula C₁₅H₂₁NO₂: C, 72.84; H, 8.56; N, 5.66. Found: C, 72.82; H, 8.61; N, 5.58.

N-heptyl-3-hydroxycinnamamide (10c)^[4]

The title compound was prepared in accordance to the *general procedure above* from 3.45g (0.030 moles) of heptylamine and 5g (0.030 moles) of 3-hydroxy cinnamic acid, along with 0.845g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography and was obtained as a dark brown coloured solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 80.4% yield, R_f : 0.46 (ethyl acetate: hexane, 2:8). IR (Nujol) cm⁻¹: 1642 (CO stretching, amide I band), 1561 (N-H bending, amide II band), 1256 (C-N stretching, amide III band), 3260 (N-H stretching). ¹H NMR (400 MHz, DMSO): δ 0.81 (3H, t, J=6.4, H-7'), 1.20–1.56 (10H, m, H-2', H-3', H-4', H-5' and H 6'), 2.66 (2H, t, J=7.4, H-1'), 5.09 (1H, s, Ar-OH); 6.35 (1H, d, J=15.6, H-2), 6.70 (1H, s, H-2''), 6.73 (1H, dd, J=7.8 & 1.8, H-5''), 6.92 (1H, d, J=8.0, H-4''), 7.13 (1H, d, J=7.6, H-6''), 7.16 (1H, d, J=15.6, H-3) and 8.17 (1H, s, N-H). ¹³C NMR (75.5 MHz, DMSO): δ 14.3 (C-7'), 22.4, 26.3, 27.7, 29.4, 31.6 (C-6', C-5', C-4', C-3' & C-2'), 42.9 (C-1'), 113.9 (C-4''), 115.4 (C-2''), 118.6 (C-2), 119.3 (C-6''), 130.1 (C-5''), 137.1 (C-1''), 140.0 (C-3), 159.1 (C-3'') and 171.4 (C-1). Analyzed for molecular formula C₁₆H₂₃NO₂: C, 73.53; H, 8.87; N, 5.36. Found: C, 73.55; H, 8.83; N, 5.48.

N-undecyl-3-hydroxycinnamamide (10d)

The title compound was prepared in accordance to the *general procedure above* from 5.10g (0.030 moles) of undecylamine and 5g (0.030 moles) of 3-hydroxy cinnamic acid, along with 1.010g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography and was obtained as a dark brown coloured solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 78.6% yield, R_f : 0.49 (ethyl acetate: hexane, 2:8). IR (Nujol) cm⁻¹: 1645 (CO stretching, amide I band), 1572 (N-H bending, amide II band), 1242 (C-N stretching, amide III band), 3250 (N-H stretching). ¹HNMR (400 MHz, DMSO): δ 0.83 (3H, t, J=6.8, H-11'), 1.21–1.48 (18H, m, H-2', H-3', H-4', H-5' H-6', H-7', H-8', H-9' and H-10'), 2.72 (2H, t, J=7.4, H-1'), 4.89 (1H, s, Ar-OH); 6.2 (1H, d, J=15.6, H-2), 6.71 (1H, s, H-2''), 6.76 (1H, dd, J=7.6 & 2.0, H-5''), 6.93(1H, d, J=7.6, H-4''), 7.12 (1H, d, J=8.0, H-6''), 7.19 (1H, d, J=15.6, H-3) and 8.16 (1H, s, N-H). ¹³C NMR (75.5 MHz, DMSO): δ14.1 (C-11'), 22.4, 22.5, 22.7, 26.3, 26.8, 27.5, 29.1, 29.3, 29.5, 30.9 (C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 43.1 (C-1'), 114.5 (C-4''), 115.6 (C-2''), 118.6 (C-2), 119.0 (C-6''), 131.1 (C-5''), 136.0 (C-1''), 139.7 (C-3), 160.1 (C-3'') and 172.4 (C-1). Analyzed for molecular formula C₂₀H₃₁NO₂: C, 75.67; H, 9.84; N, 4.41. Found: C, 76.71; H, 9.65; N, 4.45.

N-hexadecyl-3-hydroxycinnamamide (10e)

The title compound was prepared in accordance to the *general procedure above* from 7.23g (0.030 moles) of hexadecylamine and 5g (0.030 moles) of 3-hydroxy cinnamic acid, along with 1.223g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography and was obtained as a white

coloured solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 83.5% yield, R_f : 0.48 (ethyl acetate: hexane, 2:8). IR (Nujol) cm^{-1} : 1644 (CO stretching, amide I band), 1569 (N-H bending, amide II band), 1248 (C-N stretching, amide III band), 3256 (N-H stretching). ^1H NMR (400 MHz, DMSO): δ 0.86 (3H, t, $J=6.4$, H-16'), 1.3–1.57 (28H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14' and H-15'), 2.72 (2H, t, $J=7.6$, H-1'), 5.11 (1H, s, Ar-OH); 6.48 (1H, d, $J=16$, H-2), 6.69 (1H, s, H-2''), 6.75 (1H, dd, $J=8.0$ & 2.0 , H-5''), 6.91 (1H, d, $J=7.6$, H-4''), 7.14 (1H, d, $J=7.6$, H-6''), 7.16 (1H, d, $J=16$, H-3) and 8.17 (1H, s, N-H). ^{13}C NMR (75.5 MHz, DMSO): δ 14.3 (C-16'), 20.4, 20.5, 21.5, 22.5, 22.8, 22.9, 26.3, 27.1, 27.5, 29.0, 29.3, 29.5, 29.8, 30.8 (C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 42.7 (C-1'), 114.5 (C-4''), 115.2 (C-2''), 118.2 (C-2), 120.1 (C-6''), 130.2 (C-5''), 137.2 (C-1''), 139.4 (C-3), 158.1 (C-3'') and 171.4 (C-1). Analyzed for molecular formula $\text{C}_{22}\text{H}_{41}\text{NO}_2$: C, 77.47; H, 10.66; N, 3.61. Found: C, 77.31; H, 10.69; N, 3.65.

N-octadecyl-3-hydroxycinnamamide (10f)

The title compound was prepared in accordance to the *general procedure above* from 8.08g (0.030 moles) of octadecylamine and 5g (0.030 moles) of 3-hydroxy cinnamic acid, along with 1.308g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography and was obtained as a white coloured solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 80.2% yield, R_f : 0.46 (ethyl acetate: hexane, 2:8). IR (Nujol) cm^{-1} : 1645 (CO stretching, amide I band), 1564 (N-H bending, amide II band), 1242 (C-N stretching, amide III band), 3265 (N-H stretching). ^1H NMR (400 MHz, DMSO): δ 0.83 (3H, t, $J=7.2$, H-18'), 1.19–1.55 (32H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-

14', H-15', H-16' and H-17'), 2.76 (2H, t, J=7.6, H-1'), 5.07 (1H, s, Ar-OH), 6.31 (1H, d, J=16, H-2), 6.70 (1H, s, H-2''), 6.76 (1H, dd, J=7.6 & 1.8, H-5''), 6.90 (1H, d, J=8.0, H-4''), 7.12 (1H, d, J=7.6, H-6''), 7.16 (1H, d, J=16, H-3) and 8.18 (1H, s, N-H). ¹³C NMR (75.5 MHz, DMSO): δ 14.3 (C-18'), 20.2, 20.3, 20.5, 22.4, 22.5, 22.7, 26.3, 26.8, 27.5, 29.0, 29.3, 29.4, 29.5, 30.1, 30.8, 31.0, (C-17', C-16', C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 42.7 (C-1'), 114.6 (C-4''), 116.3 (C-2''), 118.0 (C-2), 119.3 (C-6''), 129.6 (C-5''), 137.0 (C-1''), 140.1 (C-3), 161.7 (C-3'') and 170.1 (C-1). Analyzed for molecular formula C₂₇H₄₅NO₂: C, 78.02; H, 10.91; N, 3.37. Found: C, 78.01; H, 10.89; N, 3.42.

N-propyl-4-hydroxycinnamamide (11a)^[5]

The title compound was prepared in accordance to the *general procedure* above from 1.77g (0.030 moles) of proylamine and 5g (0.030 moles) of 4-hydroxy cinnamic acid, along with 0.670g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography and was obtained as a light brown coloured solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 77.2% yield, R_f : 0.49 (ethyl acetate: hexane, 2:8). IR (Nujol) cm⁻¹: 1654 (CO stretching, amide I band), 1523 (N-H bending, amide II band), 1254 (C-N stretching, amide III band), 3422 (N-H stretching). ¹HNMR (400 MHz, DMSO): δ 0.90 (3H, t, J=8, H-3'), 1.58–1.64 (2H, m, H-2'), 2.74 (2H, t, J=7.6, H-1'), 4.80 (1H, s, Ar-OH); 6.26 (1H, d, J=16, H-2), 6.78 (2H, d, J=7.6, H-3'' & H-5''), 7.33 (1H, d, J=16, H-3), 7.42 (2H, d, J=8.8, H-2'' & H-6'') and 8.17 (1H, s, N-H). ¹³C NMR (75.5 MHz, DMSO): δ 14.2 (C-3'), 27.5 (C-2'), 43.5 (C-1'), 115.9 (C-3'' & C-5''), 119.1 (C-2), 127.6 (C-1''), 130.0 (C-6'' & C-2''), 143.1 (C-3), 159.9 (C-4'') and 169.7 (C-1). Analyzed for molecular formula C₁₂H₁₅NO₂: C, 70.22; H, 7.37; N, 6.82. Found: C, 70.35; H, 7.27; N, 7.54.

N-hexyl-4-hydroxycinnamamide (11b)^[6]

The title compound was prepared in accordance to the *general procedure above* from 3.03g (0.030 moles) of hexylamine and 5g (0.030 moles) of 4-hydroxy cinnamic acid, along with 0.803g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography and was obtained as a light yellow coloured crystals, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 75.6% yield, R_f : 0.45 (ethyl acetate: hexane, 2:8). IR (Nujol) cm⁻¹: 1655 (CO stretching, amide I band), 1525 (N-H bending, amide II band), 1250 (C-N stretching, amide III band), 3432 (N-H stretching). ¹HNMR (400 MHz, DMSO): δ 0.84 (3H, t, J=6.4, H-6'), 1.21–1.54 (8H, m, H-2', H-3', H-4' and H-5'), 2.71 (2H, t, J=7.6, H-1'), 5.21 (1H, s, Ar-OH); 6.24 (1H, d, J=16, H-2), 6.76 (2H, d, J=7.6, H-3'' & H-5''), 7.23 (1H, d, J=16, H-3), 7.40 (2H, d, J=8.4, H-2'' & H-6'') and 8.20 (1H, s, N-H). ¹³C NMR (75.5 MHz, DMSO): δ 14.3 (C-6'), 22.3, 26.1, 27.6, 31.2 (C-2', C-3', C-4' & C-5'), 43.1 (C-1'), 115.7 (C-3'' & C-5''), 118.0 (C-2), 127.6 (C-1''), 130.1 (C-6'' & C-2''), 142.7 (C-3), 159.8 (C-4'') and 169.4 (C-1). Analyzed for molecular formula C₁₅H₂₁NO₂: C, 72.84; H, 8.56; N, 5.66. Found: C, 72.80; H, 8.69; N, 5.51.

N-heptyl-4-hydroxycinnamamide (11c)

The title compound was prepared in accordance to the *general procedure above* from 3.45g (0.030 moles) of heptylamine and 5g (0.030 moles) of 4-hydroxy cinnamic acid, along with 0.845g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography and was obtained as a light yellow coloured solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 81.3% yield, R_f : 0.49 (ethyl acetate: hexane, 2:8). IR (Nujol) cm⁻¹: 1652 (C O

stretching, amide I band), 1528 (N-H bending, amide II band), 1252 (C-N stretching, amide III band), 3430 (N-H stretching). ¹H NMR (400 MHz, DMSO): δ 0.82 (3H, t, J=6.8, H-7'), 1.22–1.84 (10H, m, H-2', H-3', H-4', H-5' and H-6'), 2.72 (2H, t, J=7.6, H-1'), 5.27 (1H, s, Ar-OH); 6.23 (1H, d, J=16, H-2), 6.74 (2H, d, J=8.0, H-3'' & H-5''), 7.25 (1H, d, J=16, H-3), 7.43 (2H, d, J=8.4, H-2'' & H-6'') and 8.25 (1H, s, N-H). ¹³C NMR (75.5 MHz, DMSO): δ 14.3 (C-7'), 22.4, 26.4, 27.4, 29.0, 31.5 (C-6', C-5', C-4', C-3' & C-2'), 41.5 (C-1'), 116.0 (C-3'' & C-5''), 121.4 (C-2), 127.6 (C-1''), 129.5 (C-6'' & C-2''), 140.3 (C-3), 159.3 (C-4'') and 170 (C-1). Analyzed for molecular formula C₁₆H₂₃NO₂: C, 73.53; H, 8.87; N, 5.36. Found: C, 73.65; H, 8.79; N, 5.32.

N-undecyl-4-hydroxycinnamamide (11d)

The title compound was prepared in accordance to the *general procedure above* from 5.10g (0.030 moles) of undecylamine and 5g (0.030 moles) of 4-hydroxy cinnamic acid, along with 1.010g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants. The synthesized amide was purified by column chromatography and was obtained as a yellow coloured solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 75.6% yield, R_f : 0.47 (ethyl acetate: hexane, 2:8). IR (Nujol) cm⁻¹: 1655 (CO stretching, amide I band), 1526 (N-H bending, amide II band), 1248 (C-N stretching, amide III band), 3432 (N-H stretching). ¹H NMR (400 MHz, DMSO): δ 0.82 (3H, t, J=6.8, H-11'), 1.16–1.49 (18H, m, H-2', H-3', H-4', H-5' H-6', H-7', H-8', H-9' and H-10'), 2.73 (2H, t, J=7.6, H-1'), 5.09 (1H, s, Ar-OH); 6.26 (1H, d, J=16, H-2), 6.72 (2H, d, J=7.6 H-3'' & H-5''), 7.41 (1H, d, J=16, H-3), 7.45 (2H, d, J=8.8, H-2'' & H-6'') and 8.24 (1H, s, N-H). ¹³C NMR (75.5 MHz, DMSO): δ 14.1 (C-11'), 22.3, 22.9, 23.7, 26.3, 26.8, 27.6, 29.0, 29.1, 29.3, 30.1 (C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 43.1 (C-1'), 115.7 (C-3'' & C-5''), 120.2 (C-2), 127.6

(C-1''), 130.1 (C-6'' & C-2''), 141.5 (C-3), 159.7 (C-4'') and 168.8 (C-1). Analyzed for molecular formula $C_{20}H_{31}NO_2$: C, 75.67; H, 9.84; N, 4.41. Found: C, 75.69; H, 9.78; N, 4.40.

N-hexadecyl-4-hydroxycinnamamide (11e)

The title compound was prepared in accordance to the *general procedure above* from 7.23g (0.030 moles) of hexadecylamine and 5g (0.030 moles) of 4-hydroxy cinnamic acid, along with 1.223g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography and was obtained as a yellow coloured solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 80.5% yield, R_f : 0.48 (ethyl acetate: hexane, 2:8). IR (Nujol) cm^{-1} : 1650 (C O stretching, amide I band), 1523 (N-H bending, amide II band), 1255 (C-N stretching, amide III band), 3425 (N-H stretching). 1H NMR (400 MHz, DMSO): δ 0.83 (3H, t, $J=7.2$, H-16'), 1.21–1.51 (28H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14' and H-15'), 2.72 (2H, t, $J=7.6$, H-1'), 5.21 (1H, s, Ar-OH); 6.26 (1H, d, $J=16$, H-2), 6.76 (2H, d, $J=7.6$ H-3'' & H-5''), 7.41 (2H, d, $J=8.4$, H-2'' & H-6''), 7.42 (1H, d, $J=16$, H-3) and 8.23 (1H, s, N-H). ^{13}C NMR (75.5 MHz, DMSO): δ 14.2 (C-16'), 19.5, 20.3, 21.5, 22.5, 22.8, 23.9, 26.5, 27.1, 28, 29.0, 29.3, 29.5, 30.1, 31.8 (C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 42.7 (C-1'), 115.7 (C-3'' & C-5''), 121.0 (C-2), 127.8 (C-1''), 130.1 (C-6'' & C-2''), 143.3 (C-3), 159.7 (C-4'') and 171 (C-1). Analyzed for molecular formula $C_{25}H_{41}NO_2$: C, 77.47; H, 10.66; N, 3.61. Found: C, 77.52; H, 10.61; N, 3.54

N-octadecyl-4-hydroxycinnamamide (11f)^[7]

The title compound was prepared in accordance to the *general procedure above* from 8.08g (0.030 moles) of octadecylamine and 5g (0.030 moles) of 4-hydroxy cinnamic acid, along

with 1.308g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants) stem. The synthesized amide was purified by column chromatography and was obtained as a yellow coloured solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 79.6% yield, R_f : 0.49 (ethyl acetate: hexane, 2:8). IR (Nujol) cm⁻¹: 1651 (CO stretching, amide I band), 1527 (N-H bending, amide II band), 1249 (C-N stretching, amide III band), 3424 (N-H stretching). ¹H NMR (400 MHz, DMSO): δ 0.84 (3H, t, J=7.2, H-18'), 1.20–1.56 (32H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14', H-15', H-16' and H-17'), 2.73 (2H, t, J=7.6, H-1'), 5.11 (1H, s, Ar-OH) 6.24 (1H, d, J=16, H-2), 6.74 (2H, d, J=8.0 H-3'' & H-5''), 7.40 (2H, d, J=8.0, H-2'' & H-6''), 7.42 (1H, d, J=16, H-3) and 8.25 (1H, s, N-H). ¹³C NMR (75.5 MHz, DMSO): δ 15 (C-18'), 17.3, 20.3, 21.1, 22.4, 22.7, 23, 26.1, 26.8, 27.5, 29.0, 29.3, 29.4, 29.5, 30.1, 30.8, 31.0, (C-17', C-16', C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 41.8 (C-1'), 115.6 (C-3'' & C-5''), 119.9 (C-2), 127.7 (C-1''), 131.2 (C-6'' & C-2''), 142.7 (C-3), 159.4 (C-4'') and 171.3 (C-1). Analyzed for molecular formula C₂₇H₄₅NO₂: C, 78.02; H, 10.91; N, 3.37. Found: C, 78.05; H, 10.90; N, 3.32

N-propyl-3,4-dihydroxycinnamamide (12a)^[5]

The title compound was prepared in accordance to the *general procedure above* from 1.64g (0.030 moles) of propylamine and 5g (0.030 moles) of 3,4-dihydroxy cinnamic acid, along with 0.664g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography and was obtained as a dark brown coloured viscous liquid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 80.4% yield, R_f : 0.46 (ethyl acetate: hexane, 2:8). IR (Nujol) cm⁻¹: 1640 (CO stretching, amide I band), 1559 (N-H bending, amide II band), 1258 (C-N stretching, amide

III band), 3423 (N-H stretching). ^1H NMR (400 MHz, DMSO): δ 0.79 (3H, t, $J=7.6$, H-3'), 1.19–1.39 (2H, m, H-2'), 3.5 (2H, t, H-1'), 5.05 (1H, s, Ar-OH); 6.42 (1H, d, $J=14.8$, H-2), 6.52–6.54 (2H, dd, $J=8.0$ & 2.0 and $J=8.0$ & 2.0 each, H-5'' & H-6''), 6.63 (1H, s, H-2''), 7.14 (1H, d, $J=14.8$, H-3) and 8.19 (1H, s, N-H). ^{13}C NMR (75.5 MHz, DMSO): δ 11.4 (C-3'), 27.4 (C-2'), 43.1 (C-1'), 113.5 (C-2''), 115.4 (C-5''), 121.0 (C-2), 123.7 (C-6''), 129.6 (C-1''), 139.6 (C-3), 144.8 (C-3''), 145.5 (C-4'') and 170.7 (C-1). Analyzed for molecular formula $\text{C}_{12}\text{H}_{15}\text{NO}_3$: C, 65.14; H, 6.83; N, 6.33. Found: C, 65.21; H, 6.74; N, 6.52.

N-hexyl-3,4-dihydroxycinnamamide (12b)^[8]

The title compound was prepared in accordance to the *general procedure above* from 2.75g (0.030 moles) of hexylamine and 5g (0.030 moles) of 3,4-dihydroxy cinnamic acid, along with 0.775g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography and was obtained as a dark brown coloured viscous liquid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 82.4% yield, R_f : 0.49 (ethyl acetate: hexane, 2:8). IR (Nujol) cm^{-1} : 1642 (CO stretching, amide I band), 1561 (N-H bending, amide II band), 1256 (C-N stretching, amide III band), 3425 (N-H stretching). ^1H NMR (400 MHz, DMSO): δ 0.83 (3H, t, $J=6.8$, H-6'), 1.20–1.38 (8H, m, H-2', H-3', H-4' and H-5'), 3.2 (2H, t, H-1'), 5.05 (1H, s, Ar-OH); 6.24 (1H, d, $J=16$, H-2), 6.55–6.57 (2H, dd, $J=7.2$ & 2.0 and $J=7.2$ & 2.0 each, H-5'' & H-6''), 6.71 (1H, s, H-2''), 7.23 (1H, d, $J=16$, H-3) and 8.23 (1H, s, N-H). ^{13}C NMR (75.5 MHz, DMSO): δ 14.1 (C-6'), 22.4, 26.3, 29.2, 31.6 (C-2', C-3', C-4' & C-5'), 41.5 (C-1'), 113.5 (C-2''), 115.4 (C-5''), 120.2 (C-2), 122.6 (C-6''), 129.6 (C-1''), 140.5 (C-3), 144.8 (C-3''), 145.5 (C-4'') and 169.2 (C-1). Analyzed for molecular formula $\text{C}_{15}\text{H}_{21}\text{NO}_3$: C, 68.42; H, 8.04; N, 5.32. Found: C, 68.40; H, 7.98; N, 5.50.

N-heptyl-3,4-dihydroxycinnamamide (12c)^[9]

The title compound was prepared in accordance to the *general procedure above* from 3.10g (0.030 moles) of heptylamine and 5g (0.030 moles) of 3,4-dihydroxy cinnamic acid, along with 0.810g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography and was obtained as a dark brown coloured viscous liquid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 81.7% yield, R_f : 0.48 (ethyl acetate: hexane, 2:8). IR (Nujol) cm⁻¹: 1645 (CO stretching, amide I band), 1557 (N-H bending, amide II band), 1255 (C-N stretching, amide III band), 3428 (N-H stretching). ¹H NMR (400 MHz, DMSO): δ 0.86 (3H, t, J=6.4, H-7'), 1.17–1.36 (10H, m, H-2', H-3', H-4', H-5' and H 6'), 3.1 (2H, t, H-1'), 5.07 (1H, s, Ar-OH); 6.26 (1H, d, J=16, H-2), 6.51-6.53 (2H, dd, J=8.0 & 2.0 and J=8.0 & 2.0 each, H-5'' & H-6''), 6.62 (1H, s, H-2''), 7.25 (1H, d, J=16, H-3) and 8.22 (1H, s, N-H). ¹³C NMR (75.5 MHz, DMSO): δ 14.2 (C-7'), 23.4, 26.3, 27.4, 29.2, 30.6 (C-6',C-5',C-4',C-3'& C-2'), 42.1 (C-1'), 114.2 (C-2''), 115.6 (C-5''), 120.2 (C-2), 123.5 (C-6''), 127.1 (C-1''), 141.0 (C-3), 144.5 (C-3''), 145.7 (C-4'') and 171.2 (C-1). Analyzed for molecular formula C₁₆H₂₃NO₃: C, 69.29; H, 8.36; N, 5.05. Found: C, 69.25; H, 8.31; N, 5.04.

N-undecyl-3,4-dihydroxycinnamamide (12d)^[10]

The title compound was prepared in accordance to the *general procedure above* from 4.67g (0.030 moles) of undecylamine and 5g (0.030 moles) of 3,4-dihydroxy cinnamic acid, along with 0.967g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography and was obtained as a dark brown coloured viscous liquid, after purification by column chromatography by eluting

with 2% ethyl acetate in hexane in 78.5% yield, R_f : 0.46 (ethyl acetate: hexane, 2:8). IR (Nujol) cm⁻¹: 1644 (C O stretching, amide I band), 1565 (N-H bending, amide II band), 1250 (C-N stretching, amide III band), 3430 (N-H stretching). ¹HNMR (400 MHz, DMSO): δ 0.83 (3H, t, J=6.8, H-11'), 1.16–1.35 (18H, m, H-2', H-3', H-4', H-5' H-6', H-7', H-8', H-9' and H-10'), 3.3 (2H, t, H-1'), 5.03 (1H, s, Ar-OH); 6.31 (1H, d, J=15.6, H-2), 6.50-6.52 (2H, dd, J=8.0 & 2.0 and J= 8.0 & 2.0 each, H-5'' & H-6''), 6.67 (1H, s, H-2''), 7.29 (1H, d, J=15.6, H-3) and 8.20 (1H, s, N-H). ¹³C NMR (75.5 MHz, DMSO): δ14.1 (C-11'), 22.3, 22.9, 23.7, 26.3, 26.8, 27.6, 29.0, 29.1, 29.3, 30.1 (C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 43.1 (C-1'), 115.0 (C-2''), 116.1 (C-5''), 120.6 (C-2), 122.8 (C-6''), 129.5 (C-1''), 141.3 (C-3), 144.1 (C-3''), 146 (C-4'') and 170.3 (C-1). Analyzed for molecular formula C₂₀H₃₁NO₃: C, 72.04; H, 9.37; N, 4.20. Found: C, 72.05; H, 9.32; N, 4.26.

N-hexadecyl-3,4-dihydroxycinnamamide (12e)

The title compound was prepared in accordance to the *general procedure above* from 6.51g (0.030 moles) of hexadecylamine and 5g (0.030 moles) of 3,4-dihydroxy cinnamic acid, along with 1.150g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography and was obtained as a dark brown coloured solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 77.3% yield, R_f : 0.47 (ethyl acetate: hexane, 2:8). IR (Nujol) cm⁻¹: 1645 (CO stretching, amide I band), 1561 (N-H bending, amide II band), 1252 (C-N stretching, amide III band), 3432 (N-H stretching). ¹HNMR (400 MHz, DMSO): δ 0.85 (3H, t, J=7.2, H-16'), 1.21–1.61 (28H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14'and H-15'), 3.0(2H, t, H-1'), 5.09 (1H, s, Ar-OH); 6.29(1H, d, J=16, H-2), 6.52-6.54 (2H, dd, J=8.0 & 2.0 and J= 8.0 & 2.0 each, H-5'' & H-6''), 6.64 (1H, s, H-2''), 7.31 (1H, d,

J=16, H-3) and 8.22 (1H, s, N-H). ^{13}C NMR (75.5 MHz, DMSO): δ 14.3 (C-16'), 18.7, 19.3, 21.5, 22.5, 22.8, 24.1, 25.5, 26.1, 28.0, 29.1, 29.3, 29.5, 30.5, 31.8 (C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 42.7 (C-1'), 114.9 (C-2''), 115.8 (C-5''), 120.2 (C-2), 123.5 (C-6''), 129.9 (C-1''), 139.8 (C-3), 144.5 (C-3''), 145.1 (C-4'') and 172.6.3 (C-1). Analyzed for molecular formula $\text{C}_{25}\text{H}_{41}\text{NO}_3$: C, 74.40; H, 10.24; N, 3.47. Found: C, 74.51; H, 10.22; N, 3.36.

N-octadecyl-3,4-dihydroxycinnamamide (12f)^[11]

The title compound was prepared in accordance to the *general procedure above* from 7.27g (0.030 moles) of octadecylamine and 5g (0.030 moles) of 3,4-dihydroxy cinnamic acid, along with 1.22g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography and was obtained as a dark brown colored solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 81.2% yield, R_f : 0.45 (ethyl acetate: hexane, 2:8). IR (Nujol) cm^{-1} : 1646 (C O stretching, amide I band), 1566 (N-H bending, amide II band), 1245 (C-N stretching, amide III band), 3425 (N-H stretching). ^1H NMR (400 MHz, DMSO): δ 0.83 (3H, t, J=6.4, H-18'), 1.20–1.57 (32H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14', H-15', H-16' and H-17'), 3.1 (2H, t, H-1'), 5.06 (1H, s, Ar-OH) 6.33 (1H, d, J=16, H-2), 6.52-6.54 (2H, dd, J=8.0 & 2.0 and J= 8.0 & 2.0 each, H-5'' & H-6''), 6.68 (1H, s, H-2''), 7.39 (1H, d, J=16, H-3) and 8.19 (1H, s, N-H). ^{13}C NMR (75.5 MHz, DMSO): δ 14.7 (C-18'), 15.8, 17.3, 20.6, 22.4, 22.7, 24, 25.3, 26.1, 27.1, 28.0, 29.1, 29.3, 29.7, 30.1, 31.1, 32.3, (C-17', C-16', C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 41.8 (C-1'), 113.9 (C-2''), 114.8 (C-5''), 121.1 (C-2), 122.4 (C-6'') 130.9 (C-1''), 140.6 (C-3),

144.6 (C-3''), 145.5 (C-4'') and 169.9 (C-1). Analyzed for molecular formula $C_{27}H_{45}NO_3$: C, 75.13; H, 10.51; N, 3.24. Found: C, 75.16; H, 10.52; N, 3.21.

N-propyl-4-hydroxy-3-methoxycinnamamide (13a)^[12]

The title compound was prepared in accordance to the *general procedure above* from 1.47g (0.025 moles) of propylamine and 5g (0.025 moles) of 4-hydroxy-3-methoxy cinnamic acid, along with 0.647g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography and was obtained as a dark red colored solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 83.6% yield, R_f : 0.49 (ethyl acetate: hexane, 2:8). IR (Nujol) cm^{-1} : 1645 (CO stretching, amide I band), 1571 (N-H bending, amide II band), 1254 (C-N stretching, amide III band), 3426 (N-H stretching). ¹H NMR (400 MHz, DMSO): δ 0.82 (3H, t, J=7.2, H-3'), 1.20–1.50 (2H, m, H-2'), 2.70 (2H, t, J=7.4, H-1'), 3.7 (3H, s, Ar-OCH₃) 5.04 (1H, s, Ar-OH); 6.29 (1H, d, J=16, H-2), 6.74 (1H, d, J=8.0, H-6''), 7.01 (1H, d, J=7.6, H-5'') 7.15 (1H, s, H-2''), 7.24 (1H, d, J=16, H-3) and 7.97 (1H, s, N-H). ¹³C NMR (75.5 MHz, DMSO): δ 14.2 (C-3'), 27.2 (C-2'), 42.6 (C-1'), 56.0 (Ar-OCH₃), 111.1 (C-2''), 115.9 (C-5''), 119.4 (C-2), 122.9 (C-6''), 127.0 (C-1''), 139.5 (C-3), 144.7 (C-4''), 148.8 (C-3'') and 170.0 (C-1). Analyzed for molecular formula $C_{13}H_{17}NO_3$: C, 66.36; H, 7.28; N, 5.95. Found: C, 66.42; H, 7.26; N, 5.89.

N-hexyl-4-hydroxy-3-methoxycinnamamide (13b)^[13]

The title compound was prepared in accordance to the *general procedure above* from 2.52g (0.025 moles) of hexylamine and 5g (0.025 moles) of 4-hydroxy-3-methoxy cinnamic acid, along with 0.752g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants) The synthesized amide was purified by column chromatography and was obtained as a

dark red colored solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 80.7% yield, R_f : 0.48 (ethyl acetate: hexane, 2:8). IR (Nujol) cm^{-1} : 1645 (CO stretching, amide I band), 1562 (N-H bending, amide II band), 1251 (C-N stretching, amide III band), 3415 (N-H stretching). ^1H NMR (400 MHz, DMSO): δ 0.83 (3H, t, $J=6.4$, H-6'), 1.20–1.52 (8H, m, H-2', H-3', H-4' and H-5'), 2.76 (2H, t, $J=7.6$, H-1'), 3.8 (3H, s, Ar-OCH₃), 5.01 (1H, s, N-H), 6.25 (1H, d, $J=16$, H-2), 6.76 (1H, d, $J=8.0$, H-6''), 7.04 (1H, d, $J=7.6$, H-5''), 7.16 (1H, s, H-2''), 7.23 (1H, d, $J=16$, H-3) and 7.98 (1H, s, N-H). ^{13}C NMR (75.5 MHz, DMSO): δ 14.1 (C-6'), 22.4, 26.3, 29.2, 31.6 (C-2', C-3', C-4' & C-5'), 41.5 (C-1'), 56.7 (Ar-OCH₃), 112.1 (C-2''), 116.0 (C-5''), 120.0 (C-2), 123.1 (C-6''), 127.6 (C-1''), 140.6 (C-3), 144.4 (C-4''), 149.7 (C-3'') and 171.2 (C-1). Analyzed for molecular formula C₁₆H₂₃NO₃: C, 69.29; H, 8.36; N, 5.05. Found: C, 69.32; H, 8.25; N, 5.03.

N-heptyl-4-hydroxy-3-methoxycinnamamide (13c)^[4]

The title compound was prepared in accordance to the *general procedure above* from 2.96g (0.025 moles) of heptylamine and 5g (0.025 moles) of 4-hydroxy-3-methoxy cinnamic acid, along with 0.796g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography was obtained as a dark brown coloured viscous liquid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 80.5% yield, R_f : 0.46 (ethyl acetate: hexane, 2:8). IR (Nujol) cm^{-1} : 1647 (C O stretching, amide I band), 1552 (N-H bending, amide II band), 1250 (C-N stretching, amide III band), 3425 (N-H stretching). ^1H NMR (400 MHz, DMSO): δ 0.84 (3H, t, $J=6.4$, H-7'), 1.21–1.57 (10H, m, H-2', H-3', H-4', H-5' and H 6'), 2.72 (2H, t, $J=7.6$, H-1'), 3.8 (3H, s, Ar-OCH₃), 5.03 (1H, s, Ar-OH); 6.26 (1H, d, $J=16$, H-2), 6.74 (1H, d, $J=8.0$, H-6''), 7.02

(1H, d, J=7.6, H-5''), 7.12 (1H, s, H-2''), 7.25 (1H, d, J=16, H-3) and 8.01 (1H, s, N-H). ¹³C NMR (75.5 MHz, DMSO): δ 14.3 (C-7'), 24.3, 25.2, 26.3, 28.1, 29.5 (C-6', C-5', C-4', C-3' & C-2'), 42.7 (C-1'), 55.9 (Ar-OCH₃), 111.2 (C-2''), 115.1 (C-5''), 119.3 (C-2), 122.6 (C-6''), 128.2 (C-1''), 141.4 (C-3), 144.5 (C-4''), 150.3 (C-3'') and 169.2 (C-1). Analyzed for molecular formula C₁₇H₂₅NO₃: C, 70.07; H, 8.65; N, 4.81. Found: C, 70.06; H, 8.63; N, 4.92.

N-undecyl-4-hydroxy-3-methoxycinnamamide (13d)

The title compound was prepared in accordance to the *general procedure above* from 4.28g (0.025 moles) of undecylamine and 5g (0.025 moles) of 4-hydroxy-3-methoxy cinnamic acid, along with 0.928g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography was obtained as a dark brown coloured solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 81.4% yield, R_f : 0.49 (ethyl acetate: hexane, 2:8). IR (Nujol) cm⁻¹: 1645 (CO stretching, amide I band), 1556 (N-H bending, amide II band), 1254 (C-N stretching, amide III band), 3419 (N-H stretching). ¹H NMR (400 MHz, DMSO): δ 0.83 (3H, t, J=6.8, H-11'), 1.20–1.50 (18H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9' and H-10'), 2.76 (2H, t, J=7.6, H-1'), 3.7 (3H, s, Ar-OCH₃), 5.04 (1H, s, Ar-OH); 6.24 (1H, d, J=16, H-2), 6.76 (1H, d, J=8.0, H-6''), 7.02 (1H, d, J=7.6, H-5'') 7.12 (1H, s, H-2''), 7.24 (1H, d, J=16, H-3) and 7.97 (1H, s, N-H). ¹³C NMR (75.5 MHz, DMSO): δ 14.3 (C-11'), 23.1, 24.9, 25.5, 26.3, 27.8, 28.1, 29.0, 29.2, 29.6, 31.1 (C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 41.4 (C-1'), 57.1 (Ar-OCH₃), 112.1 (C-2''), 115.4 (C-5''), 119.8 (C-2), 123.4 (C-6''), 127.2 (C-1''), 140.3 (C-3), 145.2 (C-4'') 151.1 (C-3'') and 172.3 (C-1). Analyzed for molecular formula C₂₁H₃₃NO₃: C, 72.58; H, 9.57; N, 4.03. Found: C, 72.56; H, 9.62; N, 4.02.

N-hexadecyl-4-hydroxy-3-methoxycinnamamide (13e)

The title compound was prepared in accordance to the *general procedure above* from 6.03g (0.025 moles) of hexadecylamine and 5g (0.025 moles) of 4-hydroxy-3-methoxy cinnamic acid, along with 1.103g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography was obtained as a dark brown coloured solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 82.5% yield, R_f : 0.48 (ethyl acetate: hexane, 2:8). IR (Nujol) cm⁻¹: 1648 (C O stretching, amide I band), 1559 (N-H bending, amide II band), 1248 (C-N stretching, amide III band), 3424 (N-H stretching). ¹HNMR (400 MHz, DMSO): δ 0.86 (3H, t, J=7.2, H-16'), 1.21–1.58 (28H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14' and H-15'), 2.69 (2H, t, J=7.6, H-1'), 3.8 (3H, s, Ar-OCH₃), 5.02 (1H, s, Ar-OH); 6.27(1H, d, J=15.6, H-2), 6.76(1H, d, J=8.0, H-6''), 7.01 (1H, d, J=7.6, H-5''), 7.13 (1H, s, H-2''), 7.26 (1H, d, J=15.6, H-3) and 8.03 (1H, s, N-H). ¹³C NMR (75.5 MHz, DMSO): δ 14.3 (C-16'), 18.8, 19.5, 21.3, 22.7, 23.3, 24.1, 25.8, 26.1, 28.1, 28.4, 29.0, 29.5, 30.5, 31.8 (C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 41.6 (C-1'), 56.5 (Ar-OCH₃), 111.9 (C-2''), 114.7 (C-5''), 120.8 (C-2), 122.6 (C-6''), 126.2 (C-1''), 139.7 (C-3), 144.3 (C-4''), 150.1 (C-3'') and 170.3 (C-1). Analyzed for molecular formula C₂₆H₄₃NO₃: C, 74.77; H, 10.38; N, 3.35. Found: C, 74.67; H, 10.37; N, 3.39.

N-octadecyl-4-hydroxy-3-methoxycinnamamide (13f)

The title compound was prepared in accordance to the *general procedure above* from 6.73g (0.025 moles) of octadecylamine and 5g (0.025 moles) of 4-hydroxy-3-methoxy cinnamic acid, along with 1.170g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography was obtained as a

dark brown coloured solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 81.3% yield, R_f : 0.47 (ethyl acetate: hexane, 2:8). IR (Nujol) cm^{-1} : 1645 (CO stretching, amide I band), 1557 (N-H bending, amide II band), 1250 (C-N stretching, amide III band), 3124 (N-H stretching). ^1H NMR (400 MHz, DMSO): δ 0.83 (3H, t, $J=6.4$, H-18'), 1.20–1.50 (32H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14', H-15', H-16' and H-17'), 2.78 (2H, t, $J=7.6$, H-1'), 3.7 (3H, s, Ar-OCH₃), 5.02 (1H, s, Ar-OH), 6.31 (1H, d, $J=16$, H-2), 6.72 (1H, d, $J=8.0$, H-6''), 7.04 (1H, d, $J=7.6$, H-5'') 7.16 (1H, s, H-2''), 7.33 (1H, d, $J=16$, H-3) and 8.22 (1H, s, N-H). ^{13}C NMR (75.5 MHz, DMSO): δ 14.3 (C-18'), 16.8, 18.3, 21.6, 21.4, 22.7, 23, 24.3, 25.1, 27.5, 28.0, 29.2, 29.5, 29.7, 30.5, 31.3, 32.8, (C-17', C-16', C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 42.4 (C-1'), 56.1 (Ar-OCH₃), 112.0 (C-2''), 113.6 (C-5''), 120.7 (C-2), 122.8 (C-6'') 126.4 (C-1''), 140.3 (C-3) 144.2 (C-4''), 151.3 (C-3'') and 171.2 (C-1). Analyzed for molecular formula C₂₈H₄₇NO₃: C, 75.46; H, 10.63; N, 3.14. Found: C, 74.54; H, 10.61; N, 3.19

N-propyl-2-hydroxycinnamamide (14a)^[14]

The title compound was prepared in accordance to the *general procedure above* from 1.77g (0.03 moles) of propylamine and 5g (0.03 moles) of 2-hydroxy- cinnamic acid, along with 0.670g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography was obtained as a dark brown coloured solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 78.7% yield, R_f : 0.49 (ethyl acetate: hexane, 2:8). IR (Nujol) cm^{-1} : 1646 (C O stretching, amide I band), 1567 (N-H bending, amide II band), 1223 (C-N stretching, amide III band), 3249 (N-H stretching). ^1H NMR (400 MHz, DMSO): δ 0.91 (3H, t, $J=7.2$, H-3'), 1.36–1.64 (2H, m, H-2'), 2.92 (2H, t, $J=7.8$, H-1'), 5.12 (1H, s, Ar-OH), 6.50 (1H, d, $J=16$, H-2), 6.74

(1H, d, J=7.6, H-3''), 6.88 (1H, dd, J=8.0 & 1.2, H-5''), 7.10-7.14 (2H, dd, J=8.4 & 1.6, H-4''), 7.46 (1H, d, J=7.6, H-6''), 7.74 (1H, d, J=16, H-3) and 8.21 (1H, s, N-H). ¹³C NMR (75.5 MHz, DMSO): δ 11.9 (C-3'), 26.3 (C-2'), 42.7 (C-1'), 116.6 (C-3''), 119.3 (C-2), 121.2 (C-5''), 122.4 (C-1''), 128.3 (C-6''), 129.1 (C-4'') 140.2 (C-3), 156.9 (C-2'') and 170.5 (C-1). Analyzed for molecular formula C₁₂H₁₅NO₂: C, 70.22; H, 7.37; N, 6.82. Found: C, 70.19; H, 7.33; N, 6.89.

N-hexyl-2-hydroxycinnamamide (14b)

The title compound was prepared in accordance to the *general procedure above* from 3.05g (0.03 moles) of hexylamine and 5g (0.03 moles) of 2-hydroxy- cinnamic acid, along with 0.805g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography was obtained as a dark brown coloured solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 79.6% yield, R_f : 0.48 (ethyl acetate: hexane, 2:8). IR (Nujol) cm⁻¹: 1647 (C O stretching, amide I band), 1569 (N-H bending, amide II band), 1226 (C-N stretching, amide III band), 3244 (N-H stretching). ¹HNMR (400 MHz, DMSO):δ 0.84 (3H, t, J=6.4, H-6'), 1.20–1.53 (8H, m, H-2', H-3', H-4' and H-5'), 2.80 (2H, t, J=7.6, H-1'), 5.16 (1H, s, Ar-OH), 6.44 (1H, d, J=16, H-2), 6.74 (1H, d, J=7.6, H-3''), 6.89 (1H, dd, J=8.0 & 1.2, H-5''), 7.05-7.09 (2H, dd, J=8.0 & 1.6, H-4''), 7.42 (1H, d, J=7.6, H-6''), 7.61 (1H, d, J=16, H-3) and 8.22 (1H, s, N-H). ¹³C NMR (75.5 MHz, DMSO): δ 14.3 (C-6'), 21.5, 25.4, 28.1, 31.5 (C-2', C-3', C-4' & C-5'), 42.4 (C-1'), 116.5 (C-3''), 116.9 (C-1''), 120.2 (C-2), 121.8 (C-5''), 123.1 (C-1''), 127.4 (C-6''), 129.0 (C-4'') 141.1 (C-3), 155.3 (C-2'') and 169.4 (-C=O). Analyzed for molecular formula C₁₅H₂₁NO₂: C, 72.84; H, 8.56; N, 5.66. Found: C, 72.80; H, 8.49; N, 5.65.

N-heptyl-2-hydroxycinnamamide (14c)

The title compound was prepared in accordance to the *general procedure above* from 3.45g (0.03 moles) of heptylamine and 5g (0.03 moles) of 2-hydroxy- cinnamic acid, along with 0.845g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography was obtained as a dark brown coloured solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 80.3% yield, R_f : 0.49 (ethyl acetate: hexane, 2:8). IR (Nujol) cm⁻¹: 1645 (CO stretching, amide I band), 1567 (N-H bending, amide II band), 1225 (C-N stretching, amide III band), 3247 (N-H stretching). ¹H NMR (400 MHz, DMSO): δ 0.83 (3H, t, J=6.4, H-7'), 1.22–1.58 (10H, m, H-2', H-3', H-4', H-5' and H 6'), 2.73 (2H, t, J=7.6, H-1'), 5.14(1H, s, Ar-OH), 6.47 (1H, d, J=16, H-2), 6.75 (1H, d, J=7.6, H-3''), 6.91(1H, dd, J=7.6 & 1.2, H-5''), 7.05-7.10 (2H, dd, J=7.6 & 1.2, H-4''), 7.42 (1H, d, J=7.6, H-6''), 7.64 (1H, d, J=16, H-3) and 8.24 (1H, s, N-H). ¹³C NMR (75.5 MHz, DMSO): δ 15.0 (C-7'), 23.1, 23.5, 26.3, 28.8, 29.4 (C-6', C-5', C-4', C-3' & C-2'), 41.3 (C-1'), 116.5 (C-3''), 116.9 (C-1''), 119.7 (C-2), 121.8 (C-5''), 127.4 (C-6''), 129.1 (C-4'') 140.1 (C-3), 155.3 (C-2'') and 169.4 (C-1). Analyzed for molecular formula C₁₆H₂₃NO₂: C, 73.53; H, 8.87; N, 5.36. Found: C, 73.54; H, 8.85; N, 5.41.

N-undecyl-2-hydroxycinnamamide (14d)

The title compound was prepared in accordance to the *general procedure above* from 5.13g (0.025 moles) of undecylamine and 5g (0.025 moles) of 2-hydroxy- cinnamic acid, along with 1.013g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography was obtained as a red coloured solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 81.0% yield, R_f : 0.45 (ethyl acetate: hexane, 2:8). IR (Nujol) cm⁻¹: 1642 (CO stretching, amide I band), 1569 (N-H bending, amide II band), 1224 (C-N stretching, amide III band), 3245 (N-H

stretching). ¹H NMR (400 MHz, DMSO): δ 0.83 (3H, t, J=6.8, H-11'), 1.20–1.51 (18H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9' and H-10'), 2.72 (2H, t, J=7.6, H-1'), 5.13 (1H, s, Ar-OH), 6.42 (1H, d, J=16, H-2), 6.74 (1H, d, J=7.6, H-3''), 6.89 (1H, dd, J=8.0 & 1.2, H-5''), 7.04–7.11 (2H, dd, J=7.6 & 1.6, H-4''), 7.42 (1H, d, J=7.6, H-6''), 7.60 (1H, d, J=16, H-3) and 8.22 (1H, s, N-H). ¹³C NMR (75.5 MHz, DMSO): δ 15.1 (C-11'), 24.0, 25.4, 26.2, 27.4, 28.3, 29.2, 30.0, 31.2, 31.6, 32.1 (C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 41.4 (C-1'), 115.4 (C-3''), 116.3 (C-1''), 119.6 (C-2), 121.4 (C-5''), 126.3 (C-6''), 128.9 (C-4''), 141.0 (C-3), 155.4 (C-2'') and 170.4 (C-1). Analyzed for molecular formula C₂₀H₃₁NO₂: C, 75.67; H, 9.84; N, 4.41. Found: C, 75.56; H, 9.89; N, 4.42.

N-hexadecyl-2-hydroxycinnamamide (14e)

The title compound was prepared in accordance to the *general procedure above* from 7.24g (0.03 moles) of propylamine and 5g (0.03 moles) of 2-hydroxy- cinnamic acid, along with 1.224g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography was obtained as a light yellow coloured solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 77.6% yield, R_f : 0.47 (ethyl acetate: hexane, 2:8). IR (Nujol) cm⁻¹: 1645 (CO stretching, amide I band), 1571 (N-H bending, amide II band), 1223 (C-N stretching, amide III band), 3247 (N-H stretching). ¹H NMR (400 MHz, DMSO): δ 0.83 (3H, t, J=6.8, H-16'), 1.20–1.52 (28H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14' and H-15'), 2.74 (2H, t, J=7.6, H-1'), 5.14 (1H, s, Ar-OH), 6.41 (1H, d, J=16, H-2), 6.78 (1H, d, J=7.6, H-3''), 6.90 (1H, dd, J=8.0 & 1.2, H-5''), 7.05–7.10 (2H, dd, J=7.6 & 1.6, H-4''), 7.44 (1H, d, J=7.6, H-6''), 7.62 (1H, d, J=16, H-3) and 8.23 (1H, s, N-H). ¹³C NMR (75.5 MHz, DMSO): δ 14.1 (C-16'), 18.1, 19.7, 20.3, 21.2, 22.1, 24.3, 25.8, 27.3, 28.0, 28.3, 29.0, 29.5, 31.1,

32.3 (C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 43.1 (C-1'), 116.1 (C-3''), 117.0 (C-1''), 120.1 (C-2), 121.3 (C-5''), 125.1 (C-6''), 128.7 (C-4'') 141.2 (C-3), 153.1 (C-2'') and 172.6 (C-1). Analyzed for molecular formula C₂₅H₄₁NO₂: C, 77.47; H, 10.66; N, 3.61. Found: C, 77.49; H, 10.64; N, 3.65.

N-octadecyl-2-hydroxycinnamamide (14f)

The title compound was prepared in accordance to the *general procedure above* from 8.08g (0.03 moles) of propylamine and 5g (0.03 moles) of 2-hydroxy- cinnamic acid, along with 1.305g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography was obtained as a light yellow coloured solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 80.2% yield, R_f : 0.46 (ethyl acetate: hexane, 2:8). IR (Nujol) cm⁻¹: 1644 (C O stretching, amide I band), 1565 (N-H bending, amide II band), 1244 (C-N stretching, amide III band), 3244 (N-H stretching). ¹HNMR (400 MHz, DMSO): δ 0.84 (3H, t, J=7.2, H-18'), 1.20–1.52 (32H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14', H-15', H-16' and H-17'), 2.72 (2H, t, J=7.6, H-1'), 5.13 (1H, s, Ar-OH), 6.44 (1H, d, J=15.6, H-2), 6.76 (1H, d, J=7.6, H-3''), 6.89(1H, dd, J=8.0 & 1.2, H-5'') 7.05-7.10 (2H, dd, J=7.6 & 1.6, H-4''), 7.42 (1H, d, J=7.6, H-6''), 7.67 (1H, d, J=15.6, H-3) and 8.2 (1H, s, N-H). ¹³C NMR (75.5 MHz, DMSO): δ 14.2 (C-18'), 17.8, 19.1, 20.5, 21.6, 22.1, 23.3, 24.5, 26.0, 27.6, 28.1, 29.0, 29.5, 30.0, 30.5, 31.9, 32.3, (C-17', C-16', C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 41.6 (C-1'), 119.8 (C-2), 115.4 (C-3''), 116.0 (C-1''), 119.2 (C-5''), 123.9 (C-6''), 126.5 (C-4'') 140.1 (C-3), 152.0 (C-2'') and 169.3 (C-1). Analyzed for molecular formula C₂₇H₄₅NO₂: C, 78.02; H, 10.91; N, 3.37. Found: C, 78.07; H, 10.90; N, 3.39.

N-propyl-cinnamamide (15a)^[15]

The title compound was prepared in accordance to the *general procedure above* from 1.98g (0.03 moles) of propylamine and 5g (0.03 moles) of cinnamic acid, along with 0.698g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography was obtained as a dark brown colored viscous liquid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 81.1% yield, R_f : 0.49 (ethyl acetate: hexane, 2:8). IR (Nujol) cm^{-1} : 1642 (CO stretching, amide I band), 1563 (N-H bending, amide II band), 1256 (C-N stretching, amide III band), 3448 (N-H stretching). ^1H NMR (400 MHz, DMSO): δ 0.88 (3H, t, $J=7.2$, H-3'), 1.37–1.65 (2H, m, H-2'), 2.75 (2H, t, $J=7.6$, H-1'), 6.53 (1H, d, $J=16$, H-2), 7.42 (1H, d, $J=16$, H-3), 7.3-7.5 (5H, m, Ar-H), 8.04 (1H, s, N-H). ^{13}C NMR (75.5 MHz, DMSO): δ 13.9 (C-3'), 26.5 (C-2'), 41.9 (C-1'), 119.2 (C-2), 126.3 (C-4'') 127.5 (C-2'' & C-6''), 128.6 (C-3'' & C-5''), 135.3 (C-1'') 140.1(C-3) and 171.4 (C-1). Analyzed for molecular formula $\text{C}_{12}\text{H}_{15}\text{NO}$: C, 76.16; H, 7.99; N, 7.40. Found: C, 76.23; H, 7.96; N, 7.45.

N-hexyl-cinnamamide (15b)^[16]

The title compound was prepared in accordance to the *general procedure above* from 3.03g (0.03 moles) of propylamine and 5g (0.03 moles) of cinnamic acid, along with 0.803g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography was obtained as a dark brown coloured viscous liquid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 78.7% yield, R_f : 0.48 (ethyl acetate: hexane, 2:8). IR (Nujol) cm^{-1} : 1643 (CO stretching, amide I band), 1561 (N-H bending, amide II band), 1250 (C-N stretching, amide III band), 3449

(N-H stretching). ^1H NMR (400 MHz, DMSO): δ 0.83 (3H, t, $J=7.2$, H-6'), 1.25–1.75 (8H, m, H-2', H-3', H-4' and H-5'), 2.76 (2H, t, $J=7.6$, H-1'), 6.60 (1H, d, $J=16$, H-2), 7.53 (1H, d, $J=16$, H-3), 7.3–7.6 (5H, m, Ar-H), 8.17 (1H, s, N-H). ^{13}C NMR (75.5 MHz, DMSO): δ 14.2 (C-6'), 21.9, 26.0, 27.2, 30.7 (C-2', C-3', C-4' & C-5'), 42.4 (C-1'), 119.7 (C-2), 126.5 (C-4''), 128.1 (C-2'' & C-6''), 129.6 (C-3'' & C-5''), 134.9 (C-1'') 139.6 (C-3) and 170.5 (C-1). Analyzed for molecular formula $\text{C}_{15}\text{H}_{21}\text{NO}$: C, 77.88; H, 9.15; N, 6.05. Found: C, 77.89; H, 9.12; N, 6.09.

N-heptyl-cinnamamide (15c)^[17]

The title compound was prepared in accordance to the *general procedure above* from 3.45g (0.03 moles) of hexylamine and 5g (0.03 moles) of cinnamic acid, along with 0.845g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography was obtained as a red coloured solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 80.4% yield, R_f : 0.46 (ethyl acetate: hexane, 2:8). IR (Nujol) cm^{-1} : 1642 (CO stretching, amide I band), 1563 (N-H bending, amide II band), 1255 (C-N stretching, amide III band), 3447 (N-H stretching). ^1H NMR (400 MHz, DMSO): δ 0.83 (3H, t, $J=6.8$, H-7'), 1.21–1.65 (10H, m, H-2', H-3', H-4', H-5' and H 6'), 2.74 (2H, t, $J=7.6$, H-1'), 6.28 (1H, d, $J=16$, H-2), 7.47 (1H, d, $J=16$, H-3), 6.4–7.5 (5H, m, Ar-H), 8.14 (1H, s, N-H). ^{13}C NMR (75.5 MHz, DMSO): δ 14.2 (C-7'), 22.0, 22.5, 26.1, 27.4, 28.3 (C-6', C-5', C-4', C-3' & C-2'), 41.6 (C-1'), 120.1 (C-2), 126.3 (C-4''), 127.5 (C-2'' & C-6''), 128.9 (C-3'' & C-5''), 135.7 (C-1''), 140.1 (C-3) and 170.7 (C-1). Analyzed for molecular formula $\text{C}_{16}\text{H}_{23}\text{NO}$: C, 78.32; H, 9.45; N, 5.71. Found: C, 78.31; H, 9.52; N, 5.73.

N-undecyl-cinnamamide (15d)

The title compound was prepared in accordance to the *general procedure above* from 5.13g (0.03 moles) of undecylamine and 5g (0.03 moles) of cinnamic acid, along with 1.13g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography was obtained as a dark red coloured viscous liquid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 81.5% yield, R_f : 0.45 (ethyl acetate: hexane, 2:8). IR (Nujol) cm⁻¹: 1642 (CO stretching, amide I band), 1561 (N-H bending, amide II band), 1256 (C-N stretching, amide III band), 3448 (N-H stretching). ¹H NMR (400 MHz, DMSO): δ 0.84 (3H, t, J=6.4, H-11'), 1.21–1.56 (18H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9' and H-10'), 2.74 (2H, t, J=7.6, H-1'), 6.46 (1H, d, J=16, H-2), 7.2-7.5 (5H, m, Ar-H) and 7.61 (1H, d, J=16, H-3), 7.97 (1H, s, N-H). ¹³C NMR (75.5 MHz, DMSO): δ 14.2 (C-11'), 22.4, 23.6, 26.5, 27.4, 27.8, 28.8, 30.6, 31.1, 31.6, 32.0 (C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 41.4 (C-1'), 120.2 (C-2), 126.1 (C-4''), 127.5 (C-2'' & C-6''), 128.8 (C-3'' & C-5''), 135.3 (C-1'') 141.2 (C-3) and 169.7 (C-1). Analyzed for molecular formula C₂₀H₃₁NO: C, 79.68; H, 10.36; N, 4.65. Found: C, 79.62; H, 10.41; N, 4.64.

N-hexadecyl-cinnamamide (15e)

The title compound was prepared in accordance to the *general procedure above* from 7.20g (0.03 moles) of hexadecylamine and 5g (0.03 moles) of cinnamic acid, along with 1.20g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography was obtained as a dark red coloured viscous liquid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 79.8% yield, R_f : 0.49 (ethyl acetate: hexane, 2:8). IR (Nujol) cm⁻¹: 1645 (CO stretching, amide I band), 1562 (N-H bending, amide II band), 1254 (C-N stretching, amide III band), 3445

(N-H stretching). ^1H NMR (400 MHz, DMSO): δ 0.86 (3H, t, $J=6.8$, H-16'), 1.22–1.60 (28H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14' and H-15'), 2.76 (2H, t, $J=7.6$, H-1'), 6.48 (1H, d, $J=16$, H-2), 7.56 (1H, d, $J=16$, H-3), 7.2–7.5 (5H, m, Ar-H), 8.29 (1H, s, N-H). ^{13}C NMR (75.5 MHz, DMSO): δ 14.3 (C-16'), 19.0, 19.5, 20.0, 21.5, 21.9, 22.5, 24.2, 27.6, 28.5, 28.9, 29.1, 29.7, 31.4, 32.0 (C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 41.8 (C-1'), 119.2 (C-2), 125.5 (C-4''), 127.8 (C-2'' & C-6''), 128.7 (C-3'' & C-5''), 135.9 (C-1'') 140.2 (C-3) and 170.0 (C-1). Analyzed for molecular formula $\text{C}_{25}\text{H}_{41}\text{NO}$: C, 80.80; H, 11.12; N, 3.77. Found: C, 80.89; H, 11.10; N, 3.65.

N-octadecyl-cinnamamide (15f)^[18]

The title compound was prepared in accordance to the *general procedure* above from 8.08g (0.03 moles) of octadecylamine and 5g (0.03 moles) of cinnamic acid, along with 1.30g of *Candida antarctica* lipase enzyme (10% of the total amount of the reactants). The synthesized amide was purified by column chromatography was obtained as a light yellow coloured solid, after purification by column chromatography by eluting with 2% ethyl acetate in hexane in 81.4% yield, R_f : 0.48 (ethyl acetate:hexane, 2:8). IR (Nujol) cm^{-1} : 1642 (C O stretching, amide I band), 1561 (N-H bending, amide II band), 1256 (C-N stretching, amide III band), 3448 (N-H stretching). ^1H NMR (400 MHz, DMSO): δ 0.83 (3H, t, $J=7.2$, H-18'), 1.20–1.52 (32H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14', H-15', H-16' and H-17'), 2.70 (2H, t, $J=7.4$, H-1'), 6.44 (1H, d, $J=15.6$, H-2), 7.2–7.4 (5H, m, Ar-H) and 7.67 (1H, d, $J=15.6$, H-3), 8.17 (1H, s, N-H). ^{13}C NMR (75.5 MHz, DMSO): δ 14.3 (C-18'), 17.8, 19.1, 20.5, 22.2, 22.5, 23.3, 24.5, 26.5, 27.6, 28.9, 29.1, 29.2, 30.0, 30.5, 31.7, 32.5, (C-17', C-16', C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 42.5 (C-1'), 120.2 (C-2), 125.7 (C-4''), 127.3 (C-2'' & C-6''), 128.9 (C-3'' & C-5''), 136.1 (C-1'')

140.3 (C-3) and 171.4 (C-1). Analyzed for molecular formula $C_{27}H_{45}NO$: C, 81.14; H, 11.35; N, 3.50. Found: C, 81.18; H, 11.34; N, 3.57.

Compounds	Reactants		Yield (in %)	IR (Nujol) cm ⁻¹	¹ H NMR (400 MHz, DMSO)	¹³ C NMR (75.5 MHz, DMSO)	Elemental Analysis
	Phenolic acids	Alkyl amine					
N-propyl-salicylamide (9a)	Salicylic acid	Propyl amine	81.4	1643 (CO stretching, amide I band), 1557 (N-H bending, amide II band), 1261 (C-N stretching, amide III band), 3403 (N-H stretching)	δ 0.93 (3H, t, J=7.6, H- 3'), 1.59–1.68 (2H, m, H-2'), 2.81 (2H, t, J=7.6, H-1'), 6.71 (1H, d, J=8.4, H-3''), 7.20- 7.22 (2H, dd, J=8.8 & 2.1 and J= 8.4 & 2.1 each, H-4'' & H-5''), 7.74 (1H, d, J=7.6, H- 6'') and 8.31 (1H, s, N- H)	δ 11.1 (C-3'), 24.5 (C- 2'), 42.7 (C-1'), 116.5 (C-1''), 119.0 (C-3''), 119.3 (C-5''), 129.6 (C-6''), 131.7 (C-4''), 161.7 (C-2'') and 172.7 (C-1)	Analyzed for molecular formula C ₁₀ H ₁₃ NO ₂ : C, 67.02; H, 7.31; N, 7.82 Found: C, 67.23; H, 7.26; N, 7.69
N-hexyl-salicylamide (9b)^[1]	Salicylic acid	Hexyla mine	80.4	1644 (CO stretching, amide I band), 1559 (N-H bending, amide II band), 1259 (C-N stretching, amide III band), 3408 (N-H stretching)	δ 0.85 (3H, t, J=7.2, H- 6'), 1.21–1.51 (8H, m, H-2', H-3', H-4' and H-5'), 2.76 (2H, t, J=7.6, H-1'), 6.74 (1H, d, J=8.0, H-3''), 7.21- 7.24 (2H, dd, J=8.4 & 2.0 and J= 8.6 & 2.1 each, H-4'' & H-5''), 7.72 (1H, d, J=7.6, H- 6'') and 8.26 (1H, s, N- H)	δ 14.3 (C-6'), 22.5, 26.3, 29.4, 31.7 (C- 2', C-3', C-4' & C-5'), 43.1 (C-1'), 116.2 (C- 1''), 119.1 (C-3''), 119.3 (C-5''), 129.9 (C- 6''), 131.4 (C-4''), 162.7 (C-2'') and 173.0 (C-1)	Analyzed for molecular formula C ₁₃ H ₁₉ NO ₂ : C, 70.56; H, 8.65; N, 6.33. Found: C, 70.43; H, 8.21; N, 6.37

N-heptyl-salicylamide (9c) ^[2]	Salicylic acid	Heptyl amine	81.3	1647 (CO stretching, amide I band), 1558 (N-H bending, amide II band), 1254 (C-N stretching, amide III band), 3404 (N-H stretching).	δ 0.94 (3H, t, J=7.2, H-7'), 1.20–1.58 (10H, m, H-2', H-3', H-4', H-5' and H 6'), 2.81 (2H, t, J=7.6, H-1'), 6.78 (1H, d, J=8.0, H-3''), 7.25-7.31 (2H, dd, J=8.0 & 2.0 and J= 8.2 & 2.2 each, H-4'' & H-5''), 7.75 (1H, d, J=7.6, H-6'') and 8.24 (1H, s, N-H)	δ 14.3 (C-7'), 22.5, 26.3, 29.2, 29.4, 31.0(C-6', C-5', C-4', C-3' & C-2'), 43.1 (C-1'), 116.3 (C-1''), 119.1 (C-3''), 119.5 (C-5''), 129.4 (C-6''), 131.6 (C-4''), 160.9 (C-2'') and 172.6 (C-1)	Analyzed for molecular formula C ₁₄ H ₂₁ NO ₂ : C, 71.46; H, 8.99; N, 5.95. Found: C, 70.45; H, 8.85; N, 6.01
N-undecyl-salicylamide (9d) ^[2]	Salicylic acid	Undecylamine	78.2	1646 (CO stretching, amide I band), 1561 (N-H bending, amide II band), 1253 (C-N stretching, amide III band), 3410 (N-H stretching)	δ 0.83 (3H, t, J=6.4, H-11'), 1.20–1.59 (18H, m, H-2', H-3', H-4', H-5' H-6', H-7', H-8', H-9' and H-10'), 2.80 (2H, t, J=7.6, H-1'), 6.70 (1H, d, J=8.4, H-3''), 7.25-7.29 (2H, dd, J=8.0 & 2.1 and J= 8.2 & 2.0 each, H-4'' & H-5''), 7.72 (1H, d, J=8, H-6'') and 8.26 (1H, s, N-H)	δ 14.1 (C-11'), 22.4, 22.5, 22.7, 26.3, 26.8, 27.5, 29.0, 29.3, 29.4, 30.8 (C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 43.1 (C-1'), 116.3 (C-1''), 119.3 (C-3''), 120.3 (C-5''), 130.1 (C-6''), 131.4 (C-4''), 162.7 (C-2'') and 173.1 (C-1)	Analyzed for molecular formula C ₁₈ H ₂₉ NO ₂ : C, 74.18; H, 10.03; N, 4.81. Found: C, 74.15; H, 10.21; N, 4.62

N-hexadecyl-salicylamide (9e) ^[3]	Salicylic acid	Hexadecylamine	81.4	1644 (CO stretching, amide I band), 1560 (N-H bending, amide II band), 1255 (C-N stretching, amide III band), 3405 (N-H stretching)	δ 0.84 (3H, t, J=7.2, H-16'), 1.21–1.57 (28H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14' and H-15'), 2.78 (2H, t, J=7.6, H-1'), 6.75 (1H, d, J=8.0, H-3''), 7.25–7.30 (2H, dd, J=8.0 & 2.1 and J= 8.0 & 2.0 each, H-4'' & H-5''), 7.75 (1H, d, J=7.6, H-6'') and 8.22 (1H, s, N-H)	δ 14.3 (C-16'), 20.2, 20.3, 20.5, 22.4, 22.5, 22.7, 26.3, 26.8, 27.5, 29.0, 29.3, 29.4, 29.5, 30.8 (C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 42.7 (C-1'), 116.5 (C-1''), 119.0 (C-3''), 119.3 (C-5''), 129.6 (C-6''), 131.7 (C-4''), 161.7 (C-2'') and 172.1 (C-1)	Analyzed for molecular formula C ₂₃ H ₃₉ NO ₂ : C, 76.40; H, 10.87; N, 3.87. Found: C, 76.39; H, 10.42; N, 3.94
N-octadecyl-salicylamide (9f) ^[2]	Salicylic acid	Octadecylamine	82.5	1645 (CO stretching, amide I band), 1559 (N-H bending, amide II band), 1260 (C-N stretching, amide III band), 3402 (N-H stretching)	δ 0.85 (3H, t, J=7.2, H-18'), 1.20–1.61 (3H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14', H-15', H-16' and H-17'), 2.80 (2H, t, J=7.6, H-1'), 6.78 (1H, d, J=7.6, H-3''), 7.21–7.27 (2H, dd, J=8.8 & 2.1 and J= 8.4 & 2.1 each, H-4'' & H-5''), 7.73 (1H, d, J=8.0, H-6'') and 8.23 (1H, s, N-H)	δ 14.3 (C-18'), 20.2, 20.3, 20.5, 22.4, 22.5, 22.7, 26.3, 26.8, 27.5, 29.0, 29.3, 29.4, 29.5, 30.1, 30.8, 31.0, (C-17', C-16', C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 42.7 (C-1'), 116.2 (C-1''), 119.4 (C-3''), 119.7 (C-5''), 129.9 (C-6''), 131.5 (C-4''), 162.1 (C-2'') and 172.1 (C-1)	Analyzed for molecular formula C ₂₅ H ₄₃ NO ₂ : C, 77.07; H, 11.12; N, 3.60. Found: C, 76.99; H, 11.15; N, 3.63

N-propyl-3-hydroxycinnamamide (10a)	3-hydroxy cinnamic acid	Propyl amine	81.2	1650 (CO stretching, amide I band), 1572 (N-H bending, amide II band), 1243 (C-N stretching, amide III band), 3258 (N-H stretching)	δ 0.81 (3H, t, J=6.8, H-3'), 1.56–1.67 (2H, m, H-2'), 3.19 (2H, t, H-1'), 4.80 (1H, s, Ar-OH); 6.35 (1H, d, J=15.6, H-2), 6.68 (1H, s, H-2''), 6.75 (1H, dd, J=7.6 & 2.0, H-5''), 6.94 (1H, d, J=8.0, H-4''), 7.16 (1H, d, J=7.6, H-6''), 7.24 (1H, d, J=15.6, H-3) and 8.17 (1H, s, N-H)	δ 14.3 (C-3'), 23.5 (C-2'), 42.5 (C-1'), 114.2(C-4''), 115.7 (C-2''), 118.7 (C-2), 119.1 (C-6''), 129.0 (C-5''), 136.0 (C-1''), 139.6 (C-3), 158.7 (C-3'') and 170.7 (C-1)	Analyzed for molecular formula $C_{12}H_{15}NO_2$: C, 70.22; H, 7.37; N, 6.82. Found: C, 70.15; H, 7.42; N, 6.97
N-hexyl-3-hydroxycinnamamide (10b)	3-hydroxy cinnamic acid	Hexylamine	79.3	1644 (CO stretching, amide I band), 1575 (N-H bending, amide II band), 1240 (C-N stretching, amide III band), 3259 (N-H stretching)	δ 0.86 (3H, t, J=7.2, H-6'), 1.20–1.55 (8H, m, H-2', H-3', H-4' and H-5'), 2.73 (2H, t, J=7.6, H-1'), 5.02 (1H, s, Ar-OH); 6.36 (1H, d, J=16, H-2), 6.74 (1H, s, H-2''), 6.78 (1H, dd, J=8.0 & 2.0, H-5''), 6.95 (1H, d, J=7.6, H-4''), 7.14 (1H, d, J=7.6, H-6''), 7.24 (1H, d, J=16, H-3) and 8.18 (1H, s, N-H)	δ 14.3 (C-6'), 22.4, 26.7, 29.3, 31.6 (C-2', C-3', C-4' & C-5'), 42.8 (C-1'), 114.8 (C-4''), 115.2 (C-2''), 118.5 (C-2), 120.1(C-6''), 129.8 (C-5''), 136.6 (C-1''), 139.5(C-3), 158.3 (C-3'') and 170.4(-C=O).	Analyzed for molecular formula $C_{15}H_{21}NO_2$: C, 72.84; H, 8.56; N, 5.66. Found: C, 72.82; H, 8.61; N, 5.58

N-heptyl-3-hydroxycinnamamide (10c)^[4]	3-hydroxy cinnamic acid	Heptyl amine	80.4	1642 (CO stretching, amide I band), 1561 (N-H bending, amide II band), 1256 (C-N stretching, amide III band), 3260 (N-H stretching)	δ 0.81 (3H, t, J=6.4, H-7'), 1.20–1.56 (10H, m, H-2', H-3', H-4', H-5' and H 6'), 2.66 (2H, t, J=7.4, H-1'), 5.09 (1H, s, Ar-OH); 6.35 (1H, d, J=15.6, H-2), 6.70 (1H, s, H-2''), 6.73 (1H, dd, J=7.8 & 1.8, H-5''), 6.92 (1H, d, J=8.0, H-4''), 7.13 (1H, d, J=7.6, H-6''), 7.16 (1H, d, J=15.6, H-3) and 8.17 (1H, s, N-H)	δ 14.3 (C-7'), 22.4, 26.3, 27.7, 29.4, 31.6(C-6', C-5', C-4', C-3' & C-2'), 42.9 (C-1'), 113.9 (C-4''), 115.4 (C-2''), 118.6 (C-2), 119.3 (C-6''), 130.1 (C-5''), 137.1 (C-1''), 140.0 (C-3), 159.1 (C-3'') and 171.4 (C-1)	Analyzed for molecular formula C ₁₆ H ₂₃ NO ₂ : C, 73.53; H, 8.87; N, 5.36. Found: C, 73.55; H, 8.83; N, 5.48
N-undecyl-3-hydroxycinnamamide (10d)	3-hydroxy cinnamic acid	Undecylamine	78.6	1645 (CO stretching, amide I band), 1572 (N-H bending, amide II band), 1242 (C-N stretching, amide III band), 3250 (N-H stretching)	δ 0.83 (3H, t, J=6.8, H-11'), 1.21–1.48 (18H, m, H-2', H-3', H-4', H-5' H-6', H-7', H-8', H-9' and H-10'), 2.72 (2H, t, J=7.4, H-1'), 4.89 (1H, s, Ar-OH); 6.2 (1H, d, J=15.6, H-2), 6.71 (1H, s, H-2''), 6.76 (1H, dd, J=7.6 & 2.0, H-5''), 6.93(1H, d, J=7.6, H-4''), 7.12 (1H, d, J=8.0, H-6''), 7.19 (1H, d, J=15.6, H-3) and 8.16 (1H, s, N-H)	δ 14.1 (C-11'), 22.4, 22.5, 22.7, 26.3, 26.8, 27.5, 29.1, 29.3, 29.5, 30.9 (C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 43.1 (C-1'), 114.5 (C-4''), 115.6 (C-2''), 118.6 (C-2), 119.0 (C-6''), 131.1 (C-5''), 136.0 (C-1''), 139.7 (C-3), 160.1 (C-3'') and 172.4 (C-1)	Analyzed for molecular formula C ₂₀ H ₃₁ NO ₂ : C, 75.67; H, 9.84; N, 4.41. Found: C, 76.71; H, 9.65; N, 4.45

N-hexadecyl-3-hydroxycinnamamide (10e)	3-hydroxycinnamic acid	Hexadecylamine	83.5	1644 (CO stretching, amide I band), 1569 (N-H bending, amide II band), 1248 (C-N stretching, amide III band), 3256 (N-H stretching)	<p>δ 0.86 (3H, t, J=6.4, H-16'), 1.3–1.57 (28H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14' and H-15'), 2.72 (2H, t, J=7.6, H-1'), 5.11 (1H, s, Ar-OH); 6.48 (1H, d, J=16, H-2), 6.69 (1H, s, H-2''), 6.75 (1H, dd, J=8.0 & 2.0, H-5''), 6.91 (1H, d, J=7.6, H-4''), 7.14 (1H, d, J=7.6, H-6''), 7.16 (1H, d, J=16, H-3) and 8.17 (1H, s, N-H)</p>	<p>δ 14.3 (C-16'), 20.4, 20.5, 21.5, 22.5, 22.8, 22.9, 26.3, 27.1, 27.5, 29.0, 29.3, 29.5, 29.8, 30.8 (C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 42.7 (C-1'), 114.5 (C-4''), 115.2 (C-2''), 118.2 (C-2), 120.1 (C-6''), 130.2 (C-5''), 137.2 (C-1''), 139.4 (C-3), 158.1 (C-3'') and 171.4 (C-1)</p>	<p>Analyzed for molecular formula $C_{22}H_{41}NO_2$: C, 77.47; H, 10.66; N, 3.61. Found: C, 77.31; H, 10.69; N, 3.65</p>
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N-octadecyl-3-hydroxycinnamamide (10f)	3-hydroxy cinnamic acid	Octadecylamine	80.2	1645 (CO stretching, amide I band), 1564 (N-H bending, amide II band), 1242 (C-N stretching, amide III band), 3265 (N-H stretching)	δ 0.83 (3H, t, J=7.2, H-18'), 1.19–1.55 (32H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14', H-15', H-16' and H-17'), 2.76 (2H, t, J=7.6, H-1'), 5.07 (1H, s, Ar-OH), 6.31 (1H, d, J=16, H-2), 6.70 (1H, s, H-2''), 6.76 (1H, dd, J=7.6 & 1.8, H-5''), 6.90 (1H, d, J=8.0, H-4''), 7.12 (1H, d, J=7.6, H-6''), 7.16 (1H, d, J=16, H-3) and 8.18 (1H, s, N-H)	δ 14.3 (C-18'), 20.2, 20.3, 20.5, 22.4, 22.5, 22.7, 26.3, 26.8, 27.5, 29.0, 29.3, 29.4, 29.5, 30.1, 30.8, 31.0, (C-17', C-16', C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 42.7 (C-1'), 114.6 (C-4''), 116.3 (C-2''), 118.0 (C-2), 119.3 (C-6''), 129.6 (C-5''), 137.0 (C-1''), 140.1 (C-3), 161.7 (C-3'') and 170.1 (C-1)	Analyzed for molecular formula $C_{27}H_{45}NO_2$: C, 78.02; H, 10.91; N, 3.37. Found: C, 78.01; H, 10.89; N, 3.42
N-propyl-4-hydroxycinnamamide (11a)^[5]	4-hydroxy cinnamic acid	Propylamine	77.2	1654 (CO stretching, amide I band), 1523 (N-H bending, amide II band), 1254 (C-N stretching, amide III band), 3422 (N-H stretching)	δ 0.90 (3H, t, J=8, H-3'), 1.58–1.64 (2H, m, H-2'), 2.74 (2H, t, J=7.6, H-1'), 4.80 (1H, s, Ar-OH); 6.26 (1H, d, J=16, H-2), 6.78 (2H, d, J=7.6, H-3'' & H-5''), 7.33 (1H, d, J=16, H-3), 7.42 (2H, d, J=8.8, H-2'' & H-6'') and 8.17 (1H, s, N-H)	δ 14.2 (C-3'), 27.5 (C-2'), 43.5 (C-1'), 115.9 (C-3'' & C-5''), 119.1 (C-2), 127.6 (C-1''), 130.0 (C-6'' & C-2''), 143.1 (C-3), 159.9 (C-4'') and 169.7 (C-1)	Analyzed for molecular formula $C_{12}H_{15}NO_2$: C, 70.22; H, 7.37; N, 6.82. Found: C, 70.35; H, 7.27; N, 7.54

N-hexyl-4-hydroxycinnamamide (11b)^[6]	4-hydroxy cinnamic acid	Hexylamine	75.6	1655 (CO stretching, amide I band), 1525 (N-H bending, amide II band), 1250 (C-N stretching, amide III band), 3432 (N-H stretching)	δ 0.84 (3H, t, J=6.4, H-6'), 1.21–1.54 (8H, m, H-2', H-3', H-4' and H-5'), 2.71 (2H, t, J=7.6, H-1'), 5.21 (1H, s, Ar-OH); 6.24 (1H, d, J=16, H-2), 6.76 (2H, d, J=7.6, H-3'' & H-5''), 7.23 (1H, d, J=16, H-3), 7.40 (2H, d, J=8.4, H-2'' & H-6'') and 8.20 (1H, s, N-H)	δ 14.3 (C-6'), 22.3, 26.1, 27.6, 31.2 (C-2', C-3', C-4' & C-5'), 43.1 (C-1'), 115.7 (C-3'' & C-5''), 118.0 (C-2), 127.6 (C-1''), 130.1 (C-6'' & C-2''), 142.7 (C-3), 159.8 (C-4'') and 169.4 (C-1)	Analyzed for molecular formula C ₁₅ H ₂₁ NO ₂ : C, 72.84; H, 8.56; N, 5.66. Found: C, 72.80; H, 8.69; N, 5.51
N-heptyl-4-hydroxycinnamamide (11c)	4-hydroxy cinnamic acid	Heptylamine	81.3	1652 (C O stretching, amide I band), 1528 (N-H bending, amide II band), 1252 (C-N stretching, amide III band), 3430 (N-H stretching)	δ 0.82 (3H, t, J=6.8, H-7'), 1.22–1.84 (10H, m, H-2', H-3', H-4', H-5' and H 6'), 2.72 (2H, t, J=7.6, H-1'), 5.27 (1H, s, Ar-OH); 6.23 (1H, d, J=16, H-2), 6.74 (2H, d, J=8.0, H-3'' & H-5''), 7.25 (1H, d, J=16, H-3), 7.43 (2H, d, J=8.4, H-2'' & H-6'') and 8.25 (1H, s, N-H)	δ 14.3 (C-7'), 22.4, 26.4, 27.4, 29.0, 31.5 (C-6', C-5', C-4', C-3' & C-2'), 41.5 (C-1'), 116.0 (C-3'' & C-5''), 121.4 (C-2), 127.6 (C-1''), 129.5 (C-6'' & C-2''), 140.3 (C-3), 159.3 (C-4'') and 170 (C-1)	Analyzed for molecular formula C ₁₆ H ₂₃ NO ₂ : C, 73.53; H, 8.87; N, 5.36. Found: C, 73.65; H, 8.79; N, 5.32

N-undecyl-4-hydroxycinnamamide (11d)	4-hydroxy cinnamic acid	Undecylamine	75.6	1655 (CO stretching, amide I band), 1526 (N-H bending, amide II band), 1248 (C-N stretching, amide III band), 3432 (N-H stretching)	δ 0.82 (3H, t, J=6.8, H-11'), 1.16–1.49 (18H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9' and H-10'), 2.73 (2H, t, J=7.6, H-1'), 5.09 (1H, s, Ar-OH); 6.26 (1H, d, J=16, H-2), 6.72 (2H, d, J=7.6 H-3'' & H-5''), 7.41 (1H, d, J=16, H-3), 7.45 (2H, d, J=8.8, H-2'' & H-6'') and 8.24 (1H, s, N-H)	δ 14.1 (C-11'), 22.3, 22.9, 23.7, 26.3, 26.8, 27.6, 29.0, 29.1, 29.3, 30.1 (C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 43.1 (C-1'), 115.7 (C-3'' & C-5''), 120.2 (C-2), 127.6 (C-1''), 130.1 (C-6'' & C-2''), 141.5 (C-3), 159.7 (C-4'') and 168.8 (C-1)	Analyzed for molecular formula $C_{20}H_{31}NO_2$: C, 75.67; H, 9.84; N, 4.41. Found: C, 75.69; H, 9.78; N, 4.40
N-hexadecyl-4-hydroxycinnamamide (11e)	4-hydroxy cinnamic acid	Hexadecylamine	80.5	1650 (C O stretching, amide I band), 1523 (N-H bending, amide II band), 1255 (C-N stretching, amide III band), 3425 (N-H stretching)	δ 0.83 (3H, t, J=7.2, H-16'), 1.21–1.51 (28H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14' and H-15'), 2.72 (2H, t, J=7.6, H-1'), 5.21 (1H, s, Ar-OH); 6.26 (1H, d, J=16, H-2), 6.76 (2H, d, J=7.6 H-3'' & H-5''), 7.41 (2H, d, J=8.4, H-2'' & H-6''), 7.42 (1H, d, J=16, H-3) and 8.23 (1H, s, N-H)	δ 14.2 (C-16'), 19.5, 20.3, 21.5, 22.5, 22.8, 23.9, 26.5, 27.1, 28, 29.0, 29.3, 29.5, 30.1, 31.8 (C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 42.7 (C-1'), 115.7 (C-3'' & C-5''), 121.0 (C-2), 127.8 (C-1''), 130.1 (C-6'' & C-2''), 143.3 (C-3), 159.7 (C-4'') and 171 (C-1)	Analyzed for molecular formula $C_{25}H_{41}NO_2$: C, 77.47; H, 10.66; N, 3.61. Found: C, 77.52; H, 10.61; N, 3.54

N-octadecyl-4-hydroxycinnamamide (11f) ^[7]	4-hydroxycinnamic acid	Octadecylamine	79.6	1651 (CO stretching, amide I band), 1527 (N-H bending, amide II band), 1249 (C-N stretching, amide III band), 3424 (N-H stretching)	δ 0.84 (3H, t, J=7.2, H-18'), 1.20–1.56 (32H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14', H-15', H-16' and H-17'), 2.73 (2H, t, J=7.6, H-1'), 5.11 (1H, s, Ar-OH) 6.24 (1H, d, J=16, H-2), 6.74 (2H, d, J=8.0 H-3'' & H-5''), 7.40 (2H, d, J=8.0, H-2'' & H-6''), 7.42 (1H, d, J=16, H-3) and 8.25 (1H, s, N-H)	δ 15 (C-18'), 17.3, 20.3, 21.1, 22.4, 22.7, 23, 26.1, 26.8, 27.5, 29.0, 29.3, 29.4, 29.5, 30.1, 30.8, 31.0, (C-17', C-16', C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 41.8 (C-1'), 115.6 (C-3'' & C-5''), 119.9 (C-2), 127.7 (C-1''), 131.2 (C-6'' & C-2''), 142.7 (C-3), 159.4 (C-4'') and 171.3 (C-1)	Analyzed for molecular formula C ₂₇ H ₄₅ NO ₂ : C, 78.02; H, 10.91; N, 3.37. Found: C, 78.05; H, 10.90; N, 3.32
N-propyl-3,4-dihydroxycinnamamide (12a) ^[5]	3,4-dihydroxycinnamic acid	Propylamine	80.4	1640 (CO stretching, amide I band), 1559 (N-H bending, amide II band), 1258 (C-N stretching, amide III band), 3423 (N-H stretching)	δ 0.79 (3H, t, J=7.6, H-3'), 1.19–1.39 (2H, m, H-2'), 3.5 (2H, t, H-1'), 5.05 (1H, s, Ar-OH); 6.42 (1H, d, J=14.8, H-2), 6.52-6.54 (2H, dd, J=8.0 & 2.0 and J= 8.0 & 2.0 each, H-5'' & H-6''), 6.63 (1H, s, H-2''), 7.14 (1H, d, J=14.8, H-3) and 8.19 (1H, s, N-H)	δ 11.4 (C-3'), 27.4 (C-2'), 43.1 (C-1'), 113.5 (C-2''), 115.4 (C-5''), 121.0 (C-2), 123.7 (C-6''), 129.6 (C-1''), 139.6 (C-3), 144.8 (C-3''), 145.5 (C-4'') and 170.7 (C-1)	Analyzed for molecular formula C ₁₂ H ₁₅ NO ₃ : C, 65.14; H, 6.83; N, 6.33. Found: C, 65.21; H, 6.74; N, 6.52

N-hexyl-3,4-dihydroxycinnamamide (12b)^[8]	3,4-dihydroxycinnamic acid	Hexylamine	82.4	1642 (CO stretching, amide I band), 1561 (N-H bending, amide II band), 1256 (C-N stretching, amide III band), 3425 (N-H stretching)	δ 0.83 (3H, t, J=6.8, H-6'), 1.20–1.38 (8H, m, H-2', H-3', H-4' and H-5'), 3.2 (2H, t, H-1'), 5.05 (1H, s, Ar-OH); 6.24 (1H, d, J=16, H-2), 6.55-6.57 (2H, dd, J=7.2 & 2.0 and J= 7.2 & 2.0 each, H-5'' & H-6''), 6.71 (1H, s, H-2''), 7.23 (1H, d, J=16, H-3) and 8.23 (1H, s, N-H)	δ 14.1 (C-6'), 22.4, 26.3, 29.2, 31.6 (C-2', C-3', C-4' & C-5'), 41.5 (C-1'), 113.5 (C-2''), 115.4 (C-5''), 120.2 (C-2), 122.6 (C-6''), 129.6 (C-1''), 140.5 (C-3), 144.8 (C-3''), 145.5 (C-4'') and 169.2 (C-1)	Analyzed for molecular formula C ₁₅ H ₂₁ NO ₃ : C, 68.42; H, 8.04; N, 5.32. Found: C, 68.40; H, 7.98; N, 5.50
N-heptyl-3,4-dihydroxycinnamamide (12c)^[9]	3,4-dihydroxycinnamic acid	Heptylamine	81.7	1645 (CO stretching, amide I band), 1557 (N-H bending, amide II band), 1255 (C-N stretching, amide III band), 3428 (N-H stretching)	δ 0.86 (3H, t, J=6.4, H-7'), 1.17–1.36 (10H, m, H-2', H-3', H-4', H-5' and H-6'), 3.1 (2H, t, H-1'), 5.07 (1H, s, Ar-OH); 6.26 (1H, d, J=16, H-2), 6.51-6.53 (2H, dd, J=8.0 & 2.0 and J=8.0 & 2.0 each, H-5'' & H-6''), 6.62 (1H, s, H-2''), 7.25 (1H, d, J=16, H-3) and 8.22 (1H, s, N-H)	δ 14.2 (C-7'), 23.4, 26.3, 27.4, 29.2, 30.6 (C-6', C-5', C-4', C-3' & C-2'), 42.1 (C-1'), 114.2 (C-2''), 115.6 (C-5''), 120.2 (C-2), 123.5 (C-6''), 127.1 (C-1''), 141.0 (C-3), 144.5 (C-3''), 145.7 (C-4'') and 171.2 (C-1)	Analyzed for molecular formula C ₁₆ H ₂₃ NO ₃ : C, 69.29; H, 8.36; N, 5.05. Found: C, 69.25; H, 8.31; N, 5.04

N-undecyl-3,4-dihydroxycinnamamide (12d)^[10]	3,4-dihydroxycinnamic acid	Undecylamine	78.5	1644 (C O stretching, amide I band), 1565 (N-H bending, amide II band), 1250 (C-N stretching, amide III band), 3430 (N-H stretching)	δ 0.83 (3H, t, J=6.8, H-11'), 1.16–1.35 (18H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9' and H-10'), 3.3 (2H, t, H-1'), 5.03 (1H, s, Ar-OH); 6.31 (1H, d, J=15.6, H-2), 6.50-6.52 (2H, dd, J=8.0 & 2.0 and J= 8.0 & 2.0 each, H-5'' & H-6''), 6.67 (1H, s, H-2''), 7.29 (1H, d, J=15.6, H-3) and 8.20 (1H, s, N-H)	δ 14.1 (C-11'), 22.3, 22.9, 23.7, 26.3, 26.8, 27.6, 29.0, 29.1, 29.3, 30.1 (C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 43.1 (C-1'), 115.0 (C-2''), 116.1 (C-5''), 120.6 (C-2), 122.8 (C-6''), 129.5 (C-1''), 141.3 (C-3), 144.1 (C-3''), 146 (C-4'') and 170.3 (C-1)	Analyzed for molecular formula $C_{20}H_{31}NO_3$: C, 72.04; H, 9.37; N, 4.20. Found: C, 72.05; H, 9.32; N, 4.26
N-hexadecyl-3,4-dihydroxycinnamamide (12e)	3,4-dihydroxycinnamic acid	Hexadecylamine	77.3	1645 (CO stretching, amide I band), 1561 (N-H bending, amide II band), 1252 (C-N stretching, amide III band), 3432 (N-H stretching)	δ 0.85 (3H, t, J=7.2, H-16'), 1.21–1.61 (28H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14' and H-15'), 3.0 (2H, t, H-1'), 5.09 (1H, s, Ar-OH); 6.29 (1H, d, J=16, H-2), 6.52-6.54 (2H, dd, J=8.0 & 2.0 and J= 8.0 & 2.0 each, H-5'' & H-6''), 6.64 (1H, s, H-2''), 7.31 (1H, d, J=16, H-3) and 8.22 (1H, s, N-H)	δ 14.3 (C-16'), 18.7, 19.3, 21.5, 22.5, 22.8, 24.1, 25.5, 26.1, 28.0, 29.1, 29.3, 29.5, 30.5, 31.8 (C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 42.7 (C-1'), 114.9 (C-2''), 115.8 (C-5''), 120.2 (C-2), 123.5 (C-6''), 129.9 (C-1''), 139.8 (C-3), 144.5 (C-3''), 145.1 (C-4'') and 172.6.3 (C-1)	Analyzed for molecular formula $C_{25}H_{41}NO_3$: C, 74.40; H, 10.24; N, 3.47. Found: C, 74.51; H, 10.22; N, 3.36

N-octadecyl-3,4-dihydroxycinnamamide (12f)^[11]	3,4-dihydroxycinnamic acid	Octadecylamine	81.2	1646 (C O stretching, amide I band), 1566 (N-H bending, amide II band), 1245 (C-N stretching, amide III band), 3425 (N-H stretching)	δ 0.83 (3H, t, J=6.4, H-18'), 1.20–1.57 (32H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14', H-15', H-16' and H-17'), 3.1 (2H, t, H-1'), 5.06 (1H, s, Ar-OH) 6.33 (1H, d, J=16, H-2), 6.52-6.54 (2H, dd, J=8.0 & 2.0 and J= 8.0 & 2.0 each, H-5'' & H-6''), 6.68 (1H, s, H-2''), 7.39 (1H, d, J=16, H-3) and 8.19 (1H, s, N-H)	δ 14.7 (C-18'), 15.8, 17.3, 20.6, 22.4, 22.7, 24, 25.3, 26.1, 27.1, 28.0, 29.1, 29.3, 29.7, 30.1, 31.1, 32.3, (C-17', C-16', C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 41.8 (C-1'), 113.9 (C-2''), 114.8 (C-5''), 121.1 (C-2), 122.4 (C-6'') 130.9 (C-1''), 140.6 (C-3), 144.6 (C-3''), 145.5 (C-4'') and 169.9 (C-1)	Analyzed for molecular formula C ₂₇ H ₄₅ NO ₃ : C, 75.13; H, 10.51; N, 3.24. Found: C, 75.16; H, 10.52; N, 3.21
N-propyl-4-hydroxy-3-methoxycinnamamide (13a)^[12]	4-hydroxy-3-methoxycinnamic acid	Propylamine	83.6	1645 (CO stretching, amide I band), 1571 (N-H bending, amide II band), 1254 (C-N stretching, amide III band), 3426 (N-H stretching)	δ 0.82 (3H, t, J=7.2, H-3'), 1.20–1.50 (2H, m, H-2'), 2.70 (2H, t, J=7.4, H-1'), 3.7 (3H, s, Ar-OCH ₃) 5.04 (1H, s, Ar-OH); 6.29 (1H, d, J=16, H-2), 6.74 (1H, d, J=8.0, H-6''), 7.01 (1H, d, J=7.6, H-5'') 7.15 (1H, s, H-2''), 7.24 (1H, d, J=16, H-3) and 7.97 (1H, s, N-H)	δ 14.2 (C-3'), 27.2 (C-2'), 42.6 (C-1'), 56.0 (Ar-OCH ₃), 111.1 (C-2''), 115.9 (C-5''), 119.4 (C-2), 122.9 (C-6''), 127.0 (C-1''), 139.5 (C-3), 144.7 (C-4''), 148.8 (C-3'') and 170.0 (C-1)	Analyzed for molecular formula C ₁₃ H ₁₇ NO ₃ : C, 66.36; H, 7.28; N, 5.95. Found: C, 66.42; H, 7.26; N, 5.89

N-hexyl-4-hydroxy-3-methoxycinnamamide (13b)^[13]	4-hydroxy-3-methoxy cinnamic acid	Hexylamine	80.7	1645 (CO stretching, amide I band), 1562 (N-H bending, amide II band), 1251 (C-N stretching, amide III band), 3415 (N-H stretching)	δ 0.83 (3H, t, J=6.4, H-6'), 1.20–1.52 (8H, m, H-2', H-3', H-4' and H-5'), 2.76 (2H, t, J=7.6, H-1'), 3.8 (3H, s, Ar-OCH ₃), 5.01 (1H, s, N-H), 6.25 (1H, d, J=16, H-2), 6.76 (1H, d, J=8.0, H-6''), 7.04 (1H, d, J=7.6, H-5''), 7.16 (1H, s, H-2''), 7.23 (1H, d, J=16, H-3) and 7.98 (1H, s, N-H)	δ 14.1 (C-6'), 22.4, 26.3, 29.2, 31.6 (C-2', C-3', C-4' & C-5'), 41.5 (C-1'), 56.7 (Ar-OCH ₃), 112.1 (C-2''), 116.0 (C-5''), 120.0 (C-2), 123.1 (C-6''), 127.6 (C-1''), 140.6 (C-3), 144.4 (C-4''), 149.7 (C-3'') and 171.2 (C-1)	Analyzed for molecular formula C ₁₆ H ₂₃ NO ₃ : C, 69.29; H, 8.36; N, 5.05. Found: C, 69.32; H, 8.25; N, 5.03
N-heptyl-4-hydroxy-3-methoxycinnamamide (13c)^[4]	4-hydroxy-3-methoxy cinnamic acid	Heptylamine	80.5	1647 (C O stretching, amide I band), 1552 (N-H bending, amide II band), 1250 (C-N stretching, amide III band), 3425 (N-H stretching)	δ 0.84 (3H, t, J=6.4, H-7'), 1.21–1.57 (10H, m, H-2', H-3', H-4', H-5' and H 6'), 2.72 (2H, t, J=7.6, H-1'), 3.8 (3H, s, Ar-OCH ₃), 5.03 (1H, s, Ar-OH); 6.26 (1H, d, J=16, H-2), 6.74 (1H, d, J=8.0, H-6''), 7.02 (1H, d, J=7.6, H-5''), 7.12 (1H, s, H-2''), 7.25 (1H, d, J=16, H-3) and 8.01 (1H, s, N-H)	δ 14.3 (C-7'), 24.3, 25.2, 26.3, 28.1, 29.5 (C-6', C-5', C-4', C-3' & C-2'), 42.7 (C-1'), 55.9 (Ar-OCH ₃), 111.2 (C-2''), 115.1 (C-5''), 119.3 (C-2), 122.6 (C-6''), 128.2 (C-1''), 141.4 (C-3), 144.5 (C-4''), 150.3 (C-3'') and 169.2 (C-1)	Analyzed for molecular formula C ₁₇ H ₂₅ NO ₃ : C, 70.07; H, 8.65; N, 4.81. Found: C, 70.06; H, 8.63; N, 4.92

N-undecyl-4-hydroxy-3-methoxycinnamamide (13d)	4-hydroxy-3-methoxycinnamic acid	Undecylamine	81.4	1645 (CO stretching, amide I band), 1556 (N-H bending, amide II band), 1254 (C-N stretching, amide III band), 3419 (N-H stretching)	δ 0.83 (3H, t, J=6.8, H-11'), 1.20–1.50 (18H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9' and H-10'), 2.76 (2H, t, J=7.6, H-1'), 3.7 (3H, s, Ar-OCH ₃), 5.04 (1H, s, Ar-OH); 6.24 (1H, d, J=16, H-2), 6.76 (1H, d, J=8.0, H-6''), 7.02 (1H, d, J=7.6, H-5''), 7.12 (1H, s, H-2''), 7.24 (1H, d, J=16, H-3) and 7.97 (1H, s, N-H)	δ 14.3 (C-11'), 23.1, 24.9, 25.5, 26.3, 27.8, 28.1, 29.0, 29.2, 29.6, 31.1 (C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 41.4 (C-1'), 57.1 (Ar-OCH ₃), 112.1 (C-2''), 115.4 (C-5''), 119.8 (C-2), 123.4 (C-6''), 127.2 (C-1''), 140.3 (C-3), 145.2 (C-4'') 151.1 (C-3'') and 172.3 (C-1)	Analyzed for molecular formula C ₂₁ H ₃₃ NO ₃ : C, 72.58; H, 9.57; N, 4.03. Found: C, 72.56; H, 9.62; N, 4.02
N-hexadecyl-4-hydroxy-3-methoxycinnamamide (13e)	4-hydroxy-3-methoxycinnamic acid	Hexadecylamine	82.5	1648 (C O stretching, amide I band), 1559 (N-H bending, amide II band), 1248 (C-N stretching, amide III band), 3424 (N-H stretching)	δ 0.86 (3H, t, J=7.2, H-16'), 1.21–1.58 (28H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14' and H-15'), 2.69 (2H, t, J=7.6, H-1'), 3.8 (3H, s, Ar-OCH ₃), 5.02 (1H, s, Ar-OH); 6.27(1H, d, J=15.6, H-2), 6.76(1H, d, J=8.0, H-6''), 7.01 (1H, d, J=7.6, H-5''), 7.13 (1H, s, H-2''), 7.26 (1H, d, J=15.6, H-3) and 8.03 (1H, s, N-H)	δ 14.3 (C-16'), 18.8, 19.5, 21.3, 22.7, 23.3, 24.1, 25.8, 26.1, 28.1, 28.4, 29.0, 29.5, 30.5, 31.8 (C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 41.6 (C-1'), 56.5 (Ar-OCH ₃), 111.9 (C-2''), 114.7 (C-5''), 120.8 (C-2), 122.6 (C-6''), 126.2 (C-1''), 139.7 (C-3), 144.3 (C-4''), 150.1 (C-3'') and 170.3 (C-1)	Analyzed for molecular formula C ₂₆ H ₄₃ NO ₃ : C, 74.77; H, 10.38; N, 3.35. Found: C, 74.67; H, 10.37; N, 3.39

N-octadecyl-4-hydroxy-3-methoxycinnamamide (13f)	4-hydroxy-3-methoxycinnamic acid	Octadecylamine	81.3	1645 (CO stretching, amide I band), 1557 (N-H bending, amide II band), 1250 (C-N stretching, amide III band), 3124 (N-H stretching)	δ 0.83 (3H, t, J=6.4, H-18'), 1.20–1.50 (32H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14', H-15', H-16' and H-17'), 2.78 (2H, t, J=7.6, H-1'), 3.7 (3H, s, Ar-OCH ₃), 5.02 (1H, s, Ar-OH), 6.31 (1H, d, J=16, H-2), 6.72 (1H, d, J=8.0, H-6''), 7.04 (1H, d, J=7.6, H-5'') 7.16 (1H, s, H-2''), 7.33 (1H, d, J=16, H-3) and 8.22 (1H, s, N-H)	δ 14.3 (C-18'), 16.8, 18.3, 21.6, 21.4, 22.7, 23, 24.3, 25.1, 27.5, 28.0, 29.2, 29.5, 29.7, 30.5, 31.3, 32.8, (C-17', C-16', C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 42.4 (C-1'), 56.1 (Ar-OCH ₃), 112.0 (C-2''), 113.6 (C-5''), 120.7 (C-2), 122.8 (C-6'') 126.4 (C-1''), 140.3 (C-3) 144.2 (C-4''), 151.3 (C-3'') and 171.2 (C-1)	Analyzed for molecular formula C ₂₈ H ₄₇ NO ₃ : C, 75.46; H, 10.63; N, 3.14. Found: C, 74.54; H, 10.61; N, 3.19
N-propyl-2-hydroxycinnamamide (14a)^[14]	2-hydroxycinnamic acid	Propylamine	78.7	1646 (C O stretching, amide I band), 1567 (N-H bending, amide II band), 1223 (C-N stretching, amide III band), 3249 (N-H stretching)	δ 0.91 (3H, t, J=7.2, H-3'), 1.36–1.64 (2H, m, H-2'), 2.92 (2H, t, J=7.8, H-1'), 5.12 (1H, s, Ar-OH), 6.50 (1H, d, J=16, H-2), 6.74 (1H, d, J=7.6, H-3''), 6.88 (1H, dd, J=8.0 & 1.2, H-5''), 7.10–7.14 (2H, dd, J=8.4 & 1.6, H-4''), 7.46 (1H, d, J=7.6, H-6''), 7.74 (1H, d, J=16, H-3) and 8.21 (1H, s, N-H)	δ 11.9 (C-3'), 26.3 (C-2'), 42.7 (C-1'), 116.6 (C-3''), 119.3 (C-2), 121.2 (C-5''), 122.4 (C-1''), 128.3 (C-6''), 129.1 (C-4'') 140.2 (C-3), 156.9 (C-2'') and 170.5 (C-1)	Analyzed for molecular formula C ₁₂ H ₁₅ NO ₂ : C, 70.22; H, 7.37; N, 6.82. Found: C, 70.19; H, 7.33; N, 6.89

N-hexyl-2-hydroxycinnamamide (14b)	2-hydroxycinnamic acid	Hexylamine	79.6	1647 (C=O stretching, amide I band), 1569 (N-H bending, amide II band), 1226 (C-N stretching, amide III band), 3244 (N-H stretching)	δ 0.84 (3H, t, J=6.4, H-6'), 1.20–1.53 (8H, m, H-2', H-3', H-4' and H-5'), 2.80 (2H, t, J=7.6, H-1'), 5.16 (1H, s, Ar-OH), 6.44 (1H, d, J=16, H-2), 6.74 (1H, d, J=7.6, H-3''), 6.89 (1H, dd, J=8.0 & 1.2, H-5''), 7.05-7.09 (2H, dd, J=8.0 & 1.6, H-4''), 7.42 (1H, d, J=7.6, H-6''), 7.61 (1H, d, J=16, H-3) and 8.22 (1H, s, N-H)	δ 14.3 (C-6'), 21.5, 25.4, 28.1, 31.5 (C-2', C-3', C-4' & C-5'), 42.4 (C-1'), 116.5 (C-3''), 116.9 (C-1''), 120.2 (C-2), 121.8 (C-5''), 123.1 (C-1''), 127.4 (C-6''), 129.0 (C-4'') 141.1 (C-3), 155.3 (C-2'') and 169.4 (C=O)	Analyzed for molecular formula $C_{15}H_{21}NO_2$: C, 72.84; H, 8.56; N, 5.66. Found: C, 72.80; H, 8.49; N, 5.65
N-heptyl-2-hydroxycinnamamide (14c)	2-hydroxycinnamic acid	Heptylamine	80.3	1645 (C=O stretching, amide I band), 1567 (N-H bending, amide II band), 1225 (C-N stretching, amide III band), 3247 (N-H stretching)	δ 0.83 (3H, t, J=6.4, H-7'), 1.22–1.58 (10H, m, H-2', H-3', H-4', H-5' and H-6'), 2.73 (2H, t, J=7.6, H-1'), 5.14 (1H, s, Ar-OH), 6.47 (1H, d, J=16, H-2), 6.75 (1H, d, J=7.6, H-3''), 6.91 (1H, dd, J=7.6 & 1.2, H-5''), 7.05-7.10 (2H, dd, J=7.6 & 1.2, H-4''), 7.42 (1H, d, J=7.6, H-6''), 7.64 (1H, d, J=16, H-3) and 8.24 (1H, s, N-H)	δ 15.0 (C-7'), 23.1, 23.5, 26.3, 28.8, 29.4 (C-6', C-5', C-4', C-3' & C-2'), 41.3 (C-1'), 116.5 (C-3''), 116.9 (C-1''), 119.7 (C-2), 121.8 (C-5''), 127.4 (C-6''), 129.1 (C-4'') 140.1 (C-3), 155.3 (C-2'') and 169.4 (C-1)	Analyzed for molecular formula $C_{16}H_{23}NO_2$: C, 73.53; H, 8.87; N, 5.36. Found: C, 73.54; H, 8.85; N, 5.41

N-undecyl-2-hydroxycinnamamide (14d)	2-hydroxycinnamic acid	Undecylamine	81	1642 (CO stretching, amide I band), 1569 (N-H bending, amide II band), 1224 (C-N stretching, amide III band), 3245 (N-H stretching)	<p>δ 0.83 (3H, t, J=6.8, H-11'), 1.20–1.51 (18H, m, H-2', H-3', H-4', H-5' H-6', H-7', H-8', H-9' and H-10'), 2.72 (2H, t, J=7.6, H-1'), 5.13 (1H, s, Ar-OH), 6.42 (1H, d, J=16, H-2), 6.74 (1H, d, J=7.6, H-3''), 6.89 (1H, dd, J=8.0 & 1.2, H-5''), 7.04-7.11 (2H, dd, J=7.6 & 1.6, H-4''), 7.42 (1H, d, J=7.6, H-6''), 7.60 (1H, d, J=16, H-3) and 8.22 (1H, s, N-H)</p>	<p>δ 15.1 (C-11'), 24.0, 25.4, 26.2, 27.4, 28.3, 29.2, 30.0, 31.2, 31.6, 32.1 (C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 41.4 (C-1'), 115.4 (C-3''), 116.3 (C-1''), 119.6 (C-2), 121.4 (C-5''), 126.3 (C-6''), 128.9 (C-4''), 141.0 (C-3), 155.4 (C-2'') and 170.4 (C-1)</p>	<p>Analyzed for molecular formula $C_{20}H_{31}NO_2$: C, 75.67; H, 9.84; N, 4.41. Found: C, 75.56; H, 9.89; N, 4.42</p>
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N-hexadecyl-2-hydroxycinnamamide (14e)	2-hydroxycinnamic acid	Hexadecylamine	77.6	1645 (CO stretching, amide I band), 1571 (N-H bending, amide II band), 1223 (C-N stretching, amide III band), 3247 (N-H stretching)	δ 0.83 (3H, t, J=6.8, H-16'), 1.20–1.52 (28H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14' and H-15'), 2.74 (2H, t, J=7.6, H-1'), 5.14 (1H, s, Ar-OH), 6.41 (1H, d, J=16, H-2), 6.78 (1H, d, J=7.6, H-3''), 6.90 (1H, dd, J=8.0 & 1.2, H-5''), 7.05–7.10 (2H, dd, J=7.6 & 1.6, H-4''), 7.44 (1H, d, J=7.6, H-6''), 7.62 (1H, d, J=16, H-3) and 8.23 (1H, s, N-H)	δ 14.1 (C-16'), 18.1, 19.7, 20.3, 21.2, 22.1, 24.3, 25.8, 27.3, 28.0, 28.3, 29.0, 29.5, 31.1, 32.3 (C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 43.1 (C-1'), 116.1 (C-3''), 117.0 (C-1''), 120.1 (C-2), 121.3 (C-5''), 125.1 (C-6''), 128.7 (C-4'') 141.2 (C-3), 153.1 (C-2'') and 172.6 (C-1)	Analyzed for molecular formula C ₂₅ H ₄₁ NO ₂ : C, 77.47; H, 10.66; N, 3.61. Found: C, 77.49; H, 10.64; N, 3.65
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N-octadecyl-2-hydroxycinnamamide (14f)	2-hydroxycinnamic acid	Octadecylamine	80.2	1644 (C O stretching, amide I band), 1565 (N-H bending, amide II band), 1244 (C-N stretching, amide III band), 3244 (N-H stretching)	δ 0.84 (3H, t, J=7.2, H-18'), 1.20–1.52 (32H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14', H-15', H-16' and H-17'), 2.72 (2H, t, J=7.6, H-1'), 5.13 (1H, s, Ar-OH), 6.44 (1H, d, J=15.6, H-2), 6.76 (1H, d, J=7.6, H-3''), 6.89 (1H, dd, J=8.0 & 1.2, H-5'') 7.05-7.10 (2H, dd, J=7.6 & 1.6, H-4''), 7.42 (1H, d, J=7.6, H-6''), 7.67 (1H, d, J=15.6, H-3) and 8.2 (1H, s, N-H)	δ 14.2 (C-18'), 17.8, 19.1, 20.5, 21.6, 22.1, 23.3, 24.5, 26.0, 27.6, 28.1, 29.0, 29.5, 30.0, 30.5, 31.9, 32.3, (C-17', C-16', C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 41.6 (C-1'), 119.8 (C-2), 115.4 (C-3''), 116.0 (C-1''), 119.2 (C-5''), 123.9 (C-6''), 126.5 (C-4'') 140.1 (C-3), 152.0 (C-2'') and 169.3 (C-1)	Analyzed for molecular formula $C_{27}H_{45}NO_2$: C, 78.02; H, 10.91; N, 3.37. Found: C, 78.07; H, 10.90; N, 3.39
N-propylcinnamamide (15a)^[15]	Cinnamic acid	Propylamine	81.1	1642 (CO stretching, amide I band), 1563 (N-H bending, amide II band), 1256 (C-N stretching, amide III band), 3448 (N-H stretching)	δ 0.88 (3H, t, J=7.2, H-3'), 1.37–1.65 (2H, m, H-2'), 2.75 (2H, t, J=7.6, H-1'), 6.53 (1H, d, J=16, H-2), 7.42 (1H, d, J=16, H-3), 7.3-7.5 (5H, m, Ar-H), 8.04 (1H, s, N-H)	δ 13.9 (C-3'), 26.5 (C-2'), 41.9 (C-1'), 119.2 (C-2), 126.3 (C-4''), 127.5 (C-2'' & C-6''), 128.6 (C-3'' & C-5''), 135.3 (C-1'') 140.1 (C-3) and 171.4 (C-1)	Analyzed for molecular formula $C_{12}H_{15}NO$: C, 76.16; H, 7.99; N, 7.40. Found: C, 76.23; H, 7.96; N, 7.45

N-hexyl-cinnamamide (15b)^[16]	Cinnamic acid	Hexylamine	78.7	1643 (CO stretching, amide I band), 1561 (N-H bending, amide II band), 1250 (C-N stretching, amide III band), 3449 (N-H stretching)	δ 0.83 (3H, t, J=7.2, H-6'), 1.25–1.75 (8H, m, H-2', H-3', H-4' and H-5'), 2.76 (2H, t, J=7.6, H-1'), 6.60 (1H, d, J=16, H-2), 7.53 (1H, d, J=16, H-3), 7.3–7.6 (5H, m, Ar-H), 8.17 (1H, s, N-H)	δ 14.2 (C-6'), 21.9, 26.0, 27.2, 30.7 (C-2', C-3', C-4' & C-5'), 42.4 (C-1'), 119.7 (C-2), 126.5 (C-4''), 128.1 (C-2'' & C-6''), 129.6 (C-3'' & C-5''), 134.9 (C-1'') 139.6 (C-3) and 170.5 (C-1)	Analyzed for molecular formula C ₁₅ H ₂₁ NO: C, 77.88; H, 9.15; N, 6.05. Found: C, 77.89; H, 9.12; N, 6.09
N-heptyl-cinnamamide (15c)^[17]	Cinnamic acid	Heptylamine	80.4	1642 (CO stretching, amide I band), 1563 (N-H bending, amide II band), 1255 (C-N stretching, amide III band), 3447 (N-H stretching)	δ 0.83 (3H, t, J=6.8, H-7'), 1.21–1.65 (10H, m, H-2', H-3', H-4', H-5' and H-6'), 2.74 (2H, t, J=7.6, H-1'), 6.28 (1H, d, J=16, H-2), 7.47 (1H, d, J=16, H-3), 6.4–7.5 (5H, m, Ar-H), 8.14 (1H, s, N-H)	δ 14.2 (C-7'), 22.0, 22.5, 26.1, 27.4, 28.3 (C-6', C-5', C-4', C-3' & C-2'), 41.6 (C-1'), 120.1 (C-2), 126.3 (C-4''), 127.5 (C-2'' & C-6''), 128.9 (C-3'' & C-5''), 135.7 (C-1''), 140.1 (C-3) and 170.7 (C-1)	Analyzed for molecular formula C ₁₆ H ₂₃ NO: C, 78.32; H, 9.45; N, 5.71. Found: C, 78.31; H, 9.52; N, 5.73

N-undecyl-cinnamamide (15d)	Cinnamic acid	Undecylamine	81.5	1642 (CO stretching, amide I band), 1561 (N-H bending, amide II band), 1256 (C-N stretching, amide III band), 3448 (N-H stretching)	δ 0.84 (3H, t, J=6.4, H-11'), 1.21–1.56 (18H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9' and H-10'), 2.74 (2H, t, J=7.6, H-1'), 6.46 (1H, d, J=16, H-2), 7.2–7.5 (5H, m, Ar-H) and 7.61 (1H, d, J=16, H-3), 7.97 (1H, s, N-H)	δ 14.2 (C-11'), 22.4, 23.6, 26.5, 27.4, 27.8, 28.8, 30.6, 31.1, 31.6, 32.0 (C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 41.4 (C-1'), 120.2 (C-2), 126.1 (C-4''), 127.5 (C-2'' & C-6''), 128.8 (C-3'' & C-5''), 135.3 (C-1'') 141.2 (C-3) and 169.7 (C-1)	Analyzed for molecular formula C ₂₀ H ₃₁ NO: C, 79.68; H, 10.36; N, 4.65. Found: C, 79.62; H, 10.41; N, 4.64
N-hexadecyl-cinnamamide (15e)	Cinnamic acid	Hexadecylamine	79.8	1645 (CO stretching, amide I band), 1562 (N-H bending, amide II band), 1254 (C-N stretching, amide III band), 3445 (N-H stretching)	δ 0.86 (3H, t, J=6.8, H-16'), 1.22–1.60 (28H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14' and H-15'), 2.76 (2H, t, J=7.6, H-1'), 6.48 (1H, d, J=16, H-2), 7.56 (1H, d, J=16, H-3), 7.2–7.5 (5H, m, Ar-H), 8.29 (1H, s, N-H)	δ 14.3 (C-16'), 19.0, 19.5, 20.0, 21.5, 21.9, 22.5, 24.2, 27.6, 28.5, 28.9, 29.1, 29.7, 31.4, 32.0 (C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 41.8 (C-1'), 119.2 (C-2), 125.5 (C-4''), 127.8 (C-2'' & C-6''), 128.7 (C-3'' & C-5''), 135.9 (C-1'') 140.2 (C-3) and 170.0 (C-1)	Analyzed for molecular formula C ₂₅ H ₄₁ NO: C, 80.80; H, 11.12; N, 3.77. Found: C, 80.89; H, 11.10; N, 3.65

N-octadecyl-cinnamamide (15f)^[18]	Cinnamic acid	Octadecylamine	81.4	1642 (C O stretching, amide I band), 1561 (N-H bending, amide II band), 1256 (C-N stretching, amide III band), 3448 (N-H stretching)	<p>δ 0.83 (3H, t, J=7.2, H-18'), 1.20–1.52 (32H, m, H-2', H-3', H-4', H-5', H-6', H-7', H-8', H-9', H-10', H-11', H-12', H-13', H-14', H-15', H-16' and H-17'), 2.70 (2H, t, J=7.4, H-1'), 6.44 (1H, d, J=15.6, H-2), 7.2-7.4 (5H, m, Ar-H) and 7.67 (1H, d, J=15.6, H-3), 8.17 (1H, s, N-H)</p>	<p>δ 14.3 (C-18'), 17.8, 19.1, 20.5, 22.2, 22.5, 23.3, 24.5, 26.5, 27.6, 28.9, 29.1, 29.2, 30.0, 30.5, 31.7, 32.5, (C-17', C-16', C-15', C-14', C-13', C-12', C-11', C-10', C-9', C-8', C-7', C-6', C-5', C-4', C-3' and C-2'), 42.5 (C-1'), 120.2 (C-2), 125.7 (C-4''), 127.3 (C-2'' & C-6''), 128.9 (C-3'' & C-5''), 136.1 (C-1'') 140.3 (C-3) and 171.4 (C-1)</p>	<p>Analyzed for molecular formula C₂₇H₄₅NO: C, 81.14; H, 11.35; N, 3.50. Found: C, 81.18; H, 11.34; N, 3.57</p>
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^1H and ^{13}C -spectra of compounds 9a, 10a, 10b, 10d, 10e, 10f, 11c, 11d, 11e, 12e, 13d, 13e, 13f, 14b, 14c, 14d, 14e, 14f, 15d and 15e

Fig. 1 ^1H NMR spectrum of **9a** in DMSO

Fig. 2 ^{13}C NMR spectrum of **9a** in DMSO

Fig. 3 ^1H NMR spectrum of **10a** in DMSO

Fig. 4 ^{13}C NMR spectrum of **10a** in DMSO

Fig. 5 ^1H NMR spectrum of **10b** in DMSO

Fig. 6 ^{13}C NMR spectrum of **10b** in DMSO

Fig. 7 ^1H NMR spectrum of **10d** in DMSO

Fig. 8 ^{13}C NMR spectrum of **10d** in DMSO

P12

Current Data Parameters
NAME P12
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20130724
Time_ 9.47
INSTRUM spect
PROBHD 5 mm BBO BB-1H
PULPROG zg30
TD 65536
SOLVENT DMSO
NS 16
DS 2
SWH 8223.683 Hz
FIDRES 0.125483 Hz
AQ 3.9846387 sec
RG 90.5
DW 60.800 usec
DE 6.00 usec
TE 673.2 K
D1 1.00000000 sec
TDO 1

----- CHANNEL f1 -----
NUC1 1H
P1 13.10 usec
PL1 0.00 dB
SFO1 400.1404710 MHz

F2 - Processing parameters
S1 32768
SF 400.1380000 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.40

Fig. 9 ^1H NMR spectrum of 10e in DMSO

Fig. 10 ^{13}C NMR spectrum of **10e** in DMSO

Fig. 11 ^1H NMR spectrum of **10f** in DMSO

Fig. 12 ^{13}C NMR spectrum of **10f** in DMSO

Fig. 13 ^1H NMR spectrum of **11c** in DMSO

Fig. 14 ^{13}C NMR spectrum of **11c** in DMSO

Fig. 15 ^1H NMR spectrum of **11d** in DMSO

Fig. 16 ^{13}C NMR spectrum of **11d** in DMSO

Fig. 17 ^1H NMR spectrum of **11e** in DMSO

Fig. 18 ^{13}C NMR spectrum of **11e** in DMSO

P24

Fig. 19 ^1H NMR spectrum of **12e** in DMSO

P24

Fig. 20 ^{13}C NMR spectrum of **12e** in DMSO

Fig. 21 ^1H NMR spectrum of **13d** in DMSO

Fig. 22 ^{13}C NMR spectrum of **13d** in DMSO

Fig. 23 ^1H NMR spectrum of **13e** in DMSO

Fig. 24 ^{13}C NMR spectrum of **13e** in DMSO

Fig. 25 ^1H NMR spectrum of **13f** in DMSO

P30

Current Data Parameters
NAME F30
EXPNO 2
PROCNO 1

F2 - Acquisition Parameters
Date_ 20130722
Time_ 15.43
INSTRUM spect
PROBHD 5 mm BBO BB-1H
PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 3000
DS 4
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631988 sec
RG 203
DW 20.800 usec
DE 6.00 usec
TE 673.2 K
D1 2.0000000 sec
d11 0.0300000 sec
DELTA 1.89999998 sec
TDO 1

===== CHANNEL f1 =====
NUC1 13C
P1 7.10 usec
PL1 -4.00 dB
SFO1 100.6248416 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 0.00 dB
PL12 15.70 dB
PL13 19.70 dB
SFO2 400.1396006 MHz

F2 - Processing parameters
SI 32768
SF 100.6147800 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
GC 1

Fig. 26 ^{13}C NMR spectrum of 13f in DMSO

Fig. 27 ^1H NMR spectrum of **14b** in DMSO

Fig. 28 ^{13}C NMR spectrum of **14b** in DMSO

Fig. 29 ^1H NMR spectrum of **14c** in DMSO

Fig. 30 ^{13}C NMR spectrum of **14c** in DMSO

3

Fig. 31 ^1H NMR spectrum of **14d** in DMSO

Fig. 32 ^{13}C NMR spectrum of **14d** in DMSO

Fig. 33 ^1H NMR spectrum of **14e** in DMSO

Fig. 34 ^{13}C NMR spectrum of **14e** in DMSO

Fig. 35 ^1H NMR spectrum of **14f** in DMSO

Fig. 36 ^{13}C NMR spectrum of **14f** in DMSO

Fig. 37 ^1H NMR spectrum of **15d** in DMSO

Fig. 38 ^{13}C NMR spectrum of **15d** in DMSO

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Fig. 39 ^1H NMR spectrum of **15e** in DMSO

Fig. 40 ^{13}C NMR spectrum of **15e** in DMSO