Supporting information

DOI:

Title: **Simple synthesis of imidazo[1,2-*a*]pyridine derivatives bearing 2-aminonicotinonitrile or 2-aminochromene moiety**

Author(s): **Arslane-Larbi Haouchine1, Youssef Kabri2, Saléha Bakhta1\*, Christophe Curti2, Bellara Nedjar-Kolli1\*, Patrice Vanelle2\***

1Laboratory of Applied Organic Chemistry, Houari Boumediene University of Sciences and Technology, BP 32, El-Alia, Bab-Ezzouar, 16111, Algiers, Algeria.

2Aix Marseille University, Institut de Chimie Radicalaire ICR, UMR CNRS 7273, Laboratoire de Pharmaco-Chimie Radicalaire, Faculté de Pharmacie, 27 Boulevard Jean Moulin-CS 30064,13385 Marseille CEDEX 05, France.

E-Mail: patrice.vanelle@univ-amu.fr

**EXPERIMENTAL**

  **General**

Melting points were determined on Büchi B-540 and are uncorrected. HRMS were carried out at the Spectropole, Faculté des Sciences et Techniques de Saint-Jérôme, Marseille. 250 MHz 1H NMR spectra (reference CDCl3 δ = 7.26, DMSO-*d*6 δ = 2.50) and 62.5 MHz 13C NMR spectra (reference CDCl3 δ = 77.0, DMSO-*d*6 δ = 39.7) were recorded on a Bruker ARX at the Faculté de Pharmacie de Marseille. Solvents were dried by conventional methods. The following adsorbent was used for column chromatography: silica gel 60 (Merck, particle size 0.063-0.200 mm, 70-230 mesh ASTM). TLC was performed on 5 cm x 10 cm aluminium plates coated with silica gel 60F-254 (Merck) in an appropriate eluent. HRMS spectra were recorded on a QStar Elite (Applied Biosystems SCIEX) spectrometer. PEG was a matrix for HRMS. Microwave reactions were performed with a Biotage® Initiator Microwave oven using 10-20 mL sealed vials; temperatures were measured with an IR-sensor and reaction times are given as hold times.

**Synthesis of 2-(imidazo[1,2-*a*]pyridin-2-ylmethylene)malononitrile 2** :

 To a solution of 2-(imidazo[1,2-*a*]pyridine-2-carbaldehyde (10 mmol) in water (80 mL) was added malononitrile (10 mmol) and the reaction mixture was stirred at room temperature for 30 min. Yellow precipitate appeared and was filtered, washed with water and dried in a dessicator cabinet.

Yield 95%, yellow solid, mp 210 °C (recrystallized in propan-2-ol). 1H NMR (DMSO-*d*6, 250 MHz) δ = 8.67 (dt, *J* = 6.9, 1.1 Hz, 1H, HAr), 8.61 (s, 1H, HAr), 8.54 (s, 1H, HAr), 7.64 (dd, *J* = 9.3, 0.9 Hz, 1H, HAr), 7.41 (ddd, *J* = 15.9, 6.7, 1.3 Hz, 1H, HAr), 7.03 (td, *J* = 13.6, 6.8, 1.1 Hz, 1H, HAr) ppm. 13C NMR (DMSO-*d*6, 62.5 MHz) δ = 152.6, 145.7, 137.1, 128.2, 127.9, 121.8, 117.6, 114.9, 114.1, 113.3, 79.0 ppm. HRMS: calcd. for C11H6N4 [M + H+]: 195.0665; found: 195.0668 .

**General procedure for the synthesis of 2-aminopyridine derivatives 3a-i :**

A solution of 2-(imidazo[1,2-*a*]pyridin-2-ylmethylene)malononitrile **2** (1 mmol)**,** substituted acetophenones (1 mmol) and ammonium acetate (1 mmol) was heated at 100 °C for 3 h. After cooling, water was added (100 mL) and the mixture was extracted with dichloromethane (3 x 100 mL). The organic layer was dried over Na2SO4, evaporated and the crude product was purified by column chromatography [silica gel, eluent: ethyl acetate/petroleum ether (1:1)] and recrystallized in propan-2-ol.

**2-Amino-4-(imidazo[1,2-*a*]pyridin-2-yl)-6-phenylnicotinonitrile 3a :** Yield 80%, light yellow solid, mp 235 °C. 1H NMR (DMSO-*d*6,250 MHz) δ = 8.80 (s, 1H, HAr), 8.71 (dd, *J*= 6.7, 1.0 Hz, 1H, HAr), 8.10-8.13 (m, 2H, 2 HAr), 7.87 (s, 1H, HAr), 7.66 (d, *J* = 9.2 Hz, 1H, HAr), 7.50-7.56 (m, 3H, 3 HAr), 7.36 (ddd, *J*= 15.9, 6.7, 1.1 Hz, 1H, HAr), 6.96-7.00 (m, 3H, HAr, NH2) ppm. 13C NMR (DMSO-*d*6, 62.5 MHz) δ = 161.3, 158.6, 146.4, 144.4, 139.6, 137.7, 130.1, 128.8, 128.8, 127.6, 127.0, 127.0, 126.3, 117.7, 117.1, 113.3, 113.2, 107.2, 84.1 ppm. HRMS: calcd. for C19H13N5 [M + H+]312.1244; found 312.1242.

 **2-Amino-4-(imidazo[1,2-*a*]pyridin-2-yl)-6-(*p*-tolyl)nicotinonitrile 3b :** Yield 86%, green solid, mp 238 °C. 1H NMR (DMSO-*d*6, 250 MHz) δ = 8.79 (s, 1H, HAr), 8.71 (d, *J* = 6.7 Hz, 1H, HAr), 8.00 (d, *J* = 9.1 Hz, 2H, 2 HAr), 7.85 (s, 1H, HAr), 7.66 (d, *J* = 9.1 Hz, 1H, HAr), 7.31-7.38 (m, 3H, 3 HAr), 6.96-7.04 (m, 3H, HAr, NH2), 2.37 (s, 3H, CH3 ) ppm.13C NMR (DMSO-*d*6, 62.5 MHz) δ = 161.3, 158.5, 146.2, 144.4, 139.9, 139.7, 134.9, 129.4, 129.4, 127.6, 127.0, 127.0, 126.3, 117.8, 117.1, 113.2, 113.1, 106.9, 83.7, 20.9 ppm. HRMS: calcd. for C20H15N5 [M + H+]326.1400; found 326.1400.

 **2-Amino-6-(4-chlorophenyl)-4-(imidazo[1,2-*a*]pyridin-2-yl)nicotinonitrile 3c :** Yield 82%, light green solid, mp 282 °C. 1H NMR (DMSO-*d*6,250 MHz) δ = 8.80 (s, 1H, HAr), 8.71 (d, *J* = 6.7 Hz, 1H, HAr), 8.12 (d, *J* = 8.5 Hz, 2H, 2 HAr), 7.87 (s, 1H, HAr), 7.57-7.67 (m, 3H, 3 HAr), 7.39 (ddd, *J*  = 15.8, 6.7, 0.9 Hz , 1H, HAr), 7.04 (s, 2H, NH2), 6.97 (t, *J*  = 6.8, 1H, HAr) ppm. 13C NMR (DMSO-*d*6, 62.5 MHz) δ = 161.3, 157.2, 146.5, 144.4, 139.5, 136.5, 134.9, 128.8, 128.8, 128.8, 128.8, 127.6, 126.4, 117.6, 117.1, 113.4, 113.2, 107.1, 84.4 ppm. HRMS: calcd. for C19H12ClN5 [M + H+]346.0854; found 346.0854.

 **2-Amino-4-(imidazo[1,2-*a*]pyridin-2-yl)-6-(3-methoxyphenyl)nicotinonitrile 3d :** Yield 82%, light green solid, mp 240 °C. 1H NMR (DMSO-*d*6, 250 MHz) δ = 8.80 (s, 1H, HAr), 8.71 (d, *J* = 6.7 Hz, 1H, HAr), 7.84 (s, 1H, HAr), 7.66-7.70 (m, 3H, 3 HAr), 7.32-7.47 (m, 2H, 2 HAr), 6.97-7.09 (m, 4H, 2 HAr, NH2), 3.84 (s, 3H, OCH3) ppm. 13C NMR (DMSO-*d*6, 62.5 MHz) δ = 161.2, 159.6, 158.3, 146.3, 144.4, 139.7, 139.2, 129.9, 127.6, 126.3, 119.4, 117.7, 117.2, 115.7, 113.3, 113.2, 112.4, 107.4, 84.3, 55.3 ppm. HRMS: calcd. for C20H15N5O [M + H+]342.1349; found 342.1349.

**2-Amino-6-(4-flurophenyl)-4-(imidazo[1,2-*a*]pyridin-2-yl)nicotinonitrile 3e :** Yield 71%, light yellow solid, mp 263 °C. 1H NMR (DMSO-*d*6, 250 MHz) δ =8.80 (s, 1H, HAr), 8.72 (d, *J* = 6.7 Hz, 1H, HAr), 8.14-8.20 (m, 2H ,2 HAr), 7.85 (s, 1H, HAr), 7.66 (d, *J* = 9.1 Hz, 1H, HAr), 7.32-7.39 (m, 3H, 3 HAr), 6.96-7.02 (m, 3H, HAr, NH2) ppm. 13C NMR (DMSO-*d*6, 62.5 MHz) δ = 163.6 (d, *J* = 246.8 Hz, C-F), 161.3, 157.5, 146.5, 144.4, 139.6, 134.2 (d, *J* = 2.7 Hz, C), 129.3 (d, *J* = 8.7 Hz, 2 CH), 127.6, 126.4, 117.7, 117.1, 115.9 (d, *J* = 21.6 Hz, 2 CH), 113.3, 113.2, 107.0, 84.1 ppm. HRMS: calcd. for C19H12FN5 [M + H+] 330.1150; found 330.1150.

 **2-Amino-6-(4-bromophenyl)-4-(imidazo[1,2-*a*]pyridin-2-yl)nicotinonitrile 3f :** Yield 81%, dark yellow solid, mp 267 °C. 1H NMR (DMSO-*d*6,250 MHz) δ = 8.80 (s, 1H, HAr), 8.71 (d, *J* = 6.7 Hz, 1H, HAr ), 8.04 (d, *J* = 9.1 Hz, 2H, 2 HAr), 7.87 (s, 1H, HAr), 7.66-7.74 (m, 3H, 3 HAr), 7.32-7.38 (m, 1H, HAr), 7.04 (s, 2H, NH2), 6.99 (t, *J* = 6.6 Hz, 1H, HAr) ppm. 13C NMR (DMSO-*d*6, 62.5 MHz) δ = 161.3, 157.2, 146.5, 144.4, 139.5, 136.8, 131.7, 131,7, 129.0, 129.0, 127.6, 126.4, 123.8, 117.6, 117.1, 113.4, 113.2, 107.0, 84.4 ppm. HRMS: calcd. for C19H12BrN5 [M + H+]390.0349; found 390.0346.

 **2-Amino-4-(imidazo[1,2-*a*]pyridin-2-yl)-6-(4-nitrophenyl)nicotinonitrile 3g :** Yield 81%, orange solid, mp 294 °C. 1H NMR (DMSO-*d*6,250 MHz) δ  = 8.83 (s, 1H, HAr), 8.72-8.77 (m, 1H, HAr), 8.37 (m, 3H, 3 HAr), 7.98 (s, 1H, HAr), 7.90 (dt, *J* = 8.65, 1.5 Hz, 1H, HAr), 7.65-7.69 (m, 1H, HAr), 7.33-7.39 (m, 1H, HAr), 7.15 (s, 2H, NH2), 7.00 (t, *J* = 6.7 Hz, 1H, HAr) ppm. 13C NMR (DMSO-*d*6, 62.5 MHz) δ = 161.2, 156.0, 148.2, 146.8, 144.5, 143.6, 139.3, 130.0, 128.2, 127.8, 126.5, 124.0, 123.8, 117.3, 117.1, 113.5, 113.2, 108.2, 85.5 ppm. HRMS: calcd. for C19H12N6O2 [M + H+]357.1095; found 357.1094.

 **2-Amino-6-(4-cyanophenyl)-4-(imidazo[1,2-*a*]pyridin-2-yl)nicotinonitrile** **3h :** Yield 76%, light yellow solid, mp 255 °C. 1H NMR (DMSO-*d*6,250 MHz) δ = 8.82 (s, 1H, HAr), 8.71 (d, *J* = 6.7 Hz, 1H, HAr), 8.27 (d, *J* = 8.3 Hz, 2H, 2 HAr), 7.98 (d, *J* = 8.3 Hz, 2H, 2 HAr), 7.94 (s, 1H, HAr), 7.66 (d, *J* = 8.8 Hz, 1H, HAr), 7.33-7.39 (m, 1H, HAr), 7.12 (s, 2H, NH2), 7.00 (t, *J* = 6.9 Hz, 1H, HAr) ppm. 13C NMR (DMSO-*d*6, 62.5 MHz) δ = 161.3, 156.4, 154.4, 146.8, 144.5, 141.9, 139.4, 132.7, 132.7, 128.0, 127.6, 126.5, 118.7, 117.4, 117.2, 113.5, 113.2, 112.2, 107.9, 85.3 ppm. HRMS: calcd. for C20H12N6 [M + H+]337.1196 ; found 337.1195.

 **2-Amino-6-(2-hydroxyphenyl)-4-(imidazo[1,2-*a*]pyridin-2-yl)nicotinonitrile 3i :** Yield 58%, dark yellow solid, mp 288 °C. 1H NMR (DMSO-*d*6,250 MHz) δ = 13.43 (s, 1H, OH), 8.84 (s, 1H, HAr), 8.71 (d, *J* = 6.6 Hz, 1H, HAr), 7.97-8.02 (m, 2H, 2 HAr), 7.67 (d, *J* = 8.9 Hz, 1H, HAr), 7.33-7.47 (m, 4H, 4 HAr), 6.91-7.02 (m, 3H, HAr, NH2) ppm. 13C NMR (DMSO-*d*6, 62.5 MHz) δ = 159.6, 159.5, 158.9, 146.6, 144.5, 139.4, 132.4, 127.8, 127.6, 126.5, 119.1, 118.3, 118.2, 118.2, 117.2, 113.7, 113.3, 106.0, 83.6 ppm. HRMS: calcd. for C19H13N5O [M + H+]328.1193; found 328.1190.

 **General procedure for synthesis of 2-amino-4*H*-chromenes derivatives 4a-c**, **5a-c** **and 6a-c** :

 A solution of 2-(imidazo[1,2-*a*]pyridin-2-ylmethylene)malononitrile **2** (1 mmol),substituted naphtol, hydroxyquinoline or phenol (1 mmol) and tetrabutyl ammonium bromide (3 mmol) in water (10 mL) was heated at 100 °C for 4 h. After cooling, water was added (100 mL) and the mixture was extracted with dichloromethane (3 x 100 ml). The organic layer was dried over Na2SO4, evaporated and the crude product was purified by column chromatography [silica gel, eluent: ethyl acetate/petroleum ether (1:1)] and recrystallized in propan-2-ol. Noted that, the reaction between 2-(imidazo[1,2-*a*]pyridine-2-ymethylene)malononitrile **2** (1 mmol) andsubstituted phenol (1 mmol) was carried out under microwave irradiation at 110 °C for 2 h.

**2-Amino-4-(imidazo[1,2-*a*]pyridin-2-yl)-4*H*-benzo[*g*]chromene-3-carbonitrile 4a :** Yield 90%, white solid, mp 254 °C. 1H NMR (DMSO-*d*6,250 MHz) δ = 8.49 (d, *J* = 6.7 Hz, 1H, HAr), 8.22 (d, *J* = 7.4 Hz, 1H, HAr), 7.84-7.90 (m, 2H, 2 HAr), 7.58-7.62 (m, 3H, 3 HAr), 7.30-7.45 (m, 2H, 2 HAr), 7.16-7.20 (m, 3H, HAr, NH2), 6.83 (t, *J* = 6.9 Hz, 1H, HAr), 5.06 (s, 1H, CH) ppm.13C NMR (DMSO-*d*6, 62.5 MHz) δ = 160.6, 149.7, 144.5, 142.9, 132.7, 127.7, 126.9, 126.7, 126.5, 126.7, 124.6, 123.6, 122.8, 121.3, 120.6, 117.4, 116.5, 111.9, 109.8, 54.9, 35.3 ppm. HRMS: calcd. for C21H14N4O [M + H+]339.1240 ; found 339.1240.

**2-Amino-7-hydroxy-4-(imidazo[1,2-*a*]pyridin-2-yl)-4*H*-benzo[*g*]chromene-3-carbonitrile 4b :** Yield67%, dark yellow solid, mp 298 °C. 1H NMR (DMSO-*d*6,250 MHz) δ = 9.68 (s, 1H, OH), 8.43 (dt, *J* = 6.6, 1.0 Hz, 1H, HAr), 7.93 (d, *J* = 9.0 Hz, 1H, HAr), 7.76 (s, 1H, HAr), 7.64 (d, *J* = 9.1 Hz, 1H, HAr), 7.38 (d, *J* = 9.0 Hz, 1H, HAr), 7.10-7.20 (m, 3H, 3 HAr), 7.00-7.05 (m, 1H, HAr), 6.91 (s, 2H, NH2), 6.80 (t, *J* = 6.5 Hz, 1H, HAr), 5.39 (s, 1H, CH) ppm.13C NMR (DMSO-*d*6, 62.5 MHz) δ = 160.7, 154.4, 149.6, 144.6, 144.1, 132.3, 127.2, 126.8, 125.2, 124.4, 124.3, 121.0, 119.2, 117.0, 116.4, 115.7, 111.8, 109.7, 109.3, 56.1, 32.6 ppm. HRMS: calcd. for C21H14N4O2 [M + H+]355.1190; found 355.1192.

 **2-Amino-6-bromo-4-(imidazo[1,2-*a*]pyridin-2-yl)-4*H*-benzo[*g*]chromene-3-carbonitrile 4c:** Yield 64%, dark yellow solid, mp 297 °C. 1H NMR (DMSO-*d*6,250 MHz) δ = 8.44 (d, *J* = 6.7 Hz, 1H, HAr), 8.19-8.21 (m, 1H, HAr), 8.05 (d, *J* = 9.1 Hz, 1H, HAr), 7.88 (d, *J* = 9.1 Hz, 1H, HAr), 7.80-7.81 (m, 1H, HAr), 7.56-7.60 (m, 1H, HAr), 7.33-7.41 (m, 2H, 2 HAr), 7.10-7.16 (m, 1H, HAr), 7.03 (s, 2H, NH2), 6.80 (t, *J* = 6.7 Hz, 1H, HAr), 5.50 (s, 1H, CH) ppm.  13C NMR (DMSO-*d*6, 62.5 MHz) δ = 160.4, 149.3, 147.0, 144.2, 132.0, 130.1, 129.7, 129.1, 128.3, 126.9, 126.1, 124.5, 120.7, 118.2, 118.0, 116.5, 116.0, 111.9, 109.4, 56.0, 32.4 ppm. HRMS: calcd. for C21H13BrN4O [M + H+]419.0328; found 419.0328.

**2-Amino-4-(imidazo[1,2-*a*]pyridin-2-yl)-4*H*-pyrano[3,2-*h*]quinoline-3-carbonitrile 5a :** Yield 68%, light green solid, mp 259 °C. 1H NMR (DMSO-*d*6, 250 MHz) δ = 8.93 (dd, *J* = 4.2, 1.6 Hz, 1H, HAr), 8.48 (dt, *J* *=* 6.7, 1.1 Hz, 1H, HAr), 8.32 (dd, *J* = 8.3, 1.6 Hz, 1H, HAr), 7.86 (s, 1H, HAr), 7.57-7.67 (m, 2H, 2 HAr), 7.40-7.46 (m, 2H, 2 HAr), 7.14-7.21 (m, 3H, HAr, NH2), 6.84 (td, *J* = 13.5, 6.7, 1.0 Hz, 1H, HAr), 5.12 (s, 1H, CH) ppm. 13C NMR (DMSO-*d*6, 62.5 MHz) δ = 160.8, 150.1, 149.6, 144.6, 143.2, 137.5, 136.0, 127.7, 127.2, 127.0, 124.7, 123.2, 122.0, 121.4, 120.7, 116.5, 111.9, 109.8, 54.6, 35.5 ppm. HRMS: calcd. for C20H13N5O [M + H+]340.1193; found 340.1194.

**2-Amino-4-(imidazo[1,2-*a*]pyridin-2-yl)-9-methyl-4*H*-pyrano[3,2-*h*]quinoline-3-carbonitrile 5b :** Yield 75%, dark green solid, mp 217 °C. 1H NMR (DMSO-*d*6,250 MHz) δ = 8.49-8.52 (m, 1H, HAr), 8.19-8.23 (m, 1H, HAr), 7.84 (s, 1H, HAr), 7.57 (d, *J* = 8.5 Hz, 1H, HAr), 7.42-7.48 (m, 2H, 2 HAr), 7.31 (d, *J* = 8.5 Hz, 1H, HAr), 7.16-7.22 (m, 1H, HAr), 7.09 (s, 2H, NH2), 6.85 (t, *J* = 6.5 Hz, 1H, HAr), 5.09 (s, 1H, CH), 2.69 (s, 3H, CH3 ) ppm. 13C NMR (DMSO-*d*6, 62.5 MHz) δ = 160.8, 158.8, 149.5, 144.4, 142.8, 137.1, 136.1, 127.0, 126.1, 126.0, 124.7, 123.0, 122.7, 121.3, 120.7, 116.4, 111.9, 109.8, 54.7, 35.5, 25.0 ppm. HRMS: calcd. for C21H15N5O [M + H+]354.1349; found 354.1351.

 **2-Amino-5-hydroxy-4-(imidazo[1,2-*a*]pyridin-2-yl)-4*H*-pyrano[3,2-*c*]quinoline-3-carbonitrile 5c :** Yield 98%,light yellow solid, mp 273 °C. 1H NMR (DMSO-*d*6 , 250 MHz) δ = 11.77 (s, 1H, OH), 8.45 (dt, *J* = 6.7, 1.1 Hz, 1H, HAr), 7.89-7.91 (m, 1H, HAr), 7.80 (s, 1H, HAr), 7.53-7.60 (m, 1H, HAr), 7.40 (d, *J* = 8.9 Hz, 1H, HAr), 7.26-7.34 (m, 2H, 2 HAr), 7.11-7.19 (m, 3H, HAr, NH2), 6.83 (t, *J* = 6.6 Hz, 1H, HAr), 4.68 (s, 1H, CH) ppm. 13C NMR (DMSO-*d*6, 62.5 MHz) δ = 160.6, 159.4, 151.4, 147.9, 144.1, 137.7, 131.1, 126.6, 124.2, 121.9, 121.6, 120.1, 116.4, 115.3, 112.2, 111.8, 109.5, 108.8, 56.8, 30.8 ppm. HRMS: calcd. for C20H13N5O2 [M + H+]356.1142; found 356.1144.

**2-Amino-4-(imidazo[1,2-*a*]pyridin-2-yl)-6-methoxy-4*H*-chromene-3-carbonitrile 6a :** Yield 51%, dark yellow solid, mp 219 °C. 1H NMR (DMSO-*d*6,250 MHz) δ = 8.48 (dt, *J* = 6.7, 1.2 Hz, 1H, HAr), 7.77 (s, 1H, HAr), 7.45-7.49 (m, 1H, HAr), 7.19 (ddd, *J* = 15.6, 6.9, 0.9 Hz, 1H, HAr), 6.87-6.98 (m, 3H, HAr), 6.77-6.84 (m, 3H, HAr, NH2), 4.87 (s, 1H, CH), 3.64 (s, 3H, OCH3) ppm.13C NMR (DMSO-*d*6, 62.5 MHz) δ = 161.1, 155.5, 149.5, 144.4, 142.6, 127.0, 124.8, 123.6, 121.0, 116.8, 116.4, 113.6, 113.5, 111.9, 109.6, 55.4, 54.0, 35.2 ppm. HRMS: calcd. for C18H14N4O2 [M + H+]319.1190  ; found 319.1193.

**2-Amino-4-(imidazo[1,2-*a*]pyridin-2-yl)-6,7-dimethyl-4*H*-chromene-3-carbonitrile 6b :** Yield 67%, white solid, mp 277 °C. 1H NMR (DMSO-*d*6,250 MHz) δ = 8.47 (dt, *J* = 6.8 , 1.1 Hz, 1H, HAr), 7.74 (s, 1H, HAr), 7.43-7.47 (m, 1H, HAr), 7.18 (ddd, *J* = 15.7, 6.7, 1.1 Hz, 1H, HAr), 6.94 (s, 1H, HAr), 6.80-6.85 (m, 4H, 2 HAr, NH2), 4.81 (s, 1H , CH), 2.15 (s, 3H, CH3), 2.07 (s, 3H, CH3) ppm. 13C NMR (DMSO-*d*6, 62.5 MHz) δ =160.8, 150.1, 146.5, 144.4, 136.3, 132.2, 129.7, 126.9, 124.5, 121.1, 119.6, 116.5, 116.4, 111.8, 109.4, 54.7, 34.6, 19.1, 18.7 ppm. HRMS: calcd. for C19H16N4O [M + H+]317.1397; found 317.1395.

**2-Amino-4-(imidazo[1,2-*a*]pyridin-2-yl)-6,7-dimethoxy-4*H*-chromene-3-carbonitrile 6c :**Yield 92%, light yellow solid, mp 226 °C. 1H NMR (DMSO-*d*6,250 MHz) δ = 8.47 (dt, *J* = 6.8, 1.0 Hz, 1H, HAr), 7.72 (s, 1H, HAr), 7.45 (d, *J* = 9.0 Hz, 1H, HAr), 7.18 (ddd, *J* = 15.9 , 6.9, 0.9 Hz, 1H, HAr), 6.76-6.86 (m, 4H, 2HAr, NH2), 6.59 (s, 1H, HAr), 4.80 (s, 1H, CH), 3.74 (s, 3H, OCH3), 3.62 (s, 3H, OCH3) ppm.13C NMR (DMSO-*d*6, 62.5 MHz) δ = 160.9, 150.1, 148.4, 145.4, 144.4, 142.2, 126.9, 124.5, 121.0, 116.5, 113.4, 111.8, 111.5, 109.4, 100.2, 55.9, 55.7, 54.6, 34.8 ppm. HRMS: calcd. for C19H16N4O3 [M + H+]349.1295; found 349.1296.

 **Image 1H and 13C spectral data**





 



 























 

 

 

























 







