Supporting Information

An efficient synthesis of new imidazo[1,2-a]pyridine-6-carbohydrazide and pyrido[1,2-a]pyrimidine-7-carbohydrazide derivatives via a five-component cascade reaction

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**Experimental Section**

**General remarks:**

Melting points were measured on an Electrothermal 9100 apparatus. Mass spectra were recorded with an Agilent 5975C VL MSD with Triple-Axis Detector operating at an ionization potential of 70 eV. 1H and 13C NMR spectra were measured (DMSO) with a Bruker DRX-300 AVANCE spectrometer at 300 and 75 MHz, respectively. IR spectra were recorded on a Bruker Tensor 27, \( \tilde{\nu} \) in cm\(^{-1}\). All NMR spectra at room temperature were determined in DMSO-\(d_6\). Chemical shifts are reported in parts per million (\(\delta\)) downfield from an internal tetramethylsilane reference. Coupling constants (\(J\) values) are reported in hertz (Hz), and spin multiplicities are indicated by the following symbols: s (singlet), d (doublet), t (triplet), q (quartet), m (multiplet). All chemicals were purchased from Merck or Aldrich and were used without further purification.
Figure 1. Structure of all products 6a-q.
The structures of all products 6a-q were deduced from their IR, mass, $^1$H NMR, and $^{13}$C NMR spectra (see the following images).

The $^1$H and $^{13}$C NMR spectra are taken in DMSO-$d_6$, but some of the products are slightly soluble in the solvent therefore have no clear carbon spectra such as 6g, 6h, 6m, 6o, 6p, 6q.
$^1$H NMR of 6a
$^{13}$C NMR of 6a
IR of 6a
Abundance

Average of 0.353 to 1.014 min: HH-A 9\_1.dat\_a\_m.s

MS of 6a
$^1$H NMR of 6b
$^{13}$C NMR of 6b
IR of 6b
Average of 1.185 to 1.979 min.: HH-A7.d\data.ms

MS of 6b
$^1$H NMR of 6c
$^{13}$C NMR of 6c
$^1$H NMR of 6d
Average of 1.203 to 1.336 min.: HH-A1.d\data.ms

MS of 6d
$^1$H NMR of 6e
$^{13}$C NMR of 6e
IR of 6e
$^1$H NMR of 6f
$^{13}$C NMR of 6f
IR of 6f
$^1$H NMR of 6g
$^{13}$C NMR of 6g
$^1$H NMR of 6h
$^{13}$C NMR of 6h
$^1$H NMR of 6i
$^{13}$C NMR of 6i
IR of 6i
Abundance

Average of 0.201 to 2.385 min.: H H - A 1 4 D .d\ data.m s

MS of 6i
$^1$H NMR of 6j
$^{13}\text{C NMR of 6j}$
IR of 6j
Average of 1.03 to 1.383 min.: HH-A13.d\data\ms

MS of 6j
$^1$H NMR of 6k
$^{13}$C NMR of 6k
$^1$H NMR of 6l
$^1$H NMR of 6l
IR of 6l
$^1$H NMR of 6m
$^{13}\text{C}$ NMR of 6m
$^1$H NMR of 6n
\(^{13}\)C NMR of 6n
$^1$H NMR of 60
$^{13}$C NMR of 6o
IR of 60
Abundance

Average of 1.184 to 1.941 min.: HH-A17.dat.data.ms

288.1

O₂N

Cl

CH₃

H₂N

H₂N

H₂N

NO₂

MS of 6o
$^1$H NMR of 6p
$^{13}$C NMR of 6p
$^1$H NMR of 6q
$^{13}$C NMR of 6q
