Electronic supplementary information

Synthesis of functional 4H-chromenes from phenols and acetophenones under solvent- and metal-free conditions

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2. General Information

Common reagents and materials were purchased from commercial sources and purified by recrystallization or distillation. Where necessary, organic solvents were routinely dried and/or distilled prior to use and stored over molecular sieves under argon. Organic extracts were, in general, dried over anhydrous sodium sulfate (Na$_2$SO$_4$). TLC plates were visualized by exposure to ultraviolet light (UV). Chemical shifts for protons are reported in parts per million (δ scale) downfield from tetramethylsilane and are referenced to residual protium in the NMR solvents (CHCl$_3$: δ 7.26; DMSO-$d_6$: δ 2.50). Chemical shifts for carbon resonances are reported in parts per million (δ scale) downfield from tetramethylsilane and are referenced to the carbon resonances of the solvent (CDCl$_3$: δ 77.0; DMSO-$d_6$: δ 39.43). Data are represented as follows: chemical shift, multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet, br = broad), coupling constant in Hertz (Hz), and integration.
3. NMR Spectra

3a. NMR spectra of 4H-chromene 3a–p

4H-Chromene 3a

$^1$H NMR (300 MHz, CDCl$_3$)
$4H$-Chromene 3a

$^{13}$C NMR (75 MHz, CDCl$_3$)
$4H$-Chromene 3b

$^1$H NMR (300 MHz, CDCl$_3$)
$4H$-Chromene 3b

$^{13}$C NMR (75 MHz, CDCl$_3$)
$4H$-Chromene 3c

$^{1}H$ NMR (300 MHz, CDCl$_3$)
$4H$-Chromene 3c

$^{13}$C NMR (75 MHz, CDCl$_3$)
4H-Chromene 3d

$^1$H NMR (300 MHz, CDCl$_3$)
$4H$-Chromene 3d

$^{13}$C NMR (75 MHz, CDCl$_3$)
4H-Chromene 3e

$^1$H NMR (400 MHz, CDCl$_3$)
$4H$-Chromene 3e

$^{13}$C NMR (100 MHz, CDCl$_3$)
$4H$-Chromene 3f

$^1$H NMR (400 MHz, CDCl$_3$)
$4H$-Chromene $3f$

$^{13}$C NMR (100 MHz, CDCl$_3$)
4H-Chromene 3g

\(^1\)H NMR (400 MHz, CDCl\(_3\))
$4H$-Chromene $3g$

$^{13}$C NMR (100 MHz, CDCl$_3$)
4H-Chromene 3h

$^1$H NMR (400 MHz, CDCl$_3$)
4H-Chromene 3h

$^{13}$C NMR (100 MHz, CDCl$_3$)
4H-Chromene 3i

$^1$H NMR (400 MHz, CDCl₃)
$4H$-Chromene 3i

$^{13}$C NMR (100 MHz, CDCl$_3$)
$4H$-Chromene $3j$

$^1$H NMR (400 MHz, CDCl$_3$)
$4H$-Chromene 3j

$^{13}$C NMR (100 MHz, CDCl$_3$)
4H-Chromene 3k

$^1$H NMR (400 MHz, CDCl$_3$)
4H-Chromene 3k

$^{13}$C NMR (100 MHz, CDCl$_3$)
4H-Chromene 31

$^1$H NMR (400 MHz, CDCl$_3$)
$^{13}$C NMR (100 MHz, CDCl$_3$)
$4H$-Chromene $3m$

$^1$H NMR (400 MHz, CDCl$_3$)
$4H$-Chromene 3m

$^{13}$C NMR (100 MHz, CDCl$_3$)
$4H$-Chromene 3n

$^1$H NMR (400 MHz, CDCl$_3$)
4H-Chromene 3n

$^{13}$C NMR (100 MHz, CDCl$_3$)
$4H$-Chromene 30

$^1$H NMR (400 MHz, CDCl$_3$)
4\textit{H}-Chromene 30

$^{13}\text{C} \text{NMR (100 MHz, CDCl}_3\text{)}$
$4H$-Chromene 3p

$^1$H NMR (400 MHz, CDCl$_3$)
$4H$-Chromene 3p

$^{13}\text{C} \text{ NMR (100 MHz, CDCl}_3\text{)}$
3b. NMR spectra of by-product 4a

$^1$H NMR (400 MHz, CDCl$_3$)
By-product 4a

\[^{13}\text{C} \text{ NMR (100 MHz, DMSO-}\text{d}_6\)]
3c. NMR spectra of chalcone 5c

$^1$H NMR (400 MHz, CDCl$_3$)
Chalcone 5e

$^{13}$C NMR (100 MHz, CDCl$_3$)