Sulfonyl-bridged (copper-immobilized nickel ferrite) with activated montmorillonite, 
[[NiFe₂O₄@Cu]SO₄(MMT)]: a new class of magnetically separable clay nanocomposite systems towards 
Hantzsch synthesis of coumarin-based 1,4-dihydropyridines

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$^1$H NMR (300 MHz, DMSO-d6) of 7-phenyl-7,14-dihydro-6H,8H-dichromeno[4,3-b:3',4'-e]pyridine-6,8-di-one (4a)

FT-IR (KBr) of 7-phenyl-7,14-dihydro-6H,8H-dichromeno[4,3-b:3',4'-e]pyridine-6,8-dione (4a)
$^1$H NMR (300 MHz, DMSO-d6) of 7-(2-chlorophenyl)-7,14-dihydro-6H,8H-dichromeno[4,3-b:3',4'-e]pyridine-6,8-dione (4b)

$^{13}$C NMR (75 MHz, DMSO-d6) of 7-(2-chlorophenyl)-7,14-dihydro-6H,8H-dichromeno[4,3-b:3',4'-e]pyridine-6,8-dione (4b)
FT-IR (KBr) of 7-(2-chlorophenyl)-7,14-dihydro-6H,8H-dichromeno[4,3-b:3',4'-e]pyridine-6,8-dione (4b)

\[ \text{\H NMR (300 MHz, DMSO-d6) of 7-(4-chlorophenyl)-7,14-dihydro-6H,8H-dichromeno[4,3-b:3',4'-e]pyridine-6,8-dione (4c)} \]
$^1$H NMR (300 MHz, DMSO-d6) of 7-(4-chlorophenyl)-7,14-dihydro-6H,8H-dichromeno[4,3-b:3',4'-e]pyridine-6,8-dione (4c) (Deuterium exchanged)

$^{13}$C NMR (75 MHz, DMSO-d6) of 7-(4-chlorophenyl)-7,14-dihydro-6H,8H-dichromeno[4,3-b:3',4'-e]pyridine-6,8-dione (4c)
FT-IR (KBr) of 7-(4-chlorophenyl)-7,14-dihydro-6H,8H-dichromeno[4,3-b:3',4'-e]pyridine-6,8-dione (4c)

$^1$H NMR (300 MHz, DMSO-d6) of 7-(3-hydroxy-4-methoxyphenyl)-7,14-dihydro-6H,8H-dichromeno[4,3-b:3',4'-e]pyridine-6,8-dione (4d)
$^{13}$C NMR (75 MHz, DMSO-d6) of 7-(3-hydroxy-4-methoxyphenyl)-7,14-dihydro-6H,8H-dichromeno[4,3-b:3',4'-e]pyridine-6,8-dione (4d)

FT-IR (KBr) of 7-(3-hydroxy-4-methoxyphenyl)-7,14-dihydro-6H,8H-dichromeno[4,3-b:3',4'-e]pyridine-6,8-dione (4d)
$^1$H NMR (300 MHz, DMSO-d$_6$) of (4-hydroxy-3-methoxyphenyl)-7,14-dihydro-6H,8H-dichromeno[4,3-b:3', 4'-e]pyrido-dine-6,8-dione (4e)

$^{13}$C NMR (75 MHz, DMSO-d$_6$) of (4-hydroxy-3-methoxyphenyl)-7,14-dihydro-6H,8H-dichromeno[4,3-b:3', 4'-e]pyrido-dine-6,8-dione (4e)
FT-IR (KBr) of 7-(4-hydroxy-3-methoxyphenyl)-7,14-dihydro-6H,8H-dichromeno[4,3-b:3',4'-e]pyridine-6,8-dione (4e)

$^1$H NMR (300 MHz, DMSO-d6) of 7-(3-methoxyphenyl)-7,14-dihydro-6H,8H-dichromeno[4,3-b:3',4'-e]pyridine-6,8-dione (4f)
$^{13}$C NMR (75 MHz, DMSO-d6) of 7-(3-methoxyphenyl)-7,14-dihydro-6H,8H-dichromeno[4,3-b:3',4'-e]pyridine-6,8-dione (4f)

FT-IR (KBr) of 7-(3-methoxyphenyl)-7,14-dihydro-6H,8H-dichromeno[4,3-b:3',4'-e]pyridine-6,8-dione (4f)
$^1$H NMR (300 MHz, DMSO-d6) of 7-(p-tolyl)-7,14-dihydro-6H,8H-dichromeno[4,3-b:3',4'-e]pyridine-6,8-dione (4h)

$^{13}$C NMR (75 MHz, DMSO-d6) of 7-(p-tolyl)-7,14-dihydro-6H,8H-dichromeno[4,3-b:3',4'-e]pyridine-6,8-dione (4h)
FT-IR (KBr) of 7-(p-tolyl)-7,14-dihydro-6H,8H-dichromeno[4,3-b:3',4'-e]pyridine-6,8-dione (4h)

$^1$H NMR (300 MHz, DMSO-d6) of 7-(4-nitrophenyl)-7,14-dihydro-6H,8H-dichromeno[4,3-b:3',4'-e]pyridine-6,8-dione (4j)
$^{13}$C NMR (75 MHz, DMSO-d6) of 7-(4-nitrophenyl)-7,14-dihydro-6H,8H-dichromeno[4,3-b:3',4'-e]pyridine-6,8-dione (4j)

FT-IR (KBr) of 7-(4-nitrophenyl)-7,14-dihydro-6H,8H-dichromeno[4,3-b:3',4'-e]pyridine-6,8-dione (4j)
$^1$H NMR (300 MHz, DMSO-d6) of 7-(4-chloro-3-nitrophenyl)-7,14-dihydro-6H,8H-dichromeno[4,3-b:3',4'-e]pyridine-6,8-dione (4l)

$^{13}$C NMR (75 MHz, DMSO-d6) of 7-(4-chloro-3-nitrophenyl)-7,14-dihydro-6H,8H-dichromeno[4,3-b:3',4'-e]pyridine-6,8-dione (4l)
FT-IR (KBr) of 7-(4-chloro-3-nitrophenyl)-7,14-dihydro-6H,8H-dichromeno[4,3-b:3',4'-e]pyridine-6,8-dione (4l)