A layered double hydroxide, a synthetically useful heterogeneous catalyst for azide–alkyne cycloadditions in a continuous-flow reactor

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**Table 1** Elemental composition of the Cu(II)Fe(III)-LDH determined by ICP–AES.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Cu wt%</th>
<th>Cu mmol/g</th>
<th>Fe wt%</th>
<th>Fe mmol/g</th>
<th>Cu/Fe</th>
</tr>
</thead>
<tbody>
<tr>
<td>as-prepared</td>
<td>32.45</td>
<td>5.107</td>
<td>16.21</td>
<td>2.903</td>
<td>1.76</td>
</tr>
<tr>
<td>after the 10-hour long run</td>
<td>32.44</td>
<td>5.105</td>
<td>16.21</td>
<td>2.902</td>
<td>1.76</td>
</tr>
</tbody>
</table>
1-Benzyl-4-phenyl-1H-1,2,3-triazole, 1:

White solid; mp: 121–124 °C (lit.[81] mp: 123–125 °C); NMR data is in agreement with the literature reference.[81] ¹H NMR (400.1 MHz, CDCl₃) δH: 5.60 (s, 2H, CH₂), 7.31–7.38 (m, 3H, Ar-H), 7.38–7.47 (m, 5H, Ar-H), 7.70 (s, 1H, Ar-H), 7.80–7.88 (d, 2H, Ar-H, J=7.4 Hz).

1-(2-Fluorobenzyl)-4-phenyl-1H-1,2,3-triazole, 2:

White solid; mp: 87–91 °C (lit.[82] mp: 89–92 °C); NMR data is in agreement with the literature reference.[83] ¹H NMR (400.1 MHz, CDCl₃) δH: 5.63 (s, 2H, CH₂), 7.07–7.21 (m, 2H, Ar-H), 7.27–7.47 (m, 5H, Ar-H), 7.77 (s, 1H, Ar-H), 7.78–7.86 (d, 2H, Ar-H, J=7.8 Hz).

1-(4-Fluorobenzyl)-4-phenyl-1H-1,2,3-triazole, 3:

White solid; mp: 130–133 °C (lit.[84] mp: 129–131 °C); NMR data is in agreement with the literature reference.[84] ¹H NMR (400.1 MHz, CDCl₃) δH: 5.52 (s, 2H, CH₂), 6.98–7.11 (t, 2H, Ar-H, J=8.1 Hz), 7.23–7.35 (m, 3H, Ar-H), 7.36–7.45 (m, 2H, Ar-H), 7.67 (s, 1H, Ar-H), 7.74–7.85 (d, 2H, Ar-H, J=7.4 Hz).

1-(2,5-Difluorobenzyl)-4-phenyl-1H-1,2,3-triazole, 4:

White solid; mp: 100–103 °C (lit.[82] mp: 98–102 °C); NMR data is in agreement with the literature reference.[82] ¹H NMR (400.1 MHz, CDCl₃) δH: 5.61 (s, 2H, CH₂), 6.93–7.16 (m, 3H, Ar-H), 7.29–7.36 (m, 1H, Ar-H), 7.37–7.46 (m, 2H, Ar-H), 7.73–7.89 (m, 3H, Ar-H).
**1-(2-Chlorobenzyl)-4-phenyl-1H-1,2,3-triazole, 5:**

![Chemical Structure](image)

White solid; mp: 80–83 °C (lit.\[^{[S]}\] mp: 79–81 °C); NMR data is in agreement with the literature reference.\[^{[S]}\] \[^{1}\]H NMR (400.1 MHz, CDCl\(_3\)) \(\delta\): 5.71 (s, 2H, CH\(_2\)), 7.18–7.35 (m, 4H, Ar-H), 7.36–7.48 (m, 3H, Ar-H), 7.78 (s, 1H, Ar-H), 7.79–7.88 (d, 2H, Ar-H, \(J=7.8\) Hz).

**1-(4-Nitrobenzyl)-4-phenyl-1H-1,2,3-triazole, 6:**

![Chemical Structure](image)

Yellowish solid; mp: 156–159 °C (lit.\[^{[S1]}\] mp: 158–159 °C); NMR data is in agreement with the literature reference.\[^{[S1]}\] \[^{1}\]H NMR (400.1 MHz, CDCl\(_3\)) \(\delta\): 5.71 (s, 2H, CH\(_2\)), 7.30–7.40 (t, 1H, Ar-H, \(J=7.9\) Hz), 7.40–7.50 (m, 4H, Ar-H), 7.77 (s, 1H, Ar-H), 7.80–7.88 (d, 2H, Ar-H, \(J=7.7\) Hz), 8.20–8.31 (d, 2H, Ar-H, \(J=8.3\) Hz).

**1-(2-Methylbenzyl)-4-phenyl-1H-1,2,3-triazole, 7:**

![Chemical Structure](image)

White solid; mp: 91–94 °C (lit.\[^{[S6]}\] mp: 94–95 °C); NMR data is in agreement with the literature reference.\[^{[S6]}\] \[^{1}\]H NMR (400.1 MHz, CDCl\(_3\)) \(\delta\): 2.32 (s, 3H, CH\(_3\)), 5.56 (s, 2H, CH\(_2\)), 7.18–7.27 (m, 3H, Ar-H), 7.27–7.34 (m, 2H, Ar-H), 7.35–7.43 (t, 2H, Ar-H, \(J=7.3\) Hz), 7.55 (s, 1H, Ar-H), 7.75–7.84 (d, 2H, Ar-H, \(J=7.3\) Hz).

**1-(4-Methylbenzyl)-4-phenyl-1H-1,2,3-triazole, 8:**

![Chemical Structure](image)

White solid; mp: 92–94 °C (lit.\[^{[S1]}\] mp: 93–95 °C); NMR data is in agreement with the literature reference.\[^{[S1]}\] \[^{1}\]H NMR (400.1 MHz, CDCl\(_3\)) \(\delta\): 2.36 (s, 3H, CH\(_3\)), 5.52 (s, 2H, CH\(_2\)), 7.15–7.25 (m, 4H, Ar-H), 7.29–7.34 (m, 1H, Ar-H), 7.35–7.43 (m, 2H, Ar-H), 7.65 (s, 1H, Ar-H), 7.75–7.83 (d, 2H, Ar-H, \(J=7.4\) Hz).
1-(Naphthalen-1-ylmethyl)-4-phenyl-1H-1,2,3-triazole, 9:

![Chemical structure of 1-(Naphthalen-1-ylmethyl)-4-phenyl-1H-1,2,3-triazole, 9](image)

White solid; mp: 138–141 °C (lit.\[^{[S7]}\] mp: 141–142 °C); NMR data is in agreement with the literature reference.\[^{[S7]}\] \(^1\)H NMR (400.1 MHz, CDCl\(_3\)) \(\delta_H\): 5.76 (s, 2H, CH\(_2\)), 7.30–7.37 (m, 1H, Ar-H), 7.38–7.45 (m, 3H, Ar-H), 7.50–7.59 (m, 2H, Ar-H), 7.71 (s, 1H, Ar-H), 7.78–7.92 (m, 6H, Ar-H).

1-Phenethyl-4-phenyl-1H-1,2,3-triazole, 10:

![Chemical structure of 1-Phenethyl-4-phenyl-1H-1,2,3-triazole, 10](image)

White solid; mp: 139–142 °C (lit.\[^{[S1]}\] mp: 141–142 °C); NMR data is in agreement with the literature reference.\[^{[S1]}\] \(^1\)H NMR (400.1 MHz, CDCl\(_3\)) \(\delta_H\): 3.19–3.31 (t, 2H, CH\(_2\), \(J=7.2\) Hz), 4.56–4.68 (t, 2H, CH\(_2\), \(J=7.2\) Hz), 7.09–7.18 (d, 2H, Ar-H, \(J=7.3\) Hz), 7.23–7.37 (m, 4H, Ar-H), 7.37–7.46 (m, 2H, Ar-H), 7.49 (s, 1H, Ar-H), 7.73–7.83 (d, 2H, Ar-H, \(J=7.3\) Hz).

1-Cyclohexyl-4-phenyl-1H-1,2,3-triazole, 11:

![Chemical structure of 1-Cyclohexyl-4-phenyl-1H-1,2,3-triazole, 11](image)

White solid; mp: 106–109 °C (lit.\[^{[S1]}\] mp: 108–109 °C); NMR data is in agreement with the literature reference.\[^{[S1]}\] \(^1\)H NMR (400.1 MHz, CDCl\(_3\)) \(\delta_H\): 1.20–1.37 (m, 1H, CH\(_2\)), 1.38–1.56 (m, 2H, CH\(_2\)), 1.69–1.86 (m, 3H, 2 CH\(_2\)), 1.86–2.01 (m, 2H, CH\(_2\)), 2.16–2.32 (m, 2H, CH\(_2\)), 4.40–4.54 (m, 1H, CH), 7.28–7.35 (m, 1H, Ar-H), 7.36–7.46 (m, 2H, Ar-H), 7.70–7.90 (m, 3H, Ar-H).

3-(4-Phenyl-1H-1,2,3-triazol-1-yl)dihydrofuran-2(3H)-one, 12:

![Chemical structure of 3-(4-Phenyl-1H-1,2,3-triazol-1-yl)dihydrofuran-2(3H)-one, 12](image)

White solid; mp: 138–142 °C (lit.\[^{[S1]}\] mp: 140–141 °C); NMR data is in agreement with the literature reference.\[^{[S1]}\] \(^1\)H NMR (400.1 MHz, CDCl\(_3\)) \(\delta_H\): 2.98–3.20 (m, 2H, CH\(_2\)), 4.46–4.62 (m, 1H, CH\(_2\)), 4.62–4.79 (m, 1H, CH\(_2\)), 5.30–5.46 (t, 1H, CH, \(J=9.1\) Hz), 7.30–7.39 (m, 1H, Ar-H), 7.39–7.49 (m, 2H, Ar-H), 7.77–7.90 (d, 2H, Ar-H, \(J=7.7\) Hz), 8.05 (s, 1H, Ar-H).
**Ethyl 5-(4-phenyl-1H-1,2,3-triazol-1-yl)pentanoate, 13:**

White solid; mp: 50–53 °C (lit. mp: 50–53 °C); NMR data is in agreement with the literature reference.\(^{[88]}\)

\(^{[88]}\)\(\delta \)H NMR (400.1 MHz, CDCl\(_3\)) \(\delta \)H: 1.17–1.29 (m, 3H, CH\(_3\)), 1.61–1.74 (m, 2H, CH\(_2\)), 1.92–2.05 (m, 2H, CH\(_2\)), 2.23–2.40 (m, 2H, CH\(_2\)), 4.03–4.17 (m, 2H, CH\(_2\)), 4.33–4.45 (m, 2H, CH\(_2\)), 7.28–7.35 (m, 1H, Ar-H), 7.36–7.45 (m, 2H, Ar-H), 7.72–7.86 (m, 3H, Ar-H).

**1-Butyl-4-phenyl-1H-1,2,3-triazole, 14:**

White solid; mp: 46–49 °C (lit. mp: 46–47 °C); NMR data is in agreement with the literature reference.\(^{[89]}\)

\(^{[89]}\)\(\delta \)H NMR (400.1 MHz, CDCl\(_3\)) \(\delta \)H: 0.92–1.04 (t, 3H, CH\(_3\), \(J=7.4 \) Hz), 1.36–1.46 (m, 2H, CH\(_2\)), 1.88–1.99 (m, 2H, CH\(_2\)), 4.35–4.44 (t, 2H, CH\(_2\), \(J=7.3 \) Hz), 7.30–7.37 (m, 1H, Ar-H), 7.38–7.46 (m, 2H, Ar-H), 7.75 (s, 1H, Ar-H), 7.79–7.88 (d, 2H, Ar-H, \(J=7.5 \) Hz).

**1-(But-3-en-1-yl)-4-phenyl-1H-1,2,3-triazole, 15:**

Brownish solid, mp: 40–43 °C (lit. mp: 42–44 °C); NMR data is in agreement with the literature reference.\(^{[91]}\)

\(^{[91]}\)\(\delta \)H NMR (400.1 MHz, CDCl\(_3\)) \(\delta \)H: 2.63–2.76 (m, 2H, CH\(_2\)), 4.38–4.53 (t, 2H, CH\(_2\), \(J=7.2 \) Hz), 5.03–5.19 (d, 2H, CH\(_2\), \(J=12.7 \) Hz), 5.71–5.87 (m, 1H, CH), 7.29–7.36 (m, 1H, Ar-H), 7.37–7.46 (m, 2H, Ar-H), 7.75 (s, 1H, Ar-H), 7.78–7.87 (d, 2H, Ar-H, \(J=7.4 \) Hz).

**1-(3-Chloro-2-methylpropyl)-4-phenyl-1H-1,2,3-triazole, 16:**

White solid; mp: 48–50 °C (lit. mp: 50–51 °C); NMR data is in agreement with the literature reference.\(^{[88]}\)

\(^{[88]}\)\(\delta \)H NMR (400.1 MHz, CDCl\(_3\)) \(\delta \)H: 1.06–1.15 (d, 3H, CH\(_3\), \(J=6.7 \) Hz), 2.51–2.64 (m, 1H, CH), 3.40–3.52 (m, 2H, CH\(_2\)), 4.28–4.52 (m, 2H, CH\(_2\)), 7.28–7.37 (m, 1H, Ar-H), 7.38–7.47 (m, 2H, Ar-H), 7.75–7.89 (m, 3H, Ar-H).
**1-benzyl-4-(4-methoxyphenyl)-1H-1,2,3-triazole, 17:**

![Chemical structure of 1-benzyl-4-(4-methoxyphenyl)-1H-1,2,3-triazole]

White solid; mp: 140–143 °C (lit. [S1] mp: 143–145 °C); NMR data is in agreement with the literature reference. [S1] \(^1\)H NMR (400.1 MHz, CDCl\(_3\)) \(\delta_{\text{H}}\): 3.81 (s, 3H, CH\(_3\)), 5.53 (s, 2H, CH\(_2\)), 6.88–6.97 (d, 2H, Ar-H, J=8.5 Hz), 7.27–7.41 (m, 5H, Ar-H), 7.59 (s, 1H, Ar-H), 7.69–7.76 (d, 2H, Ar-H, J=8.6 Hz).

**1-Benzyl-4-propyl-1H-1,2,3-triazole, 18:**

![Chemical structure of 1-Benzyl-4-propyl-1H-1,2,3-triazole]

Brownish oil; NMR data is in agreement with the literature reference. [S1] \(^1\)H NMR (400.1 MHz, CDCl\(_3\)) \(\delta_{\text{H}}\): 0.93–1.01 (t, 3H, CH\(_3\), J=7.2 Hz), 1.64–1.76 (m, 2H, CH\(_2\)), 2.65–2.76 (t, 2H, CH\(_2\), J=7.6 Hz), 5.52 (s, 2H, CH\(_2\)), 7.25–7.30 (m, 2H, Ar-H), 7.32–7.45 (m, 4H, Ar-H).

**Ethyl 1-benzyl-1H-1,2,3-triazole-4-carboxylate, 19:**

![Chemical structure of Ethyl 1-benzyl-1H-1,2,3-triazole-4-carboxylate]

Yellowish solid; mp: 79–82 °C (lit. [S1] mp: 82–83 °C); NMR data is in agreement with the literature reference. [S1] \(^1\)H NMR (400.1 MHz, CDCl\(_3\)) \(\delta_{\text{H}}\): 1.30–1.46 (t, 3H, CH\(_3\), J=7.2 Hz), 4.32–4.46 (q, 2H, CH\(_2\), J=7.1 Hz), 5.59 (s, 2H, CH\(_2\)), 7.24–7.35 (m, 2H, Ar-H), 7.35–7.46 (m, 3H, Ar-H), 8.02 (s, 1H, Ar-H).

**(1-Benzyl-1H-1,2,3-triazol-4-yl)methyl acetate, 20:**

![Chemical structure of (1-Benzyl-1H-1,2,3-triazol-4-yl)methyl acetate]

Yellowish solid; mp: 55–58 °C (lit. [S8] mp: 55–56 °C); NMR data is in agreement with the literature reference. [S8] \(^1\)H NMR (400.1 MHz, CDCl\(_3\)) \(\delta_{\text{H}}\): 2.05 (s, 3H, CH\(_3\)), 5.20 (s, 2H, CH\(_2\)), 5.52 (s, 2H, CH\(_2\)), 7.23–7.31 (m, 2H, Ar-H), 7.34–7.41 (m, 3H, Ar-H), 7.57 (s, 1H, Ar-H).

**4-(1-Benzyl-1H-1,2,3-triazol-4-yl)butanenitrile, 21:**

![Chemical structure of 4-(1-Benzyl-1H-1,2,3-triazol-4-yl)butanenitrile]
White solid; mp: 61–64 °C (lit. \[^{[S8]}\] mp: 64–66 °C); NMR data is in agreement with the literature reference. \[^{[S8]}\] \(^{1}\)H NMR (400.1 MHz, CDCl\(_3\)) \(\delta\): 2.05–2.14 (m, 2H, CH\(_2\)), 2.40–2.47 (t, 2H, CH\(_2\), \(J=7.0\) Hz), 2.83–2.91 (t, 2H, CH\(_2\), \(J=7.20\) Hz), 5.53 (s, 2H, CH\(_2\)), 7.27–7.32 (m, 3H, Ar-H), 7.36–7.45 (m, 3H, Ar-H).

\(N\)-((1-benzyl-1H-1,2,3-triazol-4-yl)methyl)benzamide, 22:

White solid; mp: 125–128 °C (lit. \[^{[S10]}\] mp: 126–128 °C); NMR data is in agreement with the literature reference. \[^{[S12]}\] \(^{1}\)H NMR (400.1 MHz, CDCl\(_3\)) \(\delta\): 4.69–4.75 (d, 2H, CH\(_2\), \(J=5.6\) Hz), 5.55 (s, 2H, CH\(_2\)), 6.86 (m, 1H, NH), 7.31–7.34 (m, 1H, Ar-H), 7.37–7.50 (m, 5H, Ar-H), 7.51–7.58 (m, 2H, Ar-H), 7.77–7.84 (m, 2H, Ar-H).

\(1\)-Benzyl-4-ferrocenyl-1H-1,2,3-triazole, 23:

Golden yellow solid; mp: 147–150 °C (lit. \[^{[S13]}\] mp: 145–147 °C); NMR data is in agreement with the literature reference. \[^{[S3]}\] \(^{1}\)H NMR (400.1 MHz, CDCl\(_3\)) \(\delta\): 1.26–1.33 (t, 3H, CH\(_3\)), 1.39–1.44 (t, 3H, CH\(_3\)), 4.31–4.40 (q, 2H, CH\(_2\), \(J=7.3\) Hz), 4.41–4.50 (q, 2H, CH\(_2\), \(J=7.3\) Hz), 5.85 (s, 2H, CH\(_2\)), 7.31–7.34 (m, 2H, Ar-H), 7.35–7.45 (m, 4H, Ar-H).

Diethyl 1-benzyl-1H-1,2,3-triazole-4,5-dicarboxylate, 24:

Colorless oil; NMR data is in agreement with the literature reference. \[^{[S14]}\] \(^{1}\)H NMR (400.1 MHz, CDCl\(_3\)) \(\delta\): 1.26–1.33 (t, 3H, CH\(_3\), \(J=7.3\) Hz), 1.39–1.44 (t, 3H, CH\(_3\), \(J=7.3\) Hz), 4.31–4.40 (q, 2H, CH\(_2\), \(J=7.3\) Hz), 4.41–4.50 (q, 2H, CH\(_2\), \(J=7.3\) Hz), 5.85 (s, 2H, CH\(_2\)), 7.26–7.31 (m, 3H, Ar-H), 7.33–7.38 (m, 2H, Ar-H).
1-Benzyl-4-phenyl-1H-1,2,3-triazole, 1, $^1$H NMR in CDCl$_3$:

\[
\text{Diagram of 1-Benzyl-4-phenyl-1H-1,2,3-triazole.}
\]

1-(2-Fluorobenzyl)-4-phenyl-1H-1,2,3-triazole, 2, $^1$H NMR in CDCl$_3$:

\[
\text{Diagram of 1-(2-Fluorobenzyl)-4-phenyl-1H-1,2,3-triazole.}
\]
1-(4-Fluorobenzyl)-4-phenyl-1H-1,2,3-triazole, 3, $^1$H NMR in CDCl$_3$:

![1-(4-Fluorobenzyl)-4-phenyl-1H-1,2,3-triazole, 3, $^1$H NMR in CDCl$_3$](image1)

1-(2,5-Difluorobenzyl)-4-phenyl-1H-1,2,3-triazole, 4, $^1$H NMR in CDCl$_3$:

![1-(2,5-Difluorobenzyl)-4-phenyl-1H-1,2,3-triazole, 4, $^1$H NMR in CDCl$_3$](image2)
1-(2-Chlorobenzyl)-4-phenyl-1H-1,2,3-triazole, 5, $^1$H NMR in CDCl$_3$:

![NMR spectrum of 5](image)

1-(4-Nitrobenzyl)-4-phenyl-1H-1,2,3-triazole, 6, $^1$H NMR in CDCl$_3$:

![NMR spectrum of 6](image)
1-(2-Methylbenzyl)-4-phenyl-1H-1,2,3-triazole, 7, $^1$H NMR in CDCl$_3$: 


1-(4-Methylbenzyl)-4-phenyl-1H-1,2,3-triazole, 8, $^1$H NMR in CDCl$_3$:
1-(Naphthalen-1-ylmethyl)-4-phenyl-1H-1,2,3-triazole, \(9\), \(^1\)H NMR in CDCl₃:

![NMR Spectrum of \(9\)]

1-Phenethyl-4-phenyl-1H-1,2,3-triazole, \(10\), \(^1\)H NMR in CDCl₃:

![NMR Spectrum of \(10\)]
1-Cyclohexyl-4-phenyl-1H-1,2,3-triazole, 11, $^1$H NMR in CDCl$_3$: 

3-(4-Phenyl-1H-1,2,3-triazol-1-yl)dihydrofuran-2(3H)-one, 12, $^1$H NMR in CDCl$_3$: 
Ethyl 5-(4-phenyl-1H-1,2,3-triazol-1-yl)pentanoate, 13, $^1$H NMR in CDCl$_3$:

![NMR spectrum of Ethyl 5-(4-phenyl-1H-1,2,3-triazol-1-yl)pentanoate](image1)

1-Butyl-4-phenyl-1H-1,2,3-triazole, 14, $^1$H NMR in CDCl$_3$:

![NMR spectrum of 1-Butyl-4-phenyl-1H-1,2,3-triazole](image2)
1-(But-3-en-1-yl)-4-phenyl-1H-1,2,3-triazole, **15**, $^1$H NMR in CDCl$_3$:

![NMR spectrum of 1-(But-3-en-1-yl)-4-phenyl-1H-1,2,3-triazole, **15**](image)

$^1$H NMR in CDCl$_3$:

1.90, 1.86, 2.00, 2.18, 2.05 ppm

1-(3-Chloro-2-methylpropyl)-4-phenyl-1H-1,2,3-triazole, **16**, $^1$H NMR in CDCl$_3$:

![NMR spectrum of 1-(3-Chloro-2-methylpropyl)-4-phenyl-1H-1,2,3-triazole, **16**](image)

$^1$H NMR in CDCl$_3$:

2.00, 1.70, 0.99, 2.79 ppm
1-benzyl-4-(4-methoxyphenyl)-1H-1,2,3-triazole, 17, $^1$H NMR in CDCl$_3$: 

![NMR spectrum of 1-benzyl-4-(4-methoxyphenyl)-1H-1,2,3-triazole, 17](image1)

1-Benzyl-4-propyl-1H-1,2,3-triazole, 18, $^1$H NMR in CDCl$_3$: 

![NMR spectrum of 1-Benzyl-4-propyl-1H-1,2,3-triazole, 18](image2)
Ethyl 1-benzyl-1H-1,2,3-triazole-4-carboxylate, 19, $^1$H NMR in CDCl$_3$:

(1-Benzyl-1H-1,2,3-triazol-4-yl)methyl acetate, 20, $^1$H NMR in CDCl$_3$:
4-(1-Benzyl-1H-1,2,3-triazol-4-yl)butanenitrile, 21, $^1$H NMR in CDCl$_3$:

![NMR Spectrum of 4-(1-Benzyl-1H-1,2,3-triazol-4-yl)butanenitrile, 21](image)

$N$-((1-benzyl-1H-1,2,3-triazol-4-yl)methyl)benzamide, 22, $^1$H NMR in CDCl$_3$:

![NMR Spectrum of $N$-((1-benzyl-1H-1,2,3-triazol-4-yl)methyl)benzamide, 22](image)
1-Benzyl-4-ferrocenyl-1H-1,2,3-triazole, 23, $^1$H NMR in CDCl$_3$:

Diethyl 1-benzyl-1H-1,2,3-triazole-4,5-dicarboxylate, 24, $^1$H NMR in CDCl$_3$:
The test reactions to check the efficacy of the individual LDH components (Cu(NO$_3$)$_2$·3H$_2$O and Fe(NO$_3$)$_3$·9H$_2$O) were carried out as follows.

The benzyl azide–phenylacetylene model reaction (1 equiv. azide, 1.5 equiv. alkyne, $c_{\text{azide}}=0.085$ M) was repeated in a flask with 10 mol% of Cu(NO$_3$)$_2$·3H$_2$O and then with 10 mol% of Fe(NO$_3$)$_3$·9H$_2$O in 5 mL acetonitrile as solvent (the metal salts were not soluble in CH$_2$Cl$_2$). After 6 hours of stirring at reflux temperature, the mixture was concentrated under vacuum and was worked up with aqueous NaCl solution and CH$_2$Cl$_2$. The combined organic layers were dried over Na$_2$SO$_4$ and concentrated under reduced pressure. No traces of triazole products was found according to $^1$H NMR measurements with either of the metal salts.
Continuous-flow oxidative homocoupling of 4-ethynylanisole (in CH$_2$Cl$_2$ as solvent) mediated by the Cu(II)Fe(III)-LDH (1 g loaded into the catalyst bed, unused portion), and the $^1$H NMR spectra of the crude product in CDCl$_3$ with signal assignments.\[S15\]
The test reactions to check the efficacy of the individual LDH components (Cu(NO$_3$)$_2$·3H$_2$O and Fe(NO$_3$)$_3$·9H$_2$O) were carried out as follows.

The benzyl azide–phenylacetylene model reaction (1 equiv. azide, 1.5 equiv. alkyne, $c_{\text{azide}}$=0.085 M) was repeated in a flask with 10 mol% of Cu(NO$_3$)$_2$·3H$_2$O and then with 10 mol% of Fe(NO$_3$)$_3$·9H$_2$O in 5 mL acetonitrile as solvent (the metal salts were not soluble in CH$_2$Cl$_2$). After 6 hours of stirring at reflux temperature, the mixture was concentrated under vacuum and was worked up with aqueous NaCl solution and CH$_2$Cl$_2$. The combined organic layers were dried over Na$_2$SO$_4$ and concentrated under reduced pressure. No traces of triazole products was found according to $^1$H NMR measurements with either of the metal salts.
References