Lithium tert-Butoxide Mediated α-Alkylation of Ketones with Primary Alcohols under Transition-metal-free Conditions

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Table S1: Reactions with different LiOtBu sources.\(^a\)

<table>
<thead>
<tr>
<th>Entry</th>
<th>LiOtBu sources</th>
<th>GC yield (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alfa Aesar</td>
<td>92</td>
</tr>
<tr>
<td>2</td>
<td>J&amp;K</td>
<td>90</td>
</tr>
<tr>
<td>3</td>
<td>Aladdin</td>
<td>93</td>
</tr>
<tr>
<td>4</td>
<td>Adamas</td>
<td>92</td>
</tr>
<tr>
<td>5</td>
<td>Alfa Aesar (purified by sublimation)</td>
<td>92</td>
</tr>
</tbody>
</table>

\(^a\) Reaction conditions: acetophenone 1a (0.5 mmol), phenylmethanol 2a (0.75 mmol), LiOtBu (1 mmol), toluene (2 mL), 110 °C, for 12 h, under argon.

ICP Analysis of LiOtBu

LiOtBu purified by sublimation: ICP-AES (Inductively Coupled Plasma-Atomic Emission Spectrometry) of LiOtBu: A sample was prepared by dissolving LiOtBu (0.5 g) with nitric acid (0.5 mL) in pure water (total amount = 10 mL). Analysis was conducted on Optima 7300 DV (Perkin Elmer Corporation). The contents of K, Na, Al, Ca, S, and Mg are shown in Table S2. The contents of other elements (Ru, Ir, Pd, Ni, Ti, Ag, Rh, Cu and Fe) were found to be less than detection limit (0.1 ppm).

Table S2: ICP-AES analysis on the contents (ppm) of elements in LiOtBu

<table>
<thead>
<tr>
<th>K</th>
<th>Na</th>
<th>Al</th>
<th>Ca</th>
<th>S</th>
<th>Mg</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.77</td>
<td>1.23</td>
<td>0.35</td>
<td>0.46</td>
<td>0.75</td>
<td>0.6</td>
</tr>
</tbody>
</table>

LiOtBu purified by sublimation: ICP-MS (Inductively Coupled Plasma-Mass Spectrometry) of LiOtBu: A sample was prepared by diluting LiOtBu (sample of ICP-AES) in 500-fold. Analysis was conducted on X Series 2 (Thermo Fisher Scientific). The contents of the elements that was not observed in ICP-AES analysis above are shown in Table S3.

Table S3: ICP-MS analysis on the contents (ppm) of elements in LiOtBu

<table>
<thead>
<tr>
<th>Ru</th>
<th>Ir</th>
<th>Pd</th>
<th>Ni</th>
<th>Ti</th>
<th>Ag</th>
<th>Rh</th>
<th>Cu</th>
<th>Fe</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td>0.05</td>
</tr>
</tbody>
</table>

The reaction using LiOtBu purified by sublimation by us gave coupling product 3aa in 92% yield. The contents of transition metals in the sublimed LiOtBu all were <0.1 ppm (ICP-AES and ICP-MS analysis). On the other hand, different sources of LiOtBu from Alfa Aesar, J&K, Aladdin, and Adamas were used with new glassware, almost the same results were obtained. These results amply indicate that the coupling is promoted by LiOtBu itself rather than catalyzed by contaminated transition metals.
Table S4: The reactions of 1a and 2a catalyzed by different catalysts.  

![](image)

<table>
<thead>
<tr>
<th>Entry</th>
<th>Cat.</th>
<th>Solvent</th>
<th>Base</th>
<th>T [°C]</th>
<th>Yield [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cu(OAc)₂</td>
<td>dioxane</td>
<td>KOH</td>
<td>100</td>
<td>33</td>
</tr>
<tr>
<td>2</td>
<td>CuSO₄</td>
<td>dioxane</td>
<td>KOH</td>
<td>100</td>
<td>31</td>
</tr>
<tr>
<td>3</td>
<td>Cu(NO₃)₂</td>
<td>dioxane</td>
<td>KOH</td>
<td>100</td>
<td>31</td>
</tr>
<tr>
<td>4</td>
<td>Cu(acac)₂</td>
<td>dioxane</td>
<td>KOH</td>
<td>100</td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>Cu(OTf)₂</td>
<td>dioxane</td>
<td>KOH</td>
<td>100</td>
<td>15</td>
</tr>
<tr>
<td>6</td>
<td>CuCl₂</td>
<td>dioxane</td>
<td>KOH</td>
<td>100</td>
<td>37</td>
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<td>7</td>
<td>CuBr₂</td>
<td>dioxane</td>
<td>KOH</td>
<td>100</td>
<td>42</td>
</tr>
<tr>
<td>8</td>
<td>CuI</td>
<td>dioxane</td>
<td>KOH</td>
<td>100</td>
<td>31</td>
</tr>
<tr>
<td>9</td>
<td>CuBr</td>
<td>dioxane</td>
<td>KOH</td>
<td>100</td>
<td>28</td>
</tr>
<tr>
<td>10</td>
<td>CuCl</td>
<td>dioxane</td>
<td>KOH</td>
<td>100</td>
<td>25</td>
</tr>
<tr>
<td>11</td>
<td>Cu₂O</td>
<td>dioxane</td>
<td>KOH</td>
<td>100</td>
<td>25</td>
</tr>
<tr>
<td>12</td>
<td>Cu(OAc)₂</td>
<td>dioxane</td>
<td>KOH</td>
<td>100</td>
<td>37</td>
</tr>
<tr>
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<td>Cu(OAc)₂</td>
<td>dioxane</td>
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<td>44</td>
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<tr>
<td>14</td>
<td>Cu(OAc)₂</td>
<td>dioxane</td>
<td>KOH</td>
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<td>41</td>
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<tr>
<td>15</td>
<td>FeCl₃</td>
<td>dioxane</td>
<td>KOH</td>
<td>100</td>
<td>25</td>
</tr>
<tr>
<td>16</td>
<td>FeCl₂</td>
<td>dioxane</td>
<td>KOH</td>
<td>100</td>
<td>31</td>
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<tr>
<td>17</td>
<td>Pd(OAc)₂</td>
<td>dioxane</td>
<td>KOH</td>
<td>100</td>
<td>18</td>
</tr>
<tr>
<td>18</td>
<td>PdCl₂</td>
<td>dioxane</td>
<td>KOH</td>
<td>100</td>
<td>27</td>
</tr>
<tr>
<td>19</td>
<td>Cu(OAc)₂</td>
<td>toluene</td>
<td>KOH</td>
<td>110</td>
<td>39</td>
</tr>
<tr>
<td>20</td>
<td>Cu(OAc)₂</td>
<td>DMSO</td>
<td>KOH</td>
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<td>trace</td>
</tr>
<tr>
<td>21</td>
<td>Cu(OAc)₂</td>
<td>DMF</td>
<td>KOH</td>
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<tr>
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<td>Cu(OAc)₂</td>
<td>NMP</td>
<td>KOH</td>
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<td>trace</td>
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<tr>
<td>23</td>
<td>Cu(acac)₂</td>
<td>toluene</td>
<td>CsOH</td>
<td>110</td>
<td>26</td>
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<tr>
<td>24</td>
<td>CuSO₄</td>
<td>toluene</td>
<td>NaH</td>
<td>110</td>
<td>30</td>
</tr>
<tr>
<td>25</td>
<td>CuI</td>
<td>toluene</td>
<td>Et₃N</td>
<td>110</td>
<td>trace</td>
</tr>
<tr>
<td>26</td>
<td>Cu(OAc)₂</td>
<td>toluene</td>
<td>LiOrBu</td>
<td>110</td>
<td>86</td>
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<tr>
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<td>CuCl₂</td>
<td>toluene</td>
<td>LiOrBu</td>
<td>110</td>
<td>87</td>
</tr>
<tr>
<td>28</td>
<td>—</td>
<td>toluene</td>
<td>LiOrBu</td>
<td>110</td>
<td>92</td>
</tr>
</tbody>
</table>

*a Reaction conditions: acetophenone 1a (0.5 mmol), phenylmethanol 2a (0.75 mmol), catalyst (0.05 mmol), base (1.0 mmol), solvent (2 mL), for 12 h, under argon.  
b The yields were determined by GC (average of two GC runs).  
c 0.1 mmol 1,10-phenanthroline was added.  
d 0.1 mmol L-proline was added.  
e 0.1 mmol 2-acetylcyclohexanone was added.  
f 0.02 mmol catalyst was added. DMSO = dimethylsulfoxide, DMF = N,N-dimethylformamide, NMP = 1-methylpyrrolidin-2-one.
Table S5: The reactions of 1a and 2a in different solvents.

<table>
<thead>
<tr>
<th>Entry</th>
<th>Solvent</th>
<th>(T) ([^\circ \text{C}])^b</th>
<th>Yield [%]^c</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>toluene</td>
<td>110</td>
<td>92</td>
</tr>
<tr>
<td>2</td>
<td>dioxane</td>
<td>101</td>
<td>49</td>
</tr>
<tr>
<td>3</td>
<td>DMSO</td>
<td>110</td>
<td>trace</td>
</tr>
<tr>
<td>4</td>
<td>DMF</td>
<td>110</td>
<td>trace</td>
</tr>
<tr>
<td>5</td>
<td>NMP</td>
<td>110</td>
<td>trace</td>
</tr>
<tr>
<td>6</td>
<td>benzene</td>
<td>80</td>
<td>38</td>
</tr>
<tr>
<td>7</td>
<td>(o)-xylene</td>
<td>110</td>
<td>63</td>
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<tr>
<td>8</td>
<td>(m)-xylene</td>
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<tr>
<td>9</td>
<td>(p)-xylene</td>
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<td>10</td>
<td>xylene</td>
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<td>11</td>
<td>THF</td>
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<td>hexane</td>
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<td>33</td>
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<td>13</td>
<td>DCE</td>
<td>83</td>
<td>26</td>
</tr>
<tr>
<td>14</td>
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<td>trace</td>
</tr>
<tr>
<td>15</td>
<td>CH₃CN</td>
<td>81</td>
<td>29</td>
</tr>
<tr>
<td>16</td>
<td>DMAc</td>
<td>110</td>
<td>3</td>
</tr>
<tr>
<td>17</td>
<td>pyridine</td>
<td>110</td>
<td>20</td>
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<tr>
<td>18</td>
<td>toluene</td>
<td>80</td>
<td>83</td>
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<tr>
<td>19</td>
<td>toluene</td>
<td>60</td>
<td>36</td>
</tr>
<tr>
<td>20</td>
<td>toluene</td>
<td>r.t.</td>
<td>6</td>
</tr>
</tbody>
</table>

^a Reaction conditions: acetophenone 1a (0.5 mmol), phenylmethanol 2a (0.75 mmol), LiOrBu (1.0 mmol), solvent (2 mL), for 12 h, under argon. ^b Oil temperature. ^c The yields were determined by GC (average of two GC runs). DMSO = dimethylsulfoxide, DMF = \(N,N\)-dimethylformamide, NMP = 1-methylpyrrolidin-2-one, THF = tetrahydrofuran, DCE = 1,2-dichloroethane, DMAc = \(N,N\)-dimethylacetamide.
Table S6: The reactions of 1a and 2a with different bases.\(^a\)

<table>
<thead>
<tr>
<th>Entry</th>
<th>Base</th>
<th>Yield [%](^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LiO\textsubscript{t}Bu</td>
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</tr>
<tr>
<td>2</td>
<td>NaO\textsubscript{t}Bu</td>
<td>37</td>
</tr>
<tr>
<td>3</td>
<td>KO\textsubscript{t}Bu</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>K\textsubscript{2}CO\textsubscript{3}</td>
<td>trace</td>
</tr>
<tr>
<td>5</td>
<td>K\textsubscript{3}PO\textsubscript{4}</td>
<td>trace</td>
</tr>
<tr>
<td>6</td>
<td>Cs\textsubscript{2}CO\textsubscript{3}</td>
<td>trace</td>
</tr>
<tr>
<td>7</td>
<td>NaH</td>
<td>30</td>
</tr>
<tr>
<td>8</td>
<td>Et\textsubscript{3}N</td>
<td>trace</td>
</tr>
<tr>
<td>9</td>
<td>CsOH</td>
<td>31</td>
</tr>
<tr>
<td>10</td>
<td>KOH</td>
<td>29</td>
</tr>
<tr>
<td>11</td>
<td>NaOH</td>
<td>25</td>
</tr>
<tr>
<td>12</td>
<td>LiOH</td>
<td>trace</td>
</tr>
<tr>
<td>13</td>
<td>LiOH \cdot H\textsubscript{2}O</td>
<td>trace</td>
</tr>
<tr>
<td>14</td>
<td>Ba(OH)\textsubscript{2} \cdot H\textsubscript{2}O</td>
<td>trace</td>
</tr>
<tr>
<td>15</td>
<td>Li\textsubscript{2}CO\textsubscript{3}</td>
<td>trace</td>
</tr>
<tr>
<td>16</td>
<td>LiOAc</td>
<td>trace</td>
</tr>
<tr>
<td>17</td>
<td>LiBr</td>
<td>trace</td>
</tr>
<tr>
<td>18</td>
<td>LiOMe</td>
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<tr>
<td>19</td>
<td>LiOEt</td>
<td>53</td>
</tr>
<tr>
<td>20</td>
<td>—</td>
<td>trace</td>
</tr>
</tbody>
</table>

\(^a\) Reaction conditions: acetophenone 1a (0.5 mmol), phenylmethanol 2a (0.75 mmol), base (1.0 mmol), toluene (2 mL), 110 \(^\circ\)C, for 12 h, under argon. \(^b\) The yields were determined by GC (average of two GC runs).
Mechanistic Studies:

**Radical Inhibition Experiments**

![Chemical structure](image)

Typical Procedure: After standard cycles of evacuation and back-filling with dry and pure argon, an oven-dried Schlenk tube equipped with a magnetic stirring bar was charged with LiOtBu (1 mmol, 80 mg). The tube was evacuated and backfilled with argon (this procedure was repeated three times). Under a counter flow of argon, the acetophenone 1a (0.5 mmol, 60 mg), phenylmethanol 2a (0.75 mmol, 81 mg), 1,4-cyclohexadiene (1 mmol, 80 mg) or 2,2,6,6-tetramethyl-1-piperidinyloxy (1 mmol, 157 mg) or 1,1-dibenzene-1-thene (1 mmol, 180 mg) and toluene (2.0 mL) were added by syringe. The tube was sealed and the mixture was allowed to stir at 80-110°C for 12 h. The reaction mixture was then allowed to cool to ambient temperature, and quenched by the addition of a saturated NH₄Cl solution (5 mL) and extracted with diethyl ether (3×10 mL). Organic layers were gathered, dried over Na₂SO₄, filtered and concentrated in vacuum. The obtained crude product was purified by column chromatography on silica gel using mixtures of petroleum ether/ethyl acetate (30/1) and the product was dried under high vacuum for 0.5 h.

We added the radical inhibitor (i.e. 1,4-cyclohexadiene, TEMPO, and 1,1-diphenylethylene) to the reactions. It is found that such radical inhibitors only slowed down the reaction slightly but did not stop it (eq 1). It suggested that this reaction may not proceed through a radical pathway.
We conducted kinetic isotope experiments. According to two separated reactions with 1a and 2a, 1a and 2a-D under the standard conditions, the intermolecular KIE (kinetic isotope effect) value of 2.4 was obtained (eq 2). This result indicated that the cleavage of C-H bond in alcohols should be involved in the rate-limiting step.
Lithium Trapping Experiments

![Reaction Scheme](image)

Typical Procedure: After standard cycles of evacuation and back-filling with dry and pure argon, an oven-dried Schlenk tube equipped with a magnetic stirring bar was charged with LiOtBu (1 mmol, 80 mg). The tube was evacuated and backfilled with argon (this procedure was repeated three times). Under a counter flow of argon, the acetophenone 1a (0.5 mmol, 60 mg), phenylmethanol 2a (0.75 mmol, 81 mg), 12-crown-4 (2 mmol, 352 mg) and toluene (2.0 mL) were added by syringe. The tube was sealed and the mixture was allowed to stir at room temperature for 1 h, and then at 110°C for 12 h. The reaction mixture was then allowed to cool to ambient temperature, and quenched by the addition of a saturated NH₄Cl solution (5 mL) and extracted with diethyl ether (3×10 ml). The yield was 19% determined by GC with biphenyl as internal standard.

Since remarkably distinct results were obtained among KOtBu, NaOtBu, and LiOtBu, which the major difference is the countercation, we were attracted to investigating the role of the alkali metal ion (eq 3). Two equivalent (based on LiOtBu) amount of 12-crown-4, a known lithium chelator, was added to trap the Li⁺ cation during the course of the transformation, and a significantly low yield (19%) was observed. This result suggested that the Li⁺ cation possibly involved in this reaction.
Labeling Experiments

\[ \text{Product} \]

The D was determined by \(^1\)H NMR. The reaction of \(\alpha,\alpha,\alpha\)-trideuterioacetophenone with 2a 50\% deuterium was found at the \(\alpha\)-position, while the reaction using deuterated benzyl alcohol with 1a afforded the product 3aa with 23\% deuterium at the \(\alpha\)-position, no deuterium incorporation was detected at the \(\beta\)-position (eq 4). It should be noted that the \(\alpha\)-hydrogen of ketones and the hydroxyl hydrogen are very active to occur D-H exchange under base conditions, and even during the work-up.
The reaction using $\alpha,\alpha$-dideuterobenzyl alcohol as the labeled reagent, gave the product 3aa with full incorporation at the $\beta$-position, and no deuterium was found at the $\alpha$-position. Moreover, when a equimolecular amount of $\alpha,\alpha$-dideuterobenzyl alcohol and 4-methoxybenzyl alcohol were reacted with 2a, deuterated products 3aa was isolated in 41% yield with 60% deuterium at the $\beta$-position and 52% yield of 3ab was formed with 25% deuterium incorporation, as determined by $^1$H NMR and HRMS method (eq 5).
Preparation of deuterated reagents

I. Preparation of benzyl alcohol-OD (PhCH$_2$OD)$^1$

Put phenylmethanol 2a (10 mmol, 1080mg) solved in 10ml D$_2$O. The mixture was stirred for 48 hours under room temperature. And then, concentrating in vacuum the residue was purified by flash chromatography on a short silica gel (eluent: petroleum ether/ethyl acetate = 5:1) to afford 1020 mg (94%, D$_\% = 87\%$) of PhCH$_2$OD.

II. Preparation of $\alpha,\alpha,\alpha$-trideuterioacetophenone (PhCOCD$_3$)$^2$

Put acetophenone 1a (10 mmol, 1200mg) solved in 10ml D$_2$O. And then, 2 mL NaOD/D$_2$O solution (10% in D$_2$O) was added into the reaction system. The mixture was stirred for 48 hours under room temperature. And then, concentrating in vacuum the residue was purified by flash chromatography on a short silica gel (eluent: petroleum ether/ethyl acetate = 10:1) to afford 1180 mg (96%, D$_\% = 91\%$) of PhCOCD$_3$.

III. Preparation of $\alpha,\alpha$-dideuteriobenzyl alcohol (PhCD$_2$OH)$^3$

Put LiAlD$_4$ (0.30 g, 7.2 mmol) solved in THF (20 mL) at 0$^\circ$C. And then, a solution of methyl benzoate (10 mmol, 1362mg) in THF (20 mL) was added into the reaction system. The mixture was stirred for 2 hours at 0 $^\circ$C. The resulting solution was quenched with HCl 1N and was extracted with ether ($3 \times 20$ mL). And then, concentrating in vacuum the residue was purified by flash chromatography on a short silica gel (eluent: petroleum ether/ethyl acetate = 5:1) to afford 1080 mg (98%, D$_\% > 99\%$) of PhCD$_2$OH.
**General Remarks**

All reactions were carried out in an oven-dried flask under a pure and dry argon atmosphere. LiOrBu was purchased from Alfa Aesar, J&K, Aladdin, Adamas, and used in text was from Alfa Aesar. Generally, ketones and alcohols were purchased from commercial sources (Aldrich, Acros, Alfa Aesar, Aladdin, Adamas) and distilled when necessary. All solvents were dried and distilled by standard methods. These solvents were transferred by syringe to the reaction flask. Analytical thin layer chromatography (TLC) was performed using Merck silica gel GF254 plates. Flash column chromatography was performed with silica gel (200-300 mesh). NMR spectra were recorded using a Bruker Avance 300 or 400 instruments. Gas chromatographic (GC) analysis was performed on a Shimadzu GC-2014 Series GC System. GC-MS analysis was performed on Thermo Scientific AS 3000 Series GC-MS System. MS analysis was performed on Finnigan LCQ advantage Max Series MS System.
**General Procedure and Analytical data**

After standard cycles of evacuation and back-filling with dry and pure argon, an oven-dried Schlenk tube equipped with a magnetic stirring bar was charged with LiOrBu (1 mmol, 80 mg), the ketones if a solid (0.5 mmol, 1 equiv), alcohol if a solid (0.75 mmol, 1.5 equiv). The tube was evacuated and backfilled with argon (this procedure was repeated three times). Under a counter flow of argon, the ketones if a liquid (0.5 mmol, 1 equiv), alcohol if a liquid (0.75 mmol, 1.5 equiv) and toluene (2.0 mL) were added by syringe. The tube was sealed and the mixture was allowed to stir at 80-110°C for 12-36 h.

The reaction mixture was then allowed to cool to ambient temperature, and quenched by the addition of a saturated NH4Cl solution (5 mL) and extracted with diethyl ether (10 ml ×3). Organic layers were gathered, dried over Na2SO4, filtered and concentrated in vacuum. The obtained crude product was purified by column chromatography on silica gel using suitable mixtures of petroleum ether/ethyl acetate and the product was dried under vacuum for at least 0.5 h.

1):  
**1,3-diphenylpropan-1-one.** The reaction of acetophenone 1a (60 mg, 0.5 mmol), phenylmethanol 2a (81 mg, 0.75 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 94 mg (90%) of 3aa. 3aa: white solid; m. p. 73-74 °C; 1H NMR (300 MHz, CDCl3): δ 7.95 (d, J = 6.9 Hz, 2H), 7.55 (t, J = 7.2 Hz, 1H), 7.44 (t, J = 7.8 Hz, 2H), 7.32-7.17 (m, 5H), 3.30 (t, J = 6.9 Hz, 2H), 3.07 (t, J = 8.1 Hz, 2H); 13C NMR (75 MHz, CDCl3): δ 199.1, 141.2, 136.8, 132.9, 128.5, 128.4, 128.3, 127.9, 126.0, 40.3, 30.1ppm; HRMS m/z (ESI) calcd. for C15H15O (M + H)+ 211.1117, found 211.1118.

2):
3-(4-methoxyphenyl)-1-phenylpropan-1-one. The reaction of acetophenone 1a (60 mg, 0.5 mmol), (4-methoxyphenyl)methanol 2b (103.5 mg, 0.75 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 109 mg (91%) of 3ab. 3ab: white solid; m. p. 66-67 °C; \(^1\)H NMR (300 MHz, CDCl\(_3\)): \(\delta 7.96\) (d, \(J = 7.2\) Hz, 2H), 7.55 (t, \(J = 7.5\) Hz, 1H), 7.45 (t, \(J = 7.8\) Hz, 2H), 7.18 (d, \(J = 8.7\) Hz, 2H), 6.85 (d, \(J = 8.4\) Hz, 2H), 3.79 (s, 3H), 3.27 (t, \(J = 6.9\) Hz, 2H), 3.02 (t, \(J = 7.8\) Hz, 2H); \(^{13}\)C NMR (75 MHz, CDCl\(_3\)): \(\delta 199.2, 157.9, 136.8, 133.2, 131.9, 128.9, 128.5, 127.9, 113.8, 55.1, 40.6, 29.2\) ppm; HRMS \(m/z\) (ESI) calcd. for C\(_{16}\)H\(_{17}\)O (M + H)\(^+\) 241.1223, found 241.1224.

1-phenyl-3-p-tolylpropan-1-one. The reaction of acetophenone 1a (60 mg, 0.5 mmol), \(p\)-tolylmethyl alcohol 2c (91.5 mg, 0.75 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 103 mg (92%) of 3ac. 3ac: white solid; m. p. 47-48 °C; \(^1\)H NMR (300 MHz, CDCl\(_3\)): \(\delta 7.97\) (d, \(J = 6.9\) Hz, 2H), 7.56 (t, \(J = 7.5\) Hz, 1H), 7.46 (t, \(J = 7.8\) Hz, 2H), 7.26-7.11 (m, 4H), 3.30 (t, \(J = 6.9\) Hz, 2H), 3.05 (t, \(J = 7.8\) Hz, 2H), 2.34 (s, 3H); \(^{13}\)C NMR (75 MHz, CDCl\(_3\)): \(\delta 198.2, 137.1, 135.8, 134.5, 131.9, 128.1, 127.5, 127.2, 126.9, 39.5, 28.6, 19.9\) ppm; HRMS \(m/z\) (ESI) calcd. for C\(_{16}\)H\(_{17}\)O (M + H)\(^+\) 225.1274, found 225.1276.

3-(4-chlorophenyl)-1-phenylpropan-1-one. The reaction of acetophenone 1a (60 mg, 0.5 mmol), (4-chlorophenyl)methanol 2e (106.5 mg, 0.75 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 102 mg (84%) of 3ae. 3ae: white solid; m. p. 58-59 °C; \(^1\)H NMR (300 MHz, CDCl\(_3\)): \(\delta 7.85\) (d, \(J = 7.2\) Hz, 2H), 7.46 (t, \(J = 7.5\) Hz, 1H), 7.35 (t, \(J = 7.8\) Hz, 2H), 7.15 (d, \(J = 8.4\) Hz, 2H), 7.08 (d, \(J = 8.4\) Hz, 2H), 3.18 (t, \(J = 7.2\) Hz, 2H), 2.94 (t, \(J = 7.8\) Hz, 2H); \(^{13}\)C NMR (75 MHz, CDCl\(_3\)): \(\delta \)
198.7, 139.6, 136.7, 133.0, 129.7, 128.6, 128.5, 127.9, 40.0, 29.3 ppm; HRMS m/z (ESI) calcd. for C_{15}H_{14}ClO (M + H)^+ 245.0728, found 245.0727.

3-(3-bromophenyl)-1-phenylpropan-1-one. The reaction of acetophenone 1a (60 mg, 0.5 mmol), (3-bromophenyl)methanol 2f (139.5 mg, 0.75 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 125 mg (87%) of 3af. 3af: white solid; m. p. 80-81 °C; ^1H NMR (300 MHz, CDCl_3): δ 7.88 (d, J = 7.2 Hz, 2H), 7.51-7.07 (m, 7H), 3.21 (t, J = 7.2 Hz, 2H), 2.96 (t, J = 7.8 Hz, 2H); ^13C NMR (75 MHz, CDCl_3): δ 197.5, 142.6, 135.7, 132.1, 130.4, 129.0, 128.2, 127.6, 126.9, 126.1, 121.5, 38.9, 28.6 ppm; HRMS m/z (ESI) calcd. for C_{15}H_{14}BrO (M + H)^+ 289.0223, found 289.0225.

3-(2-chlorophenyl)-1-phenylpropan-1-one. The reaction of acetophenone 1a (60 mg, 0.5 mmol), (2-chlorophenyl)methanol 2g (106.5 mg, 0.75 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 99 mg (81%) of 3ag. 3ag: colorless oil; ^1H NMR (300 MHz, CDCl_3): δ 7.97 (d, J = 6.9 Hz, 2H), 7.56 (t, J = 7.5 Hz, 1H), 7.45 (t, J = 7.8 Hz, 2H), 7.38-7.30 (m, 2H), 7.22-7.13 (m, 2H), 3.32 (t, J = 6.6 Hz, 2H), 3.19 (t, J = 6.9 Hz, 2H); ^13C NMR (75 MHz, CDCl_3): δ 198.8, 138.8, 136.7, 133.9, 133.0, 130.7, 129.5, 128.5, 128.0, 127.6, 126.9, 38.3, 28.2 ppm; HRMS m/z (ESI) calcd. for C_{15}H_{14}ClO (M + H)^+ 245.0728, found 245.0731.
3-phenyl-1-p-tolylpropan-1-one. The reaction of 1-p-tolylethanone 1b (67 mg, 0.5 mmol), phenylmethanol 2a (81 mg, 0.75 mmol), Li(OtBu) (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 105 mg (94%) of 3ba. 3ba: white solid; m. p. 67-68 °C; 1H NMR (300 MHz, CDCl3): δ 7.77 (d, J = 8.1 Hz, 2H), 7.24-7.11 (m, 7H), 3.19 (t, J = 6.9 Hz, 2H), 2.98 (t, J = 7.8 Hz, 2H), 2.32 (s, 3H); 13C NMR (75 MHz, CDCl3): δ 198.7, 143.7, 141.3, 134.3, 129.2, 128.4, 128.3, 128.1, 126.0, 40.2, 30.1, 21.5 ppm; HRMS m/z (ESI) calcd. for C16H17O (M + H)+ 225.1274, found 225.1274.

1-(4-methoxyphenyl)-3-phenylpropan-1-one. The reaction of 1-(4-methoxyphenyl)ethanone 1c (75 mg, 0.5 mmol), phenylmethanol 2a (81 mg, 0.75 mmol), Li(OtBu) (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 110 mg (92%) of 3ca. 3ca: white solid; m. p. 96-97 °C; 1H NMR (300 MHz, CDCl3): δ 7.93 (d, J = 9.0 Hz, 2H), 7.31-7.19 (m, 5H), 6.91 (d, J = 8.7 Hz, 2H), 3.85 (s, 3H), 3.24 (t, J = 7.5 Hz, 2H), 3.05 (t, J = 8.1 Hz, 2H); 13C NMR (75 MHz, CDCl3): δ 197.7, 163.4, 141.3, 134.3, 129.2, 128.4, 128.3, 126.0, 113.6, 55.3, 40.0, 30.2 ppm; HRMS m/z (ESI) calcd. for C16H17O2 (M + H)+ 241.1223, found 241.1220.

3-phenyl-1-(4-(trifluoromethyl)phenyl)propan-1-one. The reaction of 1-(4-(trifluoromethyl)phenyl)ethanone 1d (94 mg, 0.5 mmol), phenylmethanol 2a (81 mg, 0.75 mmol), Li(OtBu) (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded
136 mg (98%) of 3da. 3da: white solid; m. p. 50-51 °C; $^1$H NMR (300 MHz, CDCl$_3$): δ 7.95 (d, $J = 8.4$ Hz, 2H), 7.62 (d, $J = 8.4$ Hz, 2H), 7.24-7.12 (m, 5H), 3.23 (t, $J = 7.8$ Hz, 2H), 2.99 (t, $J = 7.8$ Hz, 2H); $^{13}$C NMR (75 MHz, CDCl$_3$): δ 198.1, 140.8, 139.4, 134.5, 134.1, 128.5, 128.4, 128.3, 128.2, 125.7-125.5 (q, $J = 3.75$ Hz), 40.6, 29.9 ppm; HRMS $m/z$ (ESI) calcd. for C$_{16}$H$_{14}$F$_3$O$_2$ (M + H)$^+$ 279.0991, found 279.0992.

![3fa](image)

10): 

1-(4-fluorophenyl)-3-phenylpropan-1-one. The reaction of 1-(4-fluorophenyl)-ethanone 1f (69 mg, 0.5 mmol), phenylmethanol 2a (81 mg, 0.75 mmol), LiOtBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 111 mg (97%) of 3fa. 3fa: colorless oil; $^1$H NMR (300 MHz, CDCl$_3$): δ 7.98 (d, $J = 5.4$ Hz, 2H), 7.29-7.19 (m, 5H), 7.10 (t, $J = 8.4$ Hz, 2H), 3.26 (t, $J = 7.5$ Hz, 2H), 3.05 (t, $J = 7.2$ Hz, 2H); $^{13}$C NMR (75 MHz, CDCl$_3$): δ 197.4, 167.3, 163.9, 141.0, 133.3, 130.0, 128.5, 126.1, 115.7, 40.2, 30.0 ppm; HRMS $m/z$ (ESI) calcd. for C$_{15}$H$_{13}$FO (M + H)$^+$ 229.1023, found 229.1022.

![3ga](image)

11): 

1-(4-chlorophenyl)-3-phenylpropan-1-one. The reaction of 1-(4-chlorophenyl)-ethanone 1g (77 mg, 0.5 mmol), phenylmethanol 2a (81 mg, 0.75 mmol), LiOtBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 116 mg (95%) of 3ga. 3ga: white solid; m. p. 75-76 °C; $^1$H NMR (300 MHz, CDCl$_3$): δ 7.79 (d, $J = 8.7$ Hz, 2H), 7.32 (d, $J = 8.7$ Hz, 2H), 7.24-7.12 (m, 5H), 3.18 (t, $J = 7.2$ Hz, 2H), 2.97 (t, $J = 7.8$ Hz, 2H); $^{13}$C NMR (75 MHz, CDCl$_3$): δ 197.9, 141.0, 139.4, 135.1, 129.4, 128.8, 128.5, 128.3, 126.1, 40.3, 30.0 ppm; HRMS $m/z$ (ESI) calcd. for C$_{15}$H$_{14}$ClO (M + H)$^+$ 245.0728, found 245.0730.
1-\(\text{4- bromophenyl}\)-3-phenylpropan-1-one. The reaction of 1-\(\text{4- bromophenyl}\)-ethanone 1h (99 mg, 0.5 mmol), phenylmethanol 2a (81 mg, 0.75 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 137 mg (95%) of 3ha. 3ha: white solid; m. p. 96-99 °C; \(^1\)H NMR (300 MHz, CDCl\(_3\)): \(\delta\) 7.73 (d, \(J = 8.7\) Hz, 2H), 7.51 (d, \(J = 8.4\) Hz, 2H), 7.24-7.10 (m, 5H), 3.18 (t, \(J = 7.2\) Hz, 2H), 2.98 (t, \(J = 7.8\) Hz, 2H); \(^{13}\)C NMR (75 MHz, CDCl\(_3\)): \(\delta\) 198.0, 141.0, 135.5, 131.8, 129.5, 128.5, 128.3, 128.1, 126.2, 40.3, 30.0 ppm; HRMS \(m/z\) (ESI) calcd. for C\(_{15}\)H\(_{14}\)BrO (M + H\(^+\)) 289.0223, found 289.0225.

1-\(\text{4- iodophenyl}\)-3-phenylpropan-1-one. The reaction of 1-\(\text{4- iodophenyl}\)ethanone 1i (123 mg, 0.5 mmol), phenylmethanol 2a (81 mg, 0.75 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 161 mg (96%) of 3ia. 3ia: white solid; m. p. 118-119 °C; \(^1\)H NMR (300 MHz, CDCl\(_3\)): \(\delta\) 7.23 (d, \(J = 8.4\) Hz, 2H), 7.57 (d, \(J = 8.7\) Hz, 2H), 7.24-7.12 (m, 5H), 3.17 (t, \(J = 6.9\) Hz, 2H), 2.97 (t, \(J = 7.8\) Hz, 2H); \(^{13}\)C NMR (75 MHz, CDCl\(_3\)): \(\delta\) 198.4, 141.0, 137.9, 136.1, 129.4, 128.5, 128.3, 126.2, 100.9, 40.3, 30.0 ppm; HRMS \(m/z\) (ESI) calcd. for C\(_{15}\)H\(_{14}\)IO (M + H\(^+\)) 337.0084, found 337.0084.

3-phenyl-1-\(\circ\)-tolylpropan-1-one. The reaction of 1-\(\circ\)-tolylethanone 1j (67 mg, 0.5 mmol), phenylmethanol 2a (81 mg, 0.75 mmol), LiOrBu (80 mg, 1 mmol), in toluene
(2.0 mL), at 110 °C, under Ar, for 12 h, afforded 89 mg (79%) of 3ja. 3ja: colorless oil; 
\(^1\)H NMR (300 MHz, CDCl\(_3\)): \(\delta\) 7.48 (d, \(J = 7.5\) Hz, 1H), 7.24-7.09 (m, 8H), 3.12 (t, \(J = 6.9\) Hz, 2H), 2.94 (t, \(J = 7.8\) Hz, 2H), 2.36 (s, 3H); \(^1^3\)C NMR (75 MHz, CDCl\(_3\)): \(\delta\) 203.2, 141.1, 138.0, 137.8, 131.8, 131.1, 128.4, 128.3, 126.0, 125.5, 43.1, 30.2, 21.1 ppm; HRMS m/z (ESI) calcd. for C\(_{16}\)H\(_{17}\)O (M + H)+ 225.1274, found 225.1273.

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15):

1-(2-hydroxyphenyl)-3-phenylpropan-1-one. The reaction of 1-(2-hydroxyphenyl)-ethanone 1k (68 mg, 0.5 mmol), phenylmethanol 2a (81 mg, 0.75 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 95 mg (84%) of 3ka. 3ka: pale yellow oil; \(^1\)H NMR (300 MHz, CDCl\(_3\)): \(\delta\) 12.2 (s, 1H), 7.64 (d, \(J = 8.1\) Hz, 1H), 7.36 (t, \(J = 6.9\) Hz, 1H), 7.39-7.12 (m, 5H), 6.89 (d, \(J = 8.4\) Hz, 1H), 6.78 (t, \(J = 7.2\) Hz, 1H), 3.24 (t, \(J = 6.9\) Hz, 2H), 2.98 (t, \(J = 8.1\) Hz, 2H); \(^1^3\)C NMR (75 MHz, CDCl\(_3\)): \(\delta\) 205.3, 162.4, 140.6, 136.2, 129.7, 128.3, 126.2, 119.2, 118.8, 118.5, 39.9, 30.0 ppm; HRMS m/z (ESI) calcd. for C\(_{15}\)H\(_{15}\)O\(_2\) (M + H)+ 227.1067, found 227.1066.

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16):

3-phenyl-1-m-tolylpropan-1-one.\(^5\) The reaction of 1-m-tolylethanone 11 (67 mg, 0.5 mmol), phenylmethanol 2a (81 mg, 0.75 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 101 mg (90%) of 3la. 3la: colorless oil; \(^1\)H NMR (300 MHz, CDCl\(_3\)): \(\delta\) 7.65 (d, \(J = 8.1\) Hz, 2H), 7.28-7.11 (m, 7H), 3.19 (t, \(J = 6.9\) Hz, 2H), 2.97 (t, \(J = 8.1\) Hz, 2H), 2.30 (s, 3H); \(^1^3\)C NMR (75 MHz, CDCl\(_3\)): \(\delta\) 199.2, 141.3, 138.2, 136.8, 133.7, 128.5, 128.4, 128.39, 128.36, 126.0, 125.1, 40.4, 30.1, 21.2 ppm; HRMS m/z (ESI) calcd. for C\(_{16}\)H\(_{17}\)O (M + H)+ 225.1274, found 225.1274.
17): 

**1-(naphthalen-1-yl)-3-phenylpropan-1-one.**  The reaction of 1-(naphthalen-1-yl)-ethanone **1m** (85 mg, 0.5 mmol), phenylmethanol **2a** (81 mg, 0.75 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 118 mg (91%) of **3ma.** **3ma:** white solid; m. p. 50-51 °C; \(^{1}H\) NMR (300 MHz, CDCl\(_3\)): \(\delta\) 8.45 (d, \(J = 8.4\) Hz, 1H), 7.83 (d, \(J = 8.1\) Hz, 1H), 7.74-7.66 (m, 2H), 7.45-7.29 (m, 3H), 7.23-7.08 (m, 5H), 3.25 (t, \(J = 7.2\) Hz, 2H), 3.02 (t, \(J = 7.8\) Hz, 2H); \(^{13}C\) NMR (75 MHz, CDCl\(_3\)): \(\delta\) 203.4, 145.7, 141.0, 136.0, 132.5, 129.3, 128.5, 128.4, 128.3, 127.8, 127.3, 126.4, 126.1, 125.7, 124.3, 43.7, 30.5 ppm; HRMS \(m/z\) (ESI) calcd. for C\(_{19}\)H\(_{17}\)O (M + H)\(^+\) 261.1274, found 261.1275.

18): 

**1-(naphthalen-2-yl)-3-phenylpropan-1-one.**  The reaction of 1-(naphthalen-2-yl)-ethanone **1n** (85 mg, 0.5 mmol), phenylmethanol **2a** (81 mg, 0.75 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 118 mg (91%) of **3na.** **3na:** white solid; m. p. 92-93 °C; \(^{1}H\) NMR (300 MHz, CDCl\(_3\)): \(\delta\) 8.35 (s, 1H), 7.94 (d, \(J = 8.7\) Hz, 1H), 7.84-7.75 (m, 3H), 7.51-7.41 (m, 2H), 7.25-7.18 (m, 4H), 7.15-7.10 (m, 1H), 3.33 (t, \(J = 7.2\) Hz, 2H), 3.03 (t, \(J = 8.1\) Hz, 2H); \(^{13}C\) NMR (75 MHz, CDCl\(_3\)): \(\delta\) 197.9, 140.3, 134.5, 133.1, 131.4, 128.5, 128.4, 127.9, 127.5, 127.4, 127.3, 126.6, 125.6, 125.1, 122.7, 39.4, 29.2 ppm; HRMS \(m/z\) (ESI) calcd. for C\(_{19}\)H\(_{17}\)O (M + H)\(^+\) 261.1274, found 261.1274.
2-benzyl-3,4-dihydronaphthalen-1(2H)-one. The reaction of 3,4-dihydronaphthalen-1(2H)-one 1o (73 mg, 0.5 mmol), phenylmethanol 2a (81 mg, 0.75 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 109 mg (92%) of 3oa. 3oa: pale yellow oil; 1H NMR (300 MHz, CDCl3): δ 7.98 (d, J = 7.8 Hz, 1H), 7.36 (t, J = 8.4 Hz, 1H), 7.23-7.18 (m, 3H), 7.14-7.10 (m, 4H), 3.43-3.37 (m, 1H), 2.89-2.80 (m, 2H), 2.70-2.51 (m, 2H), 2.05-1.97 (m, 1H), 1.75-1.59 (m, 1H); 13C NMR (75 MHz, CDCl3): δ 198.2, 142.9, 138.9, 132.1, 131.4, 128.2, 125.0, 48.3, 34.6, 27.5, 26.6 ppm; HRMS m/z (ESI) calcd. for C17H17O (M + H)+ 237.1274, found 237.1273.

2-benzyl-2,3-dihydro-1H-inden-1-one. The reaction of 2,3-dihydro-1H-inden-1-one 1p (66 mg, 0.5 mmol), phenylmethanol 2a (81 mg, 0.75 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 80 mg (72%) of 3pa. 3pa: yellowish-tan oil; 1H NMR (300 MHz, CDCl3): δ 7.70 (d, J = 7.5 Hz, 1H), 7.48 (t, J = 7.8 Hz, 1H), 7.32-7.24 (m, 2H), 7.24-7.13 (m, 5H), 3.35-3.29 (m, 1H), 3.13-3.04 (m, 1H), 2.96-2.87 (m, 1H), 2.81-2.74 (m, 1H), 2.63-2.55 (m, 1H); 13C NMR (75 MHz, CDCl3): δ 207.7, 153.5, 139.6, 136.5, 134.7, 128.8, 128.4, 127.3, 126.5, 126.3, 123.9, 48.9, 36.9, 32.1 ppm; HRMS m/z (ESI) calcd. for C16H15O (M + H)+ 223.1117, found 223.1114.

3-phenyl-1-(thiophen-2-yl)propan-1-one. The reaction of 1-(thiophen-2-yl)ethanone 1q (63 mg, 0.5 mmol), phenylmethanol 2a (81 mg, 0.75 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 100 mg (93%) of 3qa. 3qa: yellow oil; 1H NMR (300 MHz, CDCl3): δ 7.60 (d, J = 3.9 Hz, 1H), 7.52 (d, J = 4.8 Hz, 1H), 7.24-7.09 (m, 5H), 7.02 (t, J = 4.5 Hz, 1H), 3.14 (t, J = 7.8 Hz, 2H), 2.98 (t, J = 8.1 Hz, 2H), 2.63-2.55 (m, 1H); 13C NMR (75 MHz, CDCl3): δ 207.7, 153.5, 139.6, 136.5, 134.7, 128.8, 128.4, 127.3, 126.5, 126.3, 123.9, 48.9, 36.9, 32.1 ppm; HRMS m/z (ESI) calcd. for C21H18O (M + H)+ 313.1274, found 313.1273.
Hz, 2H); $^{13}$C NMR (75 MHz, CDCl$_3$): $\delta$ 192.0, 144.0, 140.8, 133.4, 131.7, 128.4, 128.3, 127.9, 126.1, 41.0, 30.2 ppm; HRMS m/z (ESI) calcd. for C$_{13}$H$_{13}$SO (M + H)$^+$ 217.0682, found 217.0680.

![3ra](image)

22): 1-(furan-2-yl)-3-phenylpropan-1-one. The reaction of 1-(furan-2-yl)ethanone 1r (55 mg, 0.5 mmol), phenylmethanol 2a (81 mg, 0.75 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 41 mg (41%) of 3ra. 3ra: yellow oil; $^1$H NMR (300 MHz, CDCl$_3$): $\delta$ 7.47 (d, $J$ = 1.2 Hz, 1H), 7.22-7.10 (m, 5H), 7.07 (d, $J$ = 4.2 Hz, 1H), 6.43-9.41 (m, 1H), 3.06 (t, $J$ = 8.7 Hz, 2H), 2.95 (t, $J$ = 8.1 Hz, 2H); $^{13}$C NMR (75 MHz, CDCl$_3$): $\delta$ 188.3, 152.6, 146.2, 140.9, 128.4, 128.3, 126.1, 116.9, 112.1, 40.0, 29.8 ppm; HRMS m/z (ESI) calcd. for C$_{13}$H$_{13}$O$_2$ (M + H)$^+$ 201.0910, found 201.0908.

![4sa](image)

23): 3-phenyl-1-(pyridin-2-yl)propan-1-ol.$^{12}$ The reaction of 1-(pyridin-2-yl)ethanone 1s (60.5 mg, 0.5 mmol), phenylmethanol 2a (81 mg, 0.75 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 47 mg (44%) of 4sa. 4sa: yellow oil; $^1$H NMR (300 MHz, CDCl$_3$): $\delta$ 8.45 (d, $J$ = 1.5 Hz, 1H), 7.57 (t, $J$ = 7.5 Hz, 1H), 7.17-7.08 (m, 7H), 4.68 (d, $J$ = 3.9 Hz, 1H), 4.19 (s, 1H), 2.69 (t, $J$ = 6.9 Hz, 2H), 2.07-1.84 (m, 2H); $^{13}$C NMR (75 MHz, CDCl$_3$): $\delta$ 161.9, 148.1, 141.9, 136.6, 128.4, 128.2, 125.7, 122.2, 120.2, 72.0, 40.2, 31.5 ppm; HRMS m/z (ESI) calcd. for C$_{14}$H$_{16}$NO (M + H)$^+$ 214.1226, found 214.1225.
24): **1-phenylhexan-1-one.** The reaction of acetophenone 1a (60 mg, 0.5 mmol), butan-1-ol 2h (55.5 mg, 0.75 mmol), LiOtBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 57 mg (65%) of 3ah. 3ah: colorless oil; $^1$H NMR (300 MHz, CDCl$_3$): $\delta$ 7.96 (d, $J = 6.9$ Hz, 2H), 7.54 (t, $J = 7.2$ Hz, 1H), 7.45 (t, $J = 7.5$ Hz, 2H), 2.96 (t, $J = 7.2$ Hz, 2H), 1.80-1.70 (m, 2H), 1.40-1.34 (m, 4H), 0.91 (t, $J = 7.2$ Hz, 3H); $^{13}$C NMR (75 MHz, CDCl$_3$): $\delta$ 200.5, 137.1, 132.7, 128.5, 128.0, 38.5, 31.5, 24.0, 22.4, 13.9 ppm; HRMS m/z (ESI) calcd. for C$_{12}$H$_{17}$O (M+H)$^+$ 177.1274, found 177.1274.

25): **4-methyl-1-phenylpentan-1-one.** The reaction of acetophenone 1a (60 mg, 0.5 mmol), 2-methylpropan-1-ol 2i (55.5 mg, 0.75 mmol), LiOtBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 55 mg (63%) of 3ai. 3ai: colorless oil; $^1$H NMR (300 MHz, CDCl$_3$): $\delta$ 7.96 (d, $J = 7.2$ Hz, 2H), 7.55 (t, $J = 7.5$ Hz, 1H), 7.45 (t, $J = 7.5$ Hz, 2H), 2.96 (t, $J = 7.2$ Hz, 2H), 1.66-1.61 (m, 3H), 0.95 (d, $J = 6.3$ Hz, 6H); $^{13}$C NMR (75 MHz, CDCl$_3$): $\delta$ 199.7, 136.1, 131.8, 127.5, 127.0, 35.6, 32.2, 26.8, 21.4 ppm; HRMS m/z (ESI) calcd. for C$_{12}$H$_{17}$O (M+H)$^+$ 177.1274, found 177.1275.

26): **1-phenyloctan-1-one.** The reaction of acetophenone 1a (60 mg, 0.5 mmol), hexan-1-ol 2j (76.5 mg, 0.75 mmol), LiOtBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 72 mg (71%) of 3aj. 3aj: colorless oil; $^1$H NMR (300 MHz, CDCl$_3$): $\delta$ 7.96 (d, $J = 6.9$ Hz, 2H), 7.54 (t, $J = 7.2$ Hz, 1H), 7.45 (t, $J = 7.5$ Hz, 2H), 2.96 (t, $J = 6.9$ Hz, 2H), 2.54 (m, 4H), 1.66-1.61 (m, 3H), 0.95 (d, $J = 6.3$ Hz, 6H); $^{13}$C NMR (75 MHz, CDCl$_3$): $\delta$ 199.7, 136.1, 131.8, 127.5, 127.0, 35.6, 32.2, 26.8, 21.4 ppm; HRMS m/z (ESI) calcd. for C$_{12}$H$_{17}$O (M+H)$^+$ 177.1274, found 177.1275.
7.2 Hz, 2H), 1.79-1.69 (m, 2H), 1.40-1.29 (m, 8H), 0.88 (t, J = 6.6 Hz, 3H); $^{13}$C NMR (75 MHz, CDCl$_3$): δ 200.5, 137.1, 132.7, 128.5, 128.0, 38.6, 31.6, 29.3, 29.1, 24.3, 22.5, 14.0 ppm; HRMS m/z (ESI) calcd. for C$_{14}$H$_{21}$O (M + H)$^+$ 205.1587, found 205.1588.

27):

**1-phenyldecan-1-one.**$^{4l}$ The reaction of acetophenone 1a (60 mg, 0.5 mmol), octan-1-ol 2k (97.5 mg, 0.75 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 84 mg (72%) of 3ak. **3ak:** colorless oil; $^{1}$H NMR (300 MHz, CDCl$_3$): δ 7.94 (d, J = 6.9 Hz, 2H), 7.54 (t, J = 7.2 Hz, 1H), 7.45 (t, J = 7.5 Hz, 2H), 2.95 (t, J = 7.5 Hz, 2H), 1.79-1.69 (m, 2H), 1.34-1.09 (m, 12H), 0.88 (t, J = 6.3 Hz, 3H); $^{13}$C NMR (75 MHz, CDCl$_3$): δ 200.4, 137.1, 132.7, 128.4, 128.0, 38.5, 31.8, 29.5, 29.4, 29.2, 24.3, 22.6, 14.0 ppm; HRMS m/z (ESI) calcd. for C$_{16}$H$_{25}$O (M + H)$^+$ 233.1900, found 233.1900.

28):

**(E)-1,5-diphenylpent-4-en-1-one.**$^{4p}$ The reaction of acetophenone 1a (60 mg, 0.5 mmol), (E)-3-phenylprop-2-en-1-ol 2l (100.5 mg, 0.75 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 73 mg (62%) of 3al. **3al:** colorless oil; $^{1}$H NMR (300 MHz, CDCl$_3$): δ 7.99 (d, J = 7.2 Hz, 2H), 7.57 (t, J = 6.9 Hz, 1H), 7.48 (t, J = 7.5 Hz, 2H), 7.36-7.26 (m, 3H), 7.22 (d, J = 6.9 Hz, 2H), 6.48 (d, J = 15.9 Hz, 1H), 6.35-6.26 (m, 1H), 3.17 (t, J = 7.2 Hz, 2H), 2.71-2.64 (m, 2H); $^{13}$C NMR (75 MHz, CDCl$_3$): δ 198.2, 136.4, 135.9, 132.0, 129.8, 128.1, 127.5, 127.4, 127.0, 126.0, 125.0, 37.2, 26.5 ppm; HRMS m/z (ESI) calcd. for C$_{17}$H$_{17}$O (M + H)$^+$ 237.1274, found 237.1272.
29): **2-phenylquinoline.** The reaction of (2-aminophenyl)methanol 2n (61.5 mg, 0.5 mmol), acetophenone 1a (120 mg, 1 mmol), LiO\textsubscript{t}Bu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 96 mg (94%) of 5an. 5an: white solid; m. p. 82-83 °C; \textsuperscript{1}H NMR (300 MHz, CDCl\textsubscript{3}): δ 8.23-8.17 (m, 4H), 7.89-7.81 (m, 2H), 7.73 (t, J = 7.2 Hz, 1H), 7.56-7.47 (m, 4H); \textsuperscript{13}C NMR (75 MHz, CDCl\textsubscript{3}): δ 156.3, 147.2, 138.6, 135.7, 128.7, 128.6, 128.3, 127.8, 126.5, 126.4, 126.1, 125.2, 117.9 ppm; HRMS m/z (ESI) calcd. for C\textsubscript{15}H\textsubscript{12}N (M + H)\textsuperscript{+} 206.0964, found 206.0966.

30): **2-(4-methoxyphenyl)quinoline.** The reaction of (2-aminophenyl)methanol 2n (61.5 mg, 0.5 mmol), 1-(4-methoxyphenyl)ethanone 1b (150 mg, 1 mmol), LiO\textsubscript{t}Bu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 102 mg (87%) of 5bn. 5bn: white solid; m. p. 122-123 °C; \textsuperscript{1}H NMR (300 MHz, CDCl\textsubscript{3}): δ 8.18-8.13 (m, 4H), 7.81 (t, J = 8.7 Hz, 2H), 7.71 (t, J = 7.2 Hz, 1H), 7.49 (t, J = 7.2 Hz, 1H), 7.05 (d, J = 8.7 Hz, 2H), 3.88 (s, 3H); \textsuperscript{13}C NMR (75 MHz, CDCl\textsubscript{3}): δ 160.8, 156.8, 148.2, 136.6, 132.2, 129.6, 129.5, 128.9, 127.4, 126.9, 125.9, 118.5, 114.2, 55.3 ppm; HRMS m/z (ESI) calcd. for C\textsubscript{16}H\textsubscript{14}NO (M + H)\textsuperscript{+} 236.1070, found 236.1070.

31): **2-o-tolylquinoline.** The reaction of (2-aminophenyl)methanol 2n (61.5 mg, 0.5 mmol), 1-o-tolylethanone 1j (134 mg, 1 mmol), LiO\textsubscript{t}Bu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 78 mg (71%) of 5jn. 5jn: white solid; m. p. 73-74 °C;
\( ^1H \) NMR (300 MHz, CDCl\(_3\)): \( \delta 8.09 \) (t, \( J = 8.1 \) Hz, 2H), 7.76 (t, \( J = 8.1 \) Hz, 1H), 7.64 (t, \( J = 8.4 \) Hz, 1H), 7.48-7.39 (m, 3H), 7.28-7.19 (m, 3H), 2.32 (s, 3H); \( ^{13}C \) NMR (75 MHz, CDCl\(_3\)): \( \delta 160.2, 147.8, 140.6, 136.1, 136.0, 130.8, 129.7, 129.6, 129.5, 128.5, 127.5, 126.7, 126.4, 126.0, 122.3, 20.3 \) ppm; HRMS \( m/z \) (ESI) calcd. for C\(_{16}H_{14}N\) (M + H\(^+\)) 220.1121, found 220.1120.

![5ln](image)

32): 

2-\( m \)-tolylquinoline.\(^{14} \) The reaction of (2-aminophenyl)methanol 2\( n \) (61.5 mg, 0.5 mmol), 1-\( m \)-tolylethanone 1\( l \) (134 mg, 1 mmol), LiOtBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 99 mg (90%) of 5\( ln \). 5\( ln \): pale yellow oil; \( ^1H \) NMR (300 MHz, CDCl\(_3\)): \( \delta 8.11 \) (d, \( J = 8.4 \) Hz, 2H), 7.92 (s, 1H), 7.83 (t, \( J = 7.5 \) Hz, 1H), 7.77 (d, \( J = 8.4 \) Hz, 1H), 7.72 (d, \( J = 8.1 \) Hz, 1H), 7.63 (t, \( J = 8.4 \) Hz, 1H), 7.42 (t, \( J = 6.9 \) Hz, 1H), 7.32 (t, \( J = 7.5 \) Hz, 1H), 7.19 (d, \( J = 7.5 \) Hz, 1H), 2.39 (s, 3H); \( ^{13}C \) NMR (75 MHz, CDCl\(_3\)): \( \delta 156.5, 147.2, 138.5, 137.4, 135.6, 129.0, 128.6, 128.5, 127.6, 127.2, 126.4, 126.1, 125.1, 123.6, 118.1, 20.5 \) ppm; HRMS \( m/z \) (ESI) calcd. for C\(_{16}H_{14}N\) (M + H\(^+\)) 220.1121, found 220.1119.

![5nn](image)

33): 

2-(naphthalen-2-yl)quinoline.\(^{14} \) The reaction of (2-aminophenyl)methanol 2\( n \) (61.5 mg, 0.5 mmol), 1-(naphthalen-2-yl)ethanone 1\( n \) (170 mg, 1 mmol), LiOtBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 119 mg (93%) of 5\( nn \). 5\( nn \): white solid; m. p. 163-164 °C; \( ^1H \) NMR (300 MHz, CDCl\(_3\)): \( \delta 8.63 \) (s, 1H), 8.39 (d, \( J = 8.7 \) Hz, 1H), 8.25 (d, \( J = 8.4 \) Hz, 2H), 8.02 (t, \( J = 8.4 \) Hz, 3H), 7.92-7.89 (m, 1H), 7.85 (d, \( J = 8.1 \) Hz, 1H), 7.76 (d, \( J = 8.1 \) Hz, 1H), 7.57-7.51 (m, 3H); \( ^{13}C \) NMR (75 MHz, CDCl\(_3\)): \( \delta 156.1, 147.2, 135.8, 132.8, 132.4, 128.7, 128.6, 127.8, 127.5, 126.6, 126.4, 126.2, 126.1,
125.7, 125.4, 125.3, 124.0, 118.1 ppm; HRMS m/z (ESI) calcd. for C\textsubscript{19}H\textsubscript{14}N (M + H)\textsuperscript{+} 256.1121, found 256.1122.

![5on](image)

\textbf{5,6-dihydrobenzo[c]acridine.} The reaction of (2-aminophenyl)methanol 2n (61.5 mg, 0.5 mmol), 3,4-dihydronaphthalen-1(2H)-one 1o (146 mg, 1 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 109 mg (94%) of 5on. 5on: white solid; m. p. 64-65 °C; \textsuperscript{1}H NMR (300 MHz, CDCl\textsubscript{3}): δ 8.63 (d, J = 7.5 Hz, 1H), 8.18 (d, J = 8.4 Hz, 1H), 7.94 (s, 1H), 7.77 (d, J = 8.1 Hz, 1H), 7.68 (t, J = 8.4 Hz, 1H), 7.52-7.37 (m, 3H), 7.30 (d, J = 8.4 Hz, 1H), 3.15 (t, J = 6.3 Hz, 2H), 3.03 (t, J = 8.4 Hz, 2H); \textsuperscript{13}C NMR (75 MHz, CDCl\textsubscript{3}): δ 152.3, 146.5, 138.3, 133.6, 132.6, 129.5, 128.6, 128.3, 127.5, 126.9, 126.8, 126.2, 125.8, 125.1, 125.0, 27.7, 27.3 ppm; HRMS m/z (ESI) calcd. for C\textsubscript{17}H\textsubscript{14}N (M + H)\textsuperscript{+} 232.1121, found 232.1120.

![5qn](image)

\textbf{2-(thiophen-2-yl)quinoline.} The reaction of (2-aminophenyl)methanol 2n (61.5 mg, 0.5 mmol), 1-(thiophen-2-yl)ethanone 1q (126 mg, 1 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 100 mg (95%) of 5qn. 5qn: white solid; m. p. 130-131 °C; \textsuperscript{1}H NMR (400 MHz, CDCl\textsubscript{3}): δ 8.14-8.09 (m, 2H), 7.80-7.74 (m, 3H), 7.69 (t, J = 8.0 Hz, 1H), 7.50-7.46 (m, 2H), 7.17-7.15 (m, 1H); \textsuperscript{13}C NMR (100 MHz, CDCl\textsubscript{3}): δ 151.2, 147.0, 144.3, 135.5, 128.7, 128.1, 127.5, 127.0, 126.4, 126.1, 125.0, 124.8, 116.5 ppm; HRMS m/z (ESI) calcd. for C\textsubscript{13}H\textsubscript{10}NS (M + H)\textsuperscript{+} 212.0528, found 212.0534.
36): 2-(furan-2-y1)quinoline. The reaction of (2-aminophenyl)methanol 2n (61.5 mg, 0.5 mmol), 1-(furan-2-y1)ethanone 1r (110 mg, 1 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 55 mg (56%) of 5rn. 5rn: pale yellow solid; m. p. 93-94 °C; 1H NMR (300 MHz, CDCl3): δ 8.15 (d, J = 8.7 Hz, 2H), 7.83-7.68 (m, 3H), 7.64 (d, J = 0.9 Hz, 1H), 7.50 (t, J = 7.2 Hz, 1H), 7.24 (d, J = 3.6 Hz, 1H), 6.60-6.59 (m, 1H); 13C NMR (75 MHz, CDCl3): δ 153.6, 148.9, 148.0, 144.1, 136.6, 129.8, 129.3, 127.5, 127.1, 126.1, 117.4, 112.2, 110.1 ppm; HRMS m/z (ESI) calcd. for C13H10NO (M + H)+ 196.0757, found 196.0756.

37): 2-(pyridin-2-y1)quinoline. The reaction of (2-aminophenyl)methanol 2n (61.5 mg, 0.5 mmol), 1-(pyridin-2-y1)ethanone 1s (121 mg, 1 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 92 mg (89%) of 5sn. 5sn: white solid; m. p. 98-99 °C; 1H NMR (300 MHz, CDCl3): δ 8.74 (d, J = 4.8 Hz, 1H), 8.05 (d, J = 7.8 Hz, 1H), 8.56 (d, J = 8.7 Hz, 1H), 8.27 (d, J = 8.7 Hz, 1H), 8.18 (d, J = 8.4 Hz, 1H), 7.89-7.83 (m, 2H), 7.73 (t, J = 7.2 Hz, 1H), 7.54 (t, J = 7.5 Hz, 1H), 7.34 (t, J = 6.6 Hz, 1H); 13C NMR (75 MHz, CDCl3): δ 156.3, 156.1, 149.1, 147.9, 136.9, 136.7, 129.8, 129.5, 128.2, 127.6, 126.7, 124.0, 121.8, 118.9 ppm; HRMS m/z (ESI) calcd. for C14H14N2 (M + H)+ 207.0917, found 207.0925.

38): 3-methyl-2-phenylquinoline. The reaction of (2-aminophenyl)methanol 2n (61.5 mg,
0.5 mmol), propiophenone **1t** (134 mg, 1 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 24 h, afforded 72 mg (66%) of **5tn. 5tn**: colorless oil; 

\[^1\text{H NMR} (300 \text{ MHz, CDCl}_3)\]: δ 8.05 (d, J = 8.4 Hz, 1H), 7.91 (s, 1H), 7.67 (d, J = 7.8 Hz, 1H), 7.56 (t, J = 7.2 Hz, 1H), 7.50 (d, J = 6.9 Hz, 2H), 7.43-7.33 (m, 4H), 2.36 (s, 3H); 

\[^{13}\text{C NMR} (75 \text{ MHz, CDCl}_3)\]: δ 160.5, 146.6, 140.8, 136.7, 129.3, 129.2, 128.8, 128.3, 128.2, 127.6, 126.7, 126.4, 20.6 ppm; HRMS m/z (ESI) calcd. for C\textsubscript{16}H\textsubscript{14}N (M + H\textsuperscript{+}) 220.1121, found 220.1121.

2-phenyl-3-propylquinoline.\(^{15}\) The reaction of (2-aminophenyl)methanol **2n** (61.5 mg, 0.5 mmol), 1-phenylpentan-1-one **1u** (162 mg, 1 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 24 h, afforded 58 mg (47%) of **5un. 5un**: colorless oil; 

\[^1\text{H NMR} (400 \text{ MHz, CDCl}_3)\]: δ 8.05 (d, J = 8.4 Hz, 1H), 7.94 (s, 1H), 7.71 (d, J = 7.2 Hz, 1H), 7.57 (t, J = 8.4 Hz, 1H), 7.46-7.34 (m, 6H), 2.66 (t, J = 7.6 Hz, 2H), 1.53-1.47 (m, 2H), 0.77 (t, J = 7.2 Hz, 3H); 

\[^{13}\text{C NMR} (100 \text{ MHz, CDCl}_3)\]: δ 159.7, 145.3, 139.9, 134.7, 132.8, 128.2, 127.8, 127.7, 127.2, 127.0, 126.6, 125.8, 125.3, 33.8, 22.6, 12.8 ppm; HRMS m/z (ESI) calcd. for C\textsubscript{18}H\textsubscript{18}N (M + H\textsuperscript{+}) 248.1434, found 248.1427.

2-methylquinoline.\(^{14}\) The reaction of (2-aminophenyl)methanol **2n** (61.5 mg, 0.5 mmol), acetone **1v** (116 mg, 2 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 80 °C, under Ar, for 36 h, afforded 33 mg (46%) of **5vn. 5vn**: colorless oil; 

\[^1\text{H NMR} (300 \text{ MHz, CDCl}_3)\]: δ 8.02 (d, J = 8.4 Hz, 2H), 7.75 (d, J = 8.1 Hz, 1H), 7.67 (t, J = 7.8 Hz, 1H), 7.46 (t, J = 7.5 Hz, 1H), 7.26 (d, J = 8.1 Hz, 1H), 2.74 (s, 3H); 

\[^{13}\text{C NMR} (75 \text{ MHz, CDCl}_3)\]: δ 158.7, 147.7, 135.9, 129.2, 128.4, 127.3, 126.3, 125.4, 121.7, 25.2 ppm; HRMS m/z (ESI) calcd. for C\textsubscript{10}H\textsubscript{10}N (M + H\textsuperscript{+}) 144.0808, found 144.0810.
2-pentylquinoline. The reaction of (2-aminophenyl)methanol 2n (61.5 mg, 0.5 mmol), heptan-2-one 1w (114 mg, 1 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 24 h, afforded 60 mg (60%) of 5wn. 5wn: colorless oil; ¹H NMR (300 MHz, CDCl₃): δ 7.97 (d, J = 8.4 Hz, 2H), 7.68 (d, J = 8.1 Hz, 1H), 7.58 (t, J = 8.4 Hz, 1H), 7.38 (t, J = 8.4 Hz, 1H), 7.20 (d, J = 8.4 Hz, 1H), 1.78-1.68 (m, 2H), 1.36-1.25 (m, 4H), 0.82 (t, J = 6.9 Hz, 3H); ¹³C NMR (75 MHz, CDCl₃): δ 163.1, 147.8, 136.2, 129.3, 128.7, 127.4, 126.7, 125.6, 121.3, 39.2, 31.7, 29.7, 22.5, 14.0 ppm; HRMS m/z (ESI) calcd. for C₁₄H₁₈N (M + H)⁺ 200.1434, found 200.1434.

2-isobutylquinoline. The reaction of (2-aminophenyl)methanol 2n (61.5 mg, 0.5 mmol), 4-methylpentan-2-one 1x (100 mg, 1 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 24 h, afforded 47 mg (51%) of 5xn. 5xn: colorless oil; ¹H NMR (300 MHz, CDCl₃): δ 7.97 (t, J = 6.3 Hz, 2H), 7.68 (d, J = 8.1 Hz, 1H), 7.59 (t, J = 7.5 Hz, 1H), 7.38 (t, J = 7.5 Hz, 1H), 7.17 (d, J = 8.4 Hz, 1H), 2.77 (d, J = 7.5 Hz, 2H), 2.20-2.06 (m, 1H), 0.89 (d, J = 6.6 Hz, 6H); ¹³C NMR (75 MHz, CDCl₃): δ 162.2, 147.9, 135.9, 129.2, 128.8, 127.4, 126.7, 125.6, 122.0, 48.3, 29.4, 22.5 ppm; HRMS m/z (ESI) calcd. for C₁₃H₁₆N (M + H)⁺ 186.1277, found 186.1279.

2-cyclopropylquinoline. The reaction of (2-aminophenyl)methanol 2n (61.5 mg, 0.5 mmol), 1-cyclopropylethanone 1y (84 mg, 1 mmol), LiOrBu (80 mg, 1 mmol), in toluene
(2.0 mL), at 110 °C, under Ar, for 24 h, afforded 75 mg (89%) of 5yn. 5yn: colorless oil; 
\(^1\)H NMR (300 MHz, CDCl\(_3\)): \(\delta\) 8.02-7.98 (m, 2H), 7.75 (d, \(J = 8.1\) Hz, 1H), 7.66 (t, \(J = 8.4\) Hz, 1H), 7.44 (t, \(J = 8.1\) Hz, 1H), 7.18 (d, \(J = 8.4\) Hz, 1H), 2.32-2.23 (m, 1H), 1.21-1.16 (m, 2H), 1.14-1.10 (m, 2H); \(^{13}\)C NMR (75 MHz, CDCl\(_3\)): \(\delta\) 162.3, 146.9, 134.7, 128.2, 127.6, 126.4, 125.7, 124.1, 118.3, 17.0, 9.2 ppm; HRMS \(m/\text{z}\) (ESI) calcd. for C\(_{12}\)H\(_{12}\)N (M + H\(^+\)) 170.0964, found 170.0964.

44): 

2-isopropylquinoline.\(^{14}\) The reaction of (2-aminophenyl)methanol 2n (61.5 mg, 0.5 mmol), 3-methylbutan-2-one 1z (86 mg, 1 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 80 °C, under Ar, for 36 h, afforded 54 mg (63%) of 5zn. 5zn: colorless oil; 
\(^1\)H NMR (300 MHz, CDCl\(_3\)): \(\delta\) 8.09 (t, \(J = 8.4\) Hz, 2H), 7.79 (d, \(J = 8.1\) Hz, 1H), 7.70 (t, \(J = 6.9\) Hz, 1H), 7.49 (t, \(J = 7.2\) Hz, 1H), 7.36 (d, \(J = 8.4\) Hz, 1H), 3.36-3.23 (m, 1H), 1.42 (d, \(J = 6.9\) Hz, 6H); \(^{13}\)C NMR (75 MHz, CDCl\(_3\)): \(\delta\) 166.6, 146.6, 135.4, 128.2, 127.9, 126.4, 125.9, 124.6, 118.1, 36.2, 21.5 ppm; HRMS \(m/\text{z}\) (ESI) calcd. for C\(_{12}\)H\(_{14}\)N (M + H\(^+\)) 172.1121, found 172.1123.

45): 

2-tert-butylquinoline.\(^{18}\) The reaction of (2-aminophenyl)methanol 2n (61.5 mg, 0.5 mmol), 3,3-dimethylbutan-2-one 1aa (100 mg, 1 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 24 h, afforded 80 mg (87%) of 5aan. 5aan: colorless oil; 
\(^1\)H NMR (300 MHz, CDCl\(_3\)): \(\delta\) 8.00-7.96 (m, 2H), 7.67 (d, \(J = 8.1\) Hz, 1H), 7.57 (t, \(J = 7.2\) Hz, 1H), 7.44-7.35 (m, 2H), 1.39 (s, 9H); \(^{13}\)C NMR (75 MHz, CDCl\(_3\)): \(\delta\) 168.2, 146.3, 134.8, 128.3, 127.9, 126.1, 125.4, 124.5, 117.1, 37.0, 29.1 ppm; HRMS \(m/\text{z}\) (ESI) calcd. for C\(_{13}\)H\(_{16}\)N (M + H\(^+\)) 186.1277, found 186.1276.
2-ethyl-3-methylquinoline. The reaction of (2-aminophenyl)methanol 2n (61.5 mg, 0.5 mmol), pentan-3-one 1bb (86 mg, 1 mmol), LiOtBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 24 h, afforded 50 mg (59%) of 5bbn. 5bbn: colorless oil; \(^{1}\)H NMR (300 MHz, CDCl\(_3\)): \(\delta\) 7.94 (d, \(J = 8.4\) Hz, 1H), 7.73 (s, 1H), 7.60 (d, \(J = 7.8\) Hz, 1H), 7.52 (t, \(J = 5.7\) Hz, 1H), 7.34 (t, \(J = 8.4\) Hz, 1H), 2.94-2.87 (m, 2H), 2.39 (s, 3H), 1.29 (t, \(J = 7.5\) Hz, 3H); \(^{13}\)C NMR (75 MHz, CDCl\(_3\)): \(\delta\) 162.2, 145.6, 134.7, 128.3, 127.4, 127.2, 126.3, 125.6, 124.5, 28.4, 18.0, 11.7 ppm; HRMS m/z (ESI) calcd. for C\(_{12}\)H\(_{14}\)N (M + H)\(^+\) 172.1121, found 172.1120.

1,2,3,4-tetrahydroacridine. The reaction of (2-aminophenyl)methanol 2n (61.5 mg, 0.5 mmol), cyclohexanone 1cc (98 mg, 1 mmol), LiOtBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 24 h, afforded 70 mg (76%) of 5ccn. 5ccn: colorless oil; \(^{1}\)H NMR (300 MHz, CDCl\(_3\)): \(\delta\) 7.98 (d, \(J = 8.4\) Hz, 1H), 7.76 (s, 1H), 7.67 (d, \(J = 8.4\) Hz, 1H), 7.59 (t, \(J = 8.4\) Hz, 1H), 7.41 (t, \(J = 6.6\) Hz, 1H), 3.12 (t, \(J = 6.6\) Hz, 2H), 2.02-1.94 (m, 2H), 1.91-1.83 (m, 2H); \(^{13}\)C NMR (75 MHz, CDCl\(_3\)): \(\delta\) 159.2, 146.6, 134.9, 130.9, 128.4, 128.2, 127.2, 126.8, 125.4, 33.5, 29.2, 23.2, 22.8 ppm; HRMS m/z (ESI) calcd. for C\(_{13}\)H\(_{14}\)N (M + H)\(^+\) 184.1121, found 184.1122.

2-(2-methylprop-1-enyl)quinoline. The reaction of (2-aminophenyl)methanol 2n (61.5 mg, 0.5 mmol), 4-methylpent-3-en-2-one 1dd (98 mg, 1 mmol), LiOtBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 24 h, afforded 55 mg (60%) of 5ddn. 5ddn: pale yellow oil; \(^{1}\)H NMR (300 MHz, CDCl\(_3\)): \(\delta\) 8.00 (d, \(J = 6.6\) Hz, 2H), 7.69-7.58 (m,
2H), 7.40 (s, 1H), 7.25 (t, J = 6.6 Hz, 1H), 6.47 (s, 1H), 2.10 (s, 3H), 1.94 (s, 3H); $^{13}$C NMR (75 MHz, CDCl$_3$): δ 157.4, 147.6, 142.8, 135.8, 129.4, 128.9, 127.3, 126.2, 125.8, 125.1, 122.3, 27.4, 20.0 ppm; HRMS m/z (ESI) calcd. for C$_{13}$H$_{14}$N (M + H)$^+$ 184.1121, found 184.1123.

1,3-diphenylpropan-1-one (α-d-50%). The reaction of α,α,α-trideuterioacetophenone PhCOCD$_3$ (61.5 mg, 0.5 mmol), phenylmethanol 2a (81 mg, 0.75 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 102 mg (95%) of 1,3-diphenylpropan-1-one (α-d-50%). 1,3-diphenylpropan-1-one (α-d-50%): white solid; $^1$H NMR (300 MHz, CDCl$_3$): δ 7.87 (d, J = 7.2 Hz, 2H), 7.47 (t, J = 7.5 Hz, 1H), 7.36 (t, J = 7.5 Hz, 2H), 7.24-7.12 (m, 5H), 3.22 (t, J = 7.2 Hz, 1H), 2.99 (t, J = 6.0 Hz, 2H); $^{13}$C NMR (75 MHz, CDCl$_3$): δ 198.1, 140.2, 135.8, 132.0, 127.6, 127.5, 127.3, 127.0, 125.1, 39.4, 29.1ppm; HRMS m/z (ESI) calcd. for C$_{15}$H$_{15}$O (M + H)$^+$ 211.1117, found 211.1117; calcd. for C$_{15}$H$_{14}$DO (M + H)$^+$ 212.1180, found 212.1175; calcd. for C$_{15}$H$_{13}$D$_2$O (M + H)$^+$ 213.1243, found 213.1230.

1,3-diphenylpropan-1-one (α-d-23%). The reaction of acetophenone 1a (60 mg, 0.5 mmol), benzyl alcohol-OD PhCH$_2$OD (82 mg, 0.75 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 °C, under Ar, for 12 h, afforded 101 mg (95%) of 1,3-diphenylpropan-1-one (α-d-23%). 1,3-diphenylpropan-1-one (α-d-23%): white solid; $^1$H NMR (300 MHz, CDCl$_3$): δ 7.87 (d, J = 7.5 Hz, 2H), 7.46 (t, J = 7.2 Hz, 1H), 7.36 (t, J = 7.8 Hz, 2H), 7.24-7.11 (m, 5H), 3.22 (t, J = 7.2 Hz, 1.77Hz), 2.98 (t, J = 8.1 Hz, 2H); $^{13}$C NMR (75 MHz, CDCl$_3$): δ 199.1, 141.2, 136.8, 133.0, 128.6, 128.5, 128.4, 128.0, 126.1, 40.4, 30.1ppm; HRMS m/z (ESI) calcd. for C$_{15}$H$_{15}$O (M + H)$^+$ 211.1117, found

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211.1117; calcd. for C\textsubscript{15}H\textsubscript{14}DO (M + H)\textsuperscript{+} 212.1180, found 212.1178.

51):

1,3-diphenylpropan-1-one (β-\textit{d-100%}). The reaction of acetophenone 1\text{a} (60 mg, 0.5 mmol), α,α-dideuteriobenzyl alcohol PhCD\textsubscript{2}OH (82 mg, 0.75 mmol), LiOrBu (80 mg, 1 mmol), in toluene (2.0 mL), at 110 ºC, under Ar, for 12 h, afforded 102 mg (95%) of 1,3-diphenylpropan-1-one (β-\textit{d-100%}). 1,3-diphenylpropan-1-one (β-\textit{d-100%}): white solid; \textsuperscript{1}H NMR (300 MHz, CDCl\textsubscript{3}): δ 7.85 (d, \textit{J} = 7.2 Hz, 2H), 7.45 (t, \textit{J} = 7.2 Hz, 1H), 7.35 (t, \textit{J} = 7.8 Hz, 2H), 7.26-7.10 (m, 5H), 3.19 (s, 2H); \textsuperscript{13}C NMR (75 MHz, CDCl\textsubscript{3}): δ 198.1, 140.1, 135.8, 132.0, 127.5, 127.4, 127.3, 127.0, 125.1, 39.2, 28.4 ppm; HRMS \textit{m/z} (ESI) calcd. for C\textsubscript{15}H\textsubscript{13}D\textsubscript{2}O (M + H)\textsuperscript{+} 213.1243, found 213.1241.

52):

1,3-diphenylpropan-1-one (β-\textit{d-60%}). The reaction of acetophenone 1\text{a} (120 mg, 1 mmol), α,α-dideuteriobenzyl alcohol PhCD\textsubscript{2}OH (82 mg, 0.75 mmol), (4-methoxyphenyl)methanol (104 mg, 0.75 mmol), LiOrBu (160 mg, 2 mmol), in toluene (4.0 mL), at 110 ºC, under Ar, for 12 h, afforded 87 mg (41%) of 1,3-diphenylpropan-1-one (β-\textit{d-60%}) and 125 mg (52%) of 3-(4-methoxyphenyl)-1-phenylpropan-1-one (β-\textit{d-25%}). 1,3-diphenylpropan-1-one (β-\textit{d-60%}): white solid; \textsuperscript{1}H NMR (300 MHz, CDCl\textsubscript{3}): δ 7.88 (d, \textit{J} = 7.5 Hz, 2H), 7.47 (t, \textit{J} = 7.2 Hz, 1H), 7.36 (t, \textit{J} = 7.5 Hz, 2H), 7.24-7.10 (m, 5H), 3.23 (t, \textit{J} = 6.0 Hz, 2H), 3.02-2.95 (m, 0.8H); \textsuperscript{13}C NMR (75 MHz, CDCl\textsubscript{3}): δ 198.1, 140.2, 135.8, 132.0, 127.6, 127.5, 127.3, 127.0, 125.1, 39.3, 28.8 ppm; HRMS \textit{m/z} (EI) calcd. for C\textsubscript{15}H\textsubscript{13}DO (M\textsuperscript{+}) 211.1107, found 211.1112; calcd. for C\textsubscript{15}H\textsubscript{12}D\textsubscript{2}O (M\textsuperscript{+}) 212.1170, found 212.1174.
3-(4-methoxyphenyl)-1-phenylpropan-1-one (β-d-25%). The reaction of acetophenone 1a (120 mg, 1 mmol), α,α-dideuteriobenzyl alcohol PhCD₂OH (82 mg, 0.75 mmol), (4-methoxyphenyl)methanol (104 mg, 0.75 mmol), LiOtBu (160 mg, 2 mmol), in toluene (4.0 mL), at 110 °C, under Ar, for 12 h, afforded 87 mg (41%) of 1,3-diphenylpropan-1-one (β-d-60%) and 125 mg (52%) of 3-(4-methoxyphenyl)-1-phenylpropan-1-one (β-d-25%). 3-(4-methoxyphenyl)-1-phenylpropan-1-one (β-d-25%): white solid; ¹H NMR (300 MHz, CDCl₃): δ 7.95 (d, J = 7.2 Hz, 2H), 7.54 (t, J = 7.5 Hz, 1H), 7.44 (t, J = 7.8 Hz, 2H), 7.16 (d, J = 8.7 Hz, 2H), 6.83 (d, J = 8.4 Hz, 2H), 3.78 (s, 3H), 3.26 (t, J = 6.9 Hz, 2H), 3.01 (t, J = 7.5 Hz, 1.5H); ¹³C NMR (75 MHz, CDCl₃): δ 199.3, 158.0, 136.9, 133.3, 133.0, 129.3, 128.5, 128.0, 113.9, 55.2, 40.7, 29.3 ppm; HRMS m/z (EI) calcd. for C₁₆H₁₅DO₂ (M⁺) 241.1213, found 241.1216; calcd. for C₁₆H₁₄D₂O₂ (M⁺) 242.1276, found 242.1273.
References

$^1$H NMR and $^{13}$C NMR Spectra of Those Compounds

1): 3aa: 1,3-diphenylpropan-1-one.
2): 3ab: 3-(4-methoxyphenyl)-1-phenylpropan-1-one.
4): 3ae: 3-(4-chlorophenyl)-1-phenylpropan-1-one.
5): 3af: 3-(3-bromophenyl)-1-phenylpropan-1-one.
6): 3ag: 3-(2-chlorophenyl)-1-phenylpropan-1-one.
7): 3ba: 3-phenyl-1-p-tolylpropan-1-one.
8): 3ca: 1-(4-methoxyphenyl)-3-phenylpropan-1-one.
9): 3da: 3-phenyl-1-(4-(trifluoromethyl)phenyl)propan-1-one.
10): 3fa: 1-(4-fluorophenyl)-3-phenylpropan-1-one.
11): 3ga: 1-(4-chlorophenyl)-3-phenylpropan-1-one.
12): 3ha: 1-(4-bromophenyl)-3-phenylpropan-1-one.
13): 3ia: 1-(4-iodophenyl)-3-phenylpropan-1-one.
14): 3ja: 3-phenyl-1-o-tolylpropan-1-one.
15): 3ka: 1-(2-hydroxyphenyl)-3-phenylpropan-1-one.
16): 3la: 3-phenyl-1-\textit{m}-tolylpropan-1-one.
17): **3ma**: 1-(naphthalen-1-yl)-3-phenylpropan-1-one.
18): 3na: 1-(naphthalen-2-yl)-3-phenylpropan-1-one.
19): 3oa: 2-benzyl-3,4-dihyronaphthalen-1(2H)-one.
20): 3pa: 2-benzyl-2,3-dihydro-1H-inden-1-one.
21): 3qa: 3-phenyl-1-(thiophen-2-yl)propan-1-one.
22): 3ra: 1-(furan-2-yl)-3-phenylpropan-1-one.
23): 4sa: 3-phenyl-1-(pyridin-2-yl)propan-1-ol

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25): 3ai: 4-methyl-1-phenylpentan-1-one.
28): 3al: (E)-1,5-diphenylpent-4-en-1-one.
29): 5am: 2-phenylquinoline.
30): **5bm**: 2-(4-methoxyphenyl)quinoline.
31): 5jm: 2-<i>o</i>-tolylquinoline.
32): 5lm: 2-<i>m</i>-tolylquinoline.
33): 5nm: 2-(naphthalen-2-yl)quinoline.
34): **5om: 5,6-dihydrobenzo[c]acridine.**
35): 5qm: 2-(thiophen-2-yl)quinoline
36): **5rm:** 2-(furan-2-yl)quinoline.
37): **5sm: 2-(pyridin-2-yl)quinoline.**
38): 5tm: 3-methyl-2-phenylquinoline.
39): 5um: 2-phenyl-3-propylquinoline
40): **5vm: 2-methylquinoline**
41): 5wm: 2-pentylquinoline.
42): 5xm: 2-isobutylquinoline.
43) 5ym: 2-cyclopropylquinoline.
44): 5zm: 2-isopropylquinoline.
45): 5aam: 2-tert-butylquinoline.
46): 5bbm: 2-ethyl-3-methylquinoline.
47): 5ccm: 1,2,3,4-tetrahydroacridine.
48): 5ddm: 2-(2-methylprop-1-enyl)quinoline.
49): **1,3-diphenylpropan-1-one (α-d-50%).**

![NMR spectrum of 1,3-diphenylpropan-1-one](image-url)

**Electronic Supplementary Material (ESI) for RSC Advances**

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50): 1,3-diphenylpropan-1-one (α-d-23%).
51): 1,3-diphenylpropan-1-one (β-d-100%).
52): 1,3-diphenylpropan-1-one (β-d-60% ).
53): 3-(4-methoxyphenyl)-1-phenylpropan-1-one (β-d-25%).
54): 1,3-diphenylpropan-1-one (β-d-50%).