EurJOC
European Journal of Organic Chemistry

A Journal of
ChemPubSoc Europe

Accepted Article

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To be cited as: *Eur. J. Org. Chem.* 10.1002/ejoc.201700374

Link to VoR: http://dx.doi.org/10.1002/ejoc.201700374

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10.1002/ejoc.201700374

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A Mild and Chemoselective Hydrosilylation of α-Keto Amides using Cs_2CO_3/PMHS/2-MeTHF System

Govindharaj Kumar, Alagesan Muthukumar, and Govindasamy Sekar*[a]

Abstract: A Cs_2CO_3-catalyzed hydrosilylation of α-keto amides through *in situ* formation of $MeSiH_3$ from inexpensive polymethylhydrosiloxane in 2-MeTHF as solvent is developed. A wide range of aryl and alkyl α-keto amides derived from anilines and alkyl amines are subjected to hydrosilylation to afford α-hydroxy amides in moderate to excellent yields. This transition metal-free protocol can be applied to chemoselective hydrosilylation where the reduction undergoes only to the keto functionality of α-keto amides in the presence of simple ketones and further extended to a gram-scale reaction.

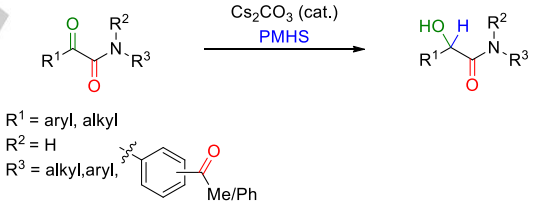
Introduction

Reduction of carbon-hetero atom multiple bonds is always of crucial importance in synthetic organic chemistry which involves several applications in both academic and industrial research.[1] Although various transition metal-catalyzed reduction reactions are found to be known so far,[2] the current research endeavours are involved in development of alternative catalytic systems which are free from transition metals to avoid contamination of such metal impurities in pharmaceutically related products.[3] Traditionally, boron and aluminium based reducing agents are being used as hydride source for the reduction of carbonyl functionalities. However, the use of these reagents is associated with certain drawbacks like need of inert and low temperature conditions, sensitivity to air as well as moisture, tedious workup procedures and chemoselective issues etc.[4]

Hydrosilanes have become alternative to the traditional reagents for the reduction of functionalities such as carbonyl, nitro, imine and alkyne due to their air stability, economic and environmentally benign properties.[5] In this context, metal-free hydrosilylation of carbonyl groups has received importance among chemists in recent years. The metal-free hydrosilylation can be classified into two major categories such as acid- and base-catalyzed hydrosilylation reactions.[6] Among them, base-catalyzed hydrosilylation of carbonyls is the topic of our interest. Recently, KO^{t}Bu,[7] NaOH/KOH[8] and TBAF[9] have been presented as active catalysts for hydrosilylation of ketones, esters, amides and imides. In addition, Cui and co-workers have reported Cs_2CO_3 as an efficient catalyst for hydrosilylation of amides using $PhSiH_3$.[10] Later, the same group has explored chemoselective hydrosilylation of aldehydes as well as ketones using Ph_2SiH_2.[11] However, use of expensive Ph_2SiH_2 usually results in high molecular weight silanol based by-products which may cause separation issues.

Very recently, we have developed a mild K_3PO_4-catalyzed chemoselective reduction of α-keto amides to highly important α-hydroxy amides or mandelamides[12] using cheap, shelf-stable, water soluble and eco-friendly polymethylhydrosiloxane (PMHS) as the hydride source.[13] But the transformation is associated with few shortcomings like reduced or failed reactivity of aliphatic amine derived α-keto amides and limited substrate scope for the chemoselective hydrosilylation of α-keto amides bearing isolated ketones. Hence, finding of a better catalytic system to overcome the limitations is needed. Similar to phosphate bases, carbonate bases are mild basic, commercially available and known for their catalytic activities in organic transformations.[14] Thus we planned to explore our research in the carbonate-catalyzed hydrosilylation.

As part of our interest in reduction chemistry,[15] we herein report a Cs_2CO_3-catalyzed chemoselective hydrosilylation of α-keto amides using PMHS. This methodology depicts selective hydrosilylation of keto functionality of α-keto amides in presence of amide and simple ketone functionalities (Scheme 1).



Scheme 1. Cs_2CO_3-catalyzed chemoselective hydrosilylation of α-keto amide.

Results and Discussion

The optimization study was carried out with 0.5 mmol of simple α-keto anilide **1a** as the model substrate which was derived from phenylglyoxalic acid and aniline. The results of the optimization studies have been depicted in Table 1. Initially, the activity of alkali metal carbonates has been tested. When **1a** was treated with 2.0 equiv. of PMHS and 10 mol% of Cs_2CO_3 as the catalyst in toluene at 60 °C, it gave the chemoselectively reduced α-hydroxy amide **2a** in 55% yield and the global reduction product **3a** in 40% yield, respectively (entry 1). When the reaction was brought to ambient temperature, a better selectivity was observed as the reaction gave 83% of **2a** and 8% of **3a** in 12 h (entry 2). Then the amount of catalyst was reduced to 5 mol% and it rendered exclusively 92% of **2a** in 16 h (entry 3). The results with other hydrosilanes such as Et_3SiH, $(EtO)_3SiH$, $Cl(CH_3)_2SiH$ and $Cl_2(CH_3)SiH$ were not productive. Then, the

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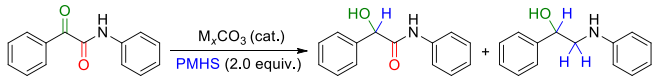
role of solvent for this chemoselective hydrosilylation reaction was examined. When polar aprotic solvents like 1,4-dioxane and THF were used as solvents for 24 h, similar results were found (entries 4 and 5). The chlorinated solvents DCM and 1,2-DCE gave the corresponding product in 64% and 75% yields, respectively (entries 6 and 7).

Table 1. Optimization of reaction conditions.[a]



1a 2a 3a

Entry	M_xCO_3 (mol%)	Solvent	Temp. (°C)	Time (h)	Yield[b] (%)	
					2a	**3a**
1	Cs_2CO_3 (10)	Toluene	60	10	55	40
2	Cs_2CO_3 (10)	Toluene	r.t.	12	83	8
3	Cs_2CO_3 (5)	Toluene	r.t.	16	92	nd
4	Cs_2CO_3 (5)	1,4-Dioxane	r.t.	24	80	nd
5	Cs_2CO_3 (5)	THF	r.t.	24	80	nd
6	Cs_2CO_3 (5)	DCM	r.t.	30	64	nd
7	Cs_2CO_3 (5)	1,2-DCE	r.t.	24	75	nd
8	**Cs_2CO_3 (5)**	**2-MeTHF**	**r.t.**	**6**	**93**	**nd**
9	Na_2CO_3 (5)	2-MeTHF	r.t.	48	nd	nd
10	K_2CO_3 (5)	2-MeTHF	r.t.	36	88	nd
11	Li_2CO_3 (5)	2-MeTHF	r.t.	48	nd	nd
12	$CaCO_3$ (5)	2-MeTHF	r.t.	48	nd	nd
13	$SrCO_3$ (5)	2-MeTHF	r.t.	48	nd	nd
14	$BaCO_3$ (5)	2-MeTHF	r.t.	48	nd	nd
15	None	2-MeTHF	r.t.	48	nd	nd[c]

[a] Reaction conditions: 0.5 mmol of **1a** in 2.0 mL of solvent.

[b] Isolated yield.

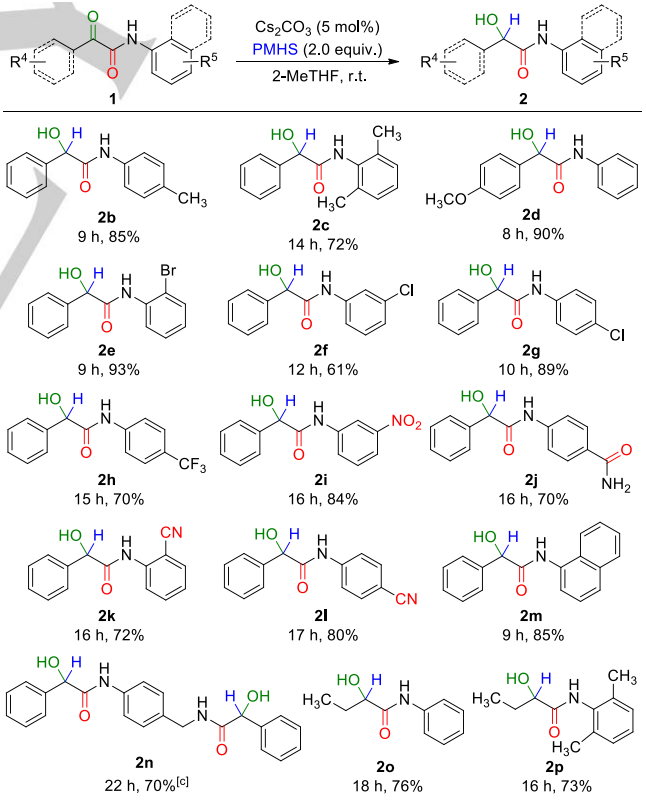
[c] In the absence of catalyst.

nd = not detected.

Interestingly, when the *greener* solvent 2-MeTHF (2-methyltetrahydrofuran)[16] was used, a drastic improvement in reactivity was observed. This resulted in 93% of the selective reduction product in 6 h (entry 8). Next, other carbonate bases were screened as catalyst for this reduction process (entries 9-11). In the case of K_2CO_3, the reaction was slow and yielded 88% of **2a** in 36 h (entry 10). However, the reactions with Na_2CO_3 and Li_2CO_3 failed to proceed even after 48 h (entries 9 and 11). Further, the ability of alkaline earth metal carbonates like $CaCO_3$, $SrCO_3$ and $BaCO_3$ to activate Si-H bond of PMHS was studied (entries 12-14). The formation of α-hydroxy amide was observed in none of the cases. A failure of reaction in the absence of catalyst indicates the essence of catalyst to effect the transformation (entry 15). From the optimization studies, it is understood that only Cs_2CO_3 and K_2CO_3 are capable to show activity than rest of the carbonate bases which indicate the size of the cations associated with carbonate play a vital role in determining the reaction rate. This observation is in accordance with Fajan's rule *i.e.,* when the size of cation increases, the ionic character of the salt increases. Among the ions of alkali and alkaline earth metals, Cs^+ has the largest ionic radius and weakest polarizing field.[17] Thus Cs_2CO_3 exists in ionic form which may assist the carbonate ion freely available to interact with hydrosilanes. Considering the yield of product and reaction time, Cs_2CO_3 was chosen as the catalyst for this transformation.

To begin with the scope of this protocol, initially, a set of α-keto anilides were subjected to hydrosilylation under the optimized reaction conditions and the results are shown in Table 2. Substrates with electron-releasing groups, like 4-methyl and 2,6-dimethyl containing α-keto anilides reacted smoothly to give the corresponding α-hydroxy anilides **2b** and **2c** in 85% and 72% yields, respectively. When 4-methoxy phenyl tethered to the keto part of α-keto anilide was treated under the standard reaction conditions, it gave 90% of the corresponding product **2d** in 8 h. The mild electron-acceptor halo substituted α-keto anilides were converted to the corresponding α-hydroxy anilides **2e**-**2g** in moderate to excellent yields.

Table 2. Scope of α-keto anilides.[a],[b]



[a] Reaction conditions: 0.5 mmol of **1** in 2.0 mL of 2-MeTHF.

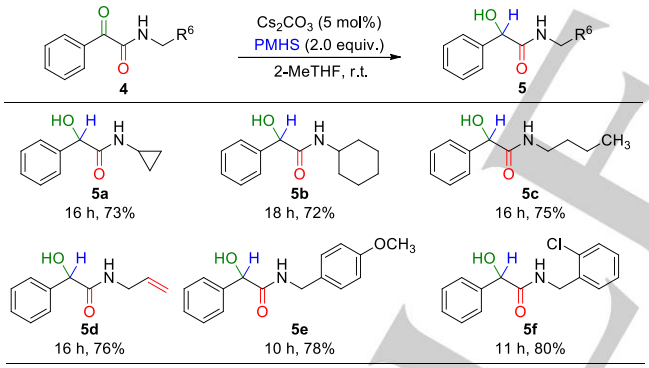
[b] Isolated yield.

[c] 4.0 equiv. of PMHS was used.

When the strong electron-acceptors bearing α-keto anilides were subjected for reduction, they resulted in corresponding products **2h**-**2l** in 70-84% yields. It is important to mention that the functional groups like nitro, amido, cyano and halo which are prone to reduction were well tolerated. 1-Amino naphthalene derived α-keto amide rendered 85% of the respective α-hydroxy amide **2m** in 9 h. When the di-α-keto amide prepared from 4-(aminomethyl)aniline was treated for hydrosilylation, 70% of di-α-hydroxy amide **2n** was isolated in 22 h. Interestingly, 2-oxobutanoic acid derived aliphatic α-keto amides bearing enolizable protons were successfully converted in this base-catalyzed hydrosilylation protocol to the respective α-hydroxy amides **2o** and **2p** in 76% and 73% yields, respectively.

From our previous report,[13] it is evident that the alkyl amine derived α-keto amides are less reactive than aniline derived α-keto amides. So, our focus was shifted towards the reactivity of α-keto amides that were prepared from alkyl amines and their derivatives (Table 3). To our delight, the reactions worked well under the standard reaction conditions. Cyclopropyl group containing α-keto amide resulted in the respective product **5a** in 73% yield. Similarly, cyclohexyl group bearing α-keto amide also gave the corresponding product **5b** in 72% yield. *n*-Butyl amine and allyl amine containing α-keto amides yielded 75% of **5c** in 16 h and 76% of **5d** without affecting the double bond in 16 h. Likewise, 4-methoxy and 2-chloro benzylamines derived α-keto amides were also successfully reduced to the corresponding mandelamides **5e** and **5f** in 78% and 80% yields, respectively.

Table 3. Scope of α-keto amides derived from alkyl amines.[a],[b]

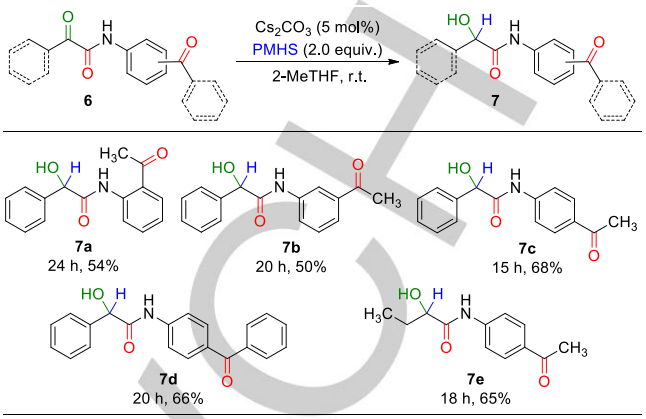


[a] Reaction conditions: 0.5 mmol of **4** in 2.0 mL of 2-MeTHF.

[b] Isolated yield.

Next, the scope of chemoselective hydrosilylation of α-keto amides bearing two similar functional groups was studied. That is, when acetyl or aroyl substituted α-keto amides were treated, the keto group of α-keto amides should undergo hydrosilylation to give corresponding mandelamides without affecting the simple ketones. Acetyl group attached to *ortho*, *meta* and *para* positions of anilide ring was well tolerated and resulted in corresponding acetyl α-hydroxy amides **7a**-**7c** in good yields. 4-Benzoyl substituted α-keto amide was also converted to **7d** in 66% yield. Notably, in the case of aliphatic α-keto amide system bearing ethyl and methyl keto groups, the reduction took place only at ethyl ketone to give the corresponding α-hydroxy amide **7e** in 65% yield.

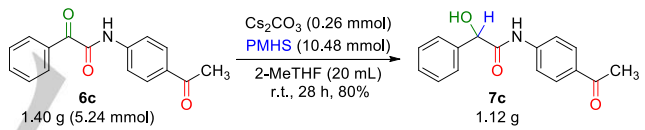
Table 4. Scope of chemoselective hydrosilylation of α-keto amide.[a],[b]



[a] Reaction conditions: 0.5 mmol of **6** in 2.0 mL of 2-MeTHF.

[b] Isolated yield.

The efficiency of chemoselective hydrosilylation was tested on a gram-scale reaction. For this purpose, 5.24 mmol of the α-keto amide **6c** was subjected to reduction using 0.26 mmol of Cs_2CO_3 and 10.48 mmol of PMHS in 20 mL of 2-MeTHF at ambient temperature for 28 h (Scheme 2). The reaction gave 80% of the selectively reduced product **7c** without perturbing the acetyl group and the solvent 2-MeTHF was recovered after workup with no major loss. It is noteworthy that an improvement in the yield and similar selectivity were observed in this reaction in comparison with the small-scale reaction (Table 4, **7c**).



Scheme 2. Gram-scale chemoselective hydrosilylation.

To shed light on the mechanism of the reaction, a 1:1 mixture of Cs_2CO_3 and PMHS was stirred in $CDCl_3$ at room temperature for 2 h. The resultant reaction mixture was analyzed by ^{1}H-NMR spectroscopy (Figure 1). The peak corresponding to Si-H in Figure 1A disappeared and a new quartet was observed at 3.52 ppm in Figure 1B. Also the appearance of new quartet at 0.18 ppm perhaps indicates the formation of $MeSiH_3$ during the course of the reaction.[19] This result is in consistent with the experiment reported by Nikonov *et al.* who demonstrated that when more basic KO^{t}Bu, KOH and TBAF were treated with PMHS, a quick formation of $MeSiH_3$ was observed *via* siloxane-silane rearrangement that acted as the reducing agent. But the formation of $MeSiH_3$ was observed with weaker acetate catalyst only at 70 °C.[7b] Since Cs_2CO_3 is a moderate base and the hydrosilylation of α-keto amides worked well at ambient temperature, there could be a possibility for the formation of $MeSiH_3$ from the interaction of carbonate ion with PMHS. In addition, removal of the volatile compounds from the Cs_2CO_3/PMHS/2-MeTHF mixture prior to the addition of **1a** resulted in no hydrosilylation.

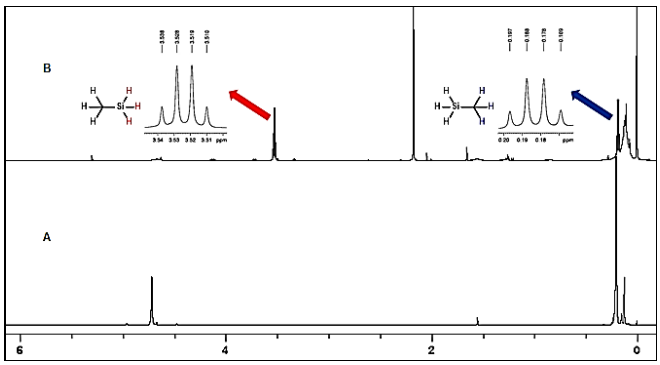
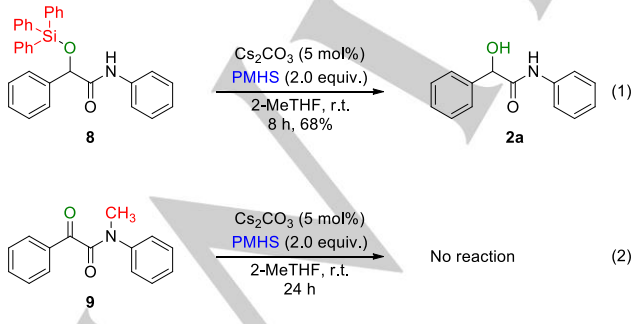


Figure 1. ^{1}H-NMR spectra of PMHS (A) and PMHS and Cs_2CO_3 (B) in $CDCl_3$ (500 MHz).

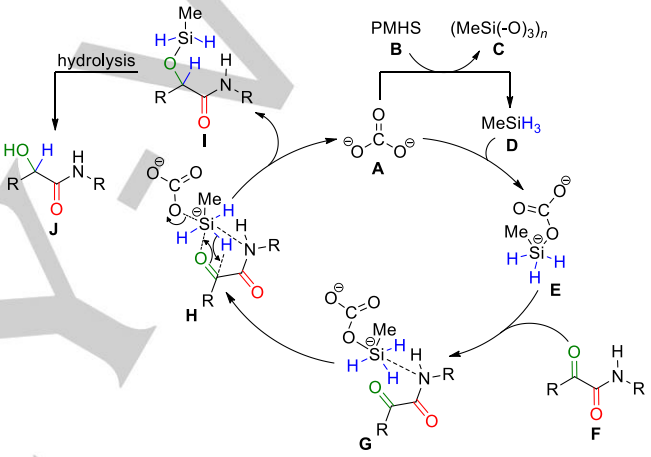
In order to isolate the silyl ether intermediate, a reaction was carried out by purging the $MeSiH_3$ gas which was generated from one compartment by the reaction of PMHS with Cs_2CO_3 (1:1 ratio) in dry 2-MeTHF to another compartment containing α-keto amide **1a** and 5 mol% of Cs_2CO_3 in dry 2-MeTHF with the aid of continuous nitrogen gas flow. However, isolation of the silyl ether intermediate was unsuccessful as the reaction rendered 86% of α-hydroxy amide **2a** as the sole product. This might be due to the unstability of silyl ether of α-hydroxy amide in the reaction medium and as a result, a rapid Si-O bond cleavage might have taken place.

To confirm this observation, the silyl ether **8** was synthesized[13] and subjected to the optimized reaction conditions (Scheme 3, eq. 1). The reaction resulted in the formation of α-hydroxy amide **2a** in 68% yield. This experiment confirms that the silyl ether of α-hydroxy amide undergoes a rapid hydrolysis during the course of the reaction. Furthermore, to know the reactivity of tertiary α-keto amide, *N*-methyl-α-keto amide **9** was treated under the standard reaction conditions (Scheme 3, eq. 2). The reaction failed to give the corresponding α-hydroxy amide even after 24 h. This depicts the importance of free amide N-H functionality for the progress of the reaction by the chelation between amide N-H and silane and thereby it may enhance the reactivity of α-keto amide. This could be the possible reason for the selective reduction α-keto amide than the rest of the functional groups.



Scheme 3. Control experiments.

Based on the experimental evidences, a plausible mechanism is proposed in Scheme 4. Initially, the dibasic carbonate ion **A** might interact with PMHS **B** to give the silicone gel $(MeSi(O\text{-})_3)_n$ **C** and $MeSiH_3$ **D**. Further interaction of **A** with **D** would give the pentavalent silicate species **E**. Interaction of **E** with N-H functionality of α-keto amide **F** would give the hexavalent species **G** which is nucleophilic in nature[20] and might undergo simultaneous hydride transfer to the activated ketone and carbonate **A** expulsion for next catalytic cycle to give silyl ether **I**. Hydrolysis of **I** might result in α-hydroxy amide **J**. Alternatively, the reaction might undergo *via* the deprotonation of secondary N-H of α-keto amide to give an amidate which might further coordinate with methylsilane to form a silicate species. Then the hydride transfer might take place through an intramolecular fashion to give α-hydroxy amide.



Scheme 4. Plausible reaction pathway for carbonate-catalyzed hydrosilylation of α-keto amide.

Conclusions

In conclusion, a mild and efficient Cs_2CO_3-catalyzed hydrosilylation of α-keto amides to highly important mandelamides has been developed using PMHS in 2-MeTHF. A study on various carbonate catalysts revealed the importance of the size of cations associated with the carbonate anion. Both aromatic and aliphatic ketones of α-keto amides prepared from aliphatic as well as aromatic amines were successfully underwent hydrosilylation and rendered the α-hydroxy amides in moderate to excellent yields. Site-selective reduction of α-keto amides and extension to a gram-scale reaction are important features of this protocol. Use of transition metal-free catalyst, inexpensive PMHS and recoverable green solvent 2-MeTHF make this transformation an eco-friendly process. The mechanistic study involves the formation of $MeSiH_3$ from the interaction of Cs_2CO_3 with PMHS which was detected in ^{1}H-NMR spectroscopy.

Experimental Section

General Considerations

All the carbonate salts and hydrosilanes were purchased from Sigma–Aldrich, Alfa Aesar and Spectrochem Pvt. Ltd. 2-MeTHF was purchased from Alfa Aesar. Thin-layer chromatography (TLC) was performed using Merck silica gel 60 F254 pre-coated plates (0.25 mm) and visualized by UV fluorescence quenching. Silica gel for column chromatography (100–200 mesh) was purchased from Avra Synthesis Pvt. Ltd. ^{1}H and ^{13}C NMR spectra were recorded on a Bruker 400 or 500 MHz instrument. ^{1}H NMR spectra are reported relative to residual $CHCl_3$ (δ = 7.26 ppm) or DMSO-d_6 (δ = 2.50 ppm). ^{13}C NMR are reported relative to $CHCl_3$ (δ = 77.16 ppm) or DMSO-d_6 (δ = 39.52 ppm). FTIR spectra were recorded on a JASCO spectrometer and are reported in frequency of absorption (cm^{-1}). High resolution mass spectra (HR-MS) were recorded on Q-Tof Micro mass spectrometer.

General Experimental Procedure for Synthesis of α-Keto Amides

To a stirred mixture of benzoylformic acid (2.0 mmol) and Et_3N (4.0 mmol) in CH_2Cl_2 (10 mL) at 0 °C, thionyl chloride (4.0 mmol) was added dropwise under a nitrogen atmosphere. The stirring was continued for 20 min and then a suspension of the corresponding amine (2.0 mmol) in CH_2Cl_2 (10 mL) was added slowly to the reaction mixture at 0 °C under a nitrogen atmosphere. The stirring was continued at room temperature and the completion of reaction was monitored by TLC. The organic layer was washed with water and with saturated $NaHCO_3$ solution for two times, respectively or until the effervescence stopped. Finally, the organic layer was washed with water, dried over Na_2SO_4 and evaporated under reduced pressure. The solid residue was purified by silica gel column chromatography.

General Experimental Procedure for Cs_2CO_3-catalyzed Chemoselective hydrosilylation of α-Keto Amides

To an oven-dried reaction tube equipped with a magnetic bar, α-keto amide (0.5 mmol) and Cs_2CO_3 (0.05 mmol) were weighed and 2.0 mL of 2-MeTHF was added. Then, 1.0 mmol of PMHS was slowly added to the reaction mixture. The reaction tube was closed with a glass stopper and the resulting reaction mixture was stirred vigorously at room temperature. The progress of the reaction was monitored by TLC. After complete consumption of starting material, 10 mL of 5% aqueous NaOH solution was added to the reaction and the resulting mixture was stirred for 10 min. The reaction mixture was extracted with ethyl acetate (2×10 mL). The combined organic layers were washed with brine, dried over anhydrous $MgSO_4$, filtered off and the solvent was removed under reduced pressure. The resulting residue was purified by silica gel column chromatography (eluent= hexanes:ethyl acetate, 80:20) to obtain pure a-hydroxyamide.

Experimental Procedure for the Gram-Scale Synthesis of *N*-(4-Acetylphenyl)-2-hydroxy-2-phenylacetamide 7c

To an oven-dried 50 mL round-bottom flask equipped with a magnetic bar, 1.40 g of *N*-(4-acetylphenyl)-2-oxo-2-phenylacetamide **6c** (5.24 mmol) and 84 mg of Cs_2CO_3 (0.26 mmol) were weighed and 20 mL of 2-MeTHF was added. Then, 0.6 mL (10.48 mmol) of PMHS was slowly added to the reaction mixture. The container was closed with a glass stopper and allowed for vigorous stirring at room temperature for 28 h. After complete consumption of starting material, 25 mL of 5% aqueous NaOH solution was added to the reaction and the resulting mixture was stirred for 10 min. The organic layer was withdrawn, dried over anhydrous $MgSO_4$, filtered off and the solvent was removed under reduced pressure. The solvent was recovered without major loss. The resulting residue was purified by silica gel column chromatography (eluent: hexanes-ethyl acetate, 80:20) to result pure *N*-(4-acetylphenyl)-2-hydroxy-2-phenylacetamide **7c** in 80% yield.

2-Hydroxy-*N*,2-diphenylacetamide 2a: Yield 93%; colorless solid; mp = 148-150 °C (Lit.[15e] mp = 150-151 °C); R_f = 0.32 (hexanes:ethyl acetate (8:2); IR (KBr) *v* = 3428, 3298, 3248, 3298, 3240,1655, 1555, 1497, 1236, 907, 782 cm^{-1}; ^{1}H NMR (500 MHz, DMSO-d_6) δ = 5.10 (d, *J* = 4.5 Hz, 1H), 6.43 (d, *J* = 5.0 Hz, 1H), 7.04 (t, *J* = 7.5 Hz, 1H), 7.25-7.31 (m, 3H), 7.32-7.38 (m, 2H), 7.51 (d, *J* = 7.5 Hz, 2H), 7.69 (d, *J* = 7.5 Hz, 2H), 9.91 (s, 1H); ^{13}C NMR (125 MHz, DMSO-d_6) δ = 74.0, 119.7, 123.5, 126.6, 127.6, 128.1, 128.6, 138.5, 140.9, 171.2; HRMS (ESI) calcd for $C_{14}H_{13}NO_2Na$ $[M+Na]^+$ 250.0844; found 250.0859.

2-Hydroxy-2-phenyl-*N*-(*p*-tolyl)acetamide 2b: Yield 85%; colorless solid; mp = 165-167 °C (Lit.[13] mp = 167-168 °C); R_f = 0.43 (hexanes:ethyl acetate (7:3); IR (KBr) *v* = 3284, 3196, 1672, 1542, 1415, 1357, 1183, 961, 767, 698 cm^{-1}; ^{1}H NMR (500 MHz, DMSO-d_6) δ = 2.24 (s, 1H), 5.08 (d, *J* = 5.0 Hz, 1H), 6.40 (d, *J* = 5.0 Hz, 1H), 7.09 (d, *J* = 8.5 Hz, 2H), 7.26-7.33 (m, 1H), 7.35-7.37 (m, 2H), 7.49-7.53 (m, 2H), 7.55-7.60 (m, 2H), 9.82 (s, 1H); ^{13}C NMR (125 MHz, DMSO-d_6) δ = 20.4, 74.0, 119.7, 126.6, 127.6, 128.1, 129.0, 132.4, 136.0, 140.9, 170.9; HRMS (ESI) calcd for $C_{15}H_{15}NO_2Na$ $[M+Na]^+$ 264.1000; found 264.0985.

***N*-(2,6-Dimethylphenyl)-2-hydroxy-2-phenylacetamide 2c:** Yield 72%; colorless solid; mp = 140-142 °C (Lit.[13] mp = 140-141 °C); R_f = 0.48 (hexanes:ethyl acetate (7:3); IR (KBr) *v* = 3386, 3313, 1668, 1522, 1046, 751, 695 cm^{-1}; ^{1}H NMR (400 MHz, DMSO-d_6) δ = 2.01 (s, 6H), 5.11 (d, *J* = 4.4 Hz, 1H), 6.35 (d, *J* = 4.4 Hz, 1H), 6.98-7.10 (m, 3H), 7.26-7.32 (m, 1H), 7.34-7.40 (m, 2H), 7.55 (d, *J* = 7.2 Hz, 2H), 9.39 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6) δ = 17.9, 74.0, 126.4, 126.6, 127.5, 127.6, 128.0, 134.8, 135.4, 141.4, 170.9; HRMS (ESI) calcd for $C_{16}H_{17}NO_2Na$ $[M+Na]^+$ 278.1157; found 278.1129.

2-Hydroxy-2-(4-methoxyphenyl)-*N*-phenylacetamide 2d: Yield 90%; colorless solid; mp = 93-95 °C (Lit.[15e] mp = 94-95 °C); R_f = 0.34 (hexanes:ethyl acetate (8:2); IR (KBr) *v* = 3330, 2967, 1655, 1506, 1260, 1124, 1046, 909, 769 cm^{-1}; ^{1}H NMR (400 MHz, DMSO-d_6) δ = 3.73 (s, 3H), 5.03 (d, *J* = 4.0 Hz, 1H), 6.31 (d, *J* = 4.4 Hz, 1H), 6.91 (d, *J* = 8.0 Hz, 2H), 7.04 (t, *J* = 6.8 Hz, 1H), 7.28 (t, *J* = 7.2 Hz, 2H), 7.42 (d, *J* = 8.0 Hz, 2H), 7.69 (d, *J* = 7.2 Hz, 2H), 9.86 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6) δ = 55.1, 73.6, 113.5, 119.6, 123.5, 127.8, 128.6, 133.0, 138.6, 158.3, 171.4.

***N*-(2-Bromophenyl)-2-hydroxy-2-phenylacetamide 2e:** Yield 93%; colorless solid; mp = 78-80 °C; R_f = 0.30 (hexanes:ethyl acetate (8:2); IR (KBr) *v* = 3288, 3047, 1658, 1546, 1405, 1268, 1064, 767, 622 cm^{-1}; ^{1}H NMR (500 MHz, DMSO-d_6) δ = 5.17 (d, *J* = 3.5 Hz, 1H), 7.00 (t, *J* = 4.5 Hz, 1H), 7.05-7.11 (m, 1H), 7.28-7.33 (m, 1H), 7.34-7.41 (m, 3H), 7.50 (d, *J* = 7.0 Hz, 2H), 7.64-7.71 (m, 1H), 8.07-8.12 (m, 1H), 9.64 (s, 1H); ^{13}C NMR (125 MHz, DMSO-d_6) δ = 73.7, 114.4, 122.2, 125.9, 126.7, 127.9, 128.3, 128.5 132.6, 135.4, 140.4, 170.9; HRMS (ESI) calcd for $C_{14}H_{12}BrNO_2Na$ $[M+Na]^+$ 327.9949; found 327.9967.

***N*-(3-Chlorophenyl)-2-hydroxy-2-phenylacetamide 2f:** Yield 61%; colorless solid; mp = 166-168 °C; R_f = 0.23 (hexanes:ethyl acetate (8:2); IR (KBr) *v* = 3393, 3298, 3062, 1648, 1529, 1460, 1246, 1031, 887, 764 cm^{-1}; ^{1}H NMR (500 MHz, DMSO-d_6) δ = 5.11 (d, *J* = 4.5 Hz, 1H), 6.51 (d, *J* = 4.5 Hz, 1H), 7.09-7.12 (m, 1H), 7.26-7.30 (m, 1H), 7.31-7.33 (m, 1H), 7.34-7.38 (m, 2H), 7.51 (d, *J* = 7.5 Hz, 2H), 7.63-7.67 (m, 1H), 10.14 (s, 1H); ^{13}C NMR (125 MHz, DMSO-d_6) δ = 74.1, 118.2, 119.2, 123.2, 126.6, 127.7, 128.1, 130.3, 132.9, 140.0, 140.6, 171.7; HRMS (ESI) calcd for $C_{14}H_{12}NO_2ClNa$ $[M+Na]^+$ 284.0454; found 284.0477.

***N*-(4-Chlorophenyl)-2-hydroxy-2-phenylacetamide 2g:** Yield 89%; colorless solid; mp = 162-164 °C (Lit.[13] mp = 159-160 °C); R_f = 0.25 (hexanes:ethyl acetate (8:2); IR (KBr) ν = 3285, 2905, 1623, 1519, 1245, 1059, 822, 699, cm^{-1}; ^1H NMR (500 MHz, DMSO-d_6) δ = 5.09 (d, J = 4.5 Hz, 1H), 6.49 (d, J = 4.5 Hz, 1H), 7.26-7.31 (m, 1H), 7.32-7.34 (m, 2H), 7.35-7.38 (m, 2H), 7.50 (d, J = 7.5 Hz, 2H), 7.75 (d, J = 9.0 Hz, 2H), 10.10 (s, 1H); ^{13}C NMR (125 MHz, DMSO-d_6) δ = 74.1, 121.3, 126.6, 127.1, 127.7, 128.2, 128.5, 137.6, 140.7, 171.4; HRMS (ESI) calcd for $C_{14}H_{12}NO_2ClNa$ $[M+Na]^+$ 284.0454; found 284.0481.

2-Hydroxy-2-phenyl-*N*-(4-(trifluoromethyl)phenyl)acetamide 2h: Yield 70%; colorless solid; mp = 178-180 °C (Lit.[13] mp = 175-176 °C); R_f = 0.22 (hexanes:ethyl acetate (8:2); IR (KBr) ν = 3322, 3166, 2697, 1649, 1541, 1273, 1122, 911, 770, cm^{-1}; ^1H NMR (500 MHz, DMSO-d_6) δ = 5.14 (d, J = 4.5 Hz, 1H), 6.53 (d, J = 4.5 Hz, 1H), 7.26-7.32 (m, 1H), 7.33-7.39 (m, 2H), 7.46-7.54 (m, 2H), 7.65 (d, J = 8.5 Hz, 2H), 7.94 (d, J = 8.5 Hz, 2H), 10.31 (s, 1H); ^{13}C NMR (125 MHz, DMSO-d_6) δ = 74.1, 119.7, 123.2, 123.3, 123.5, 123.7, 124.0, 125.4, 125.8, 125.9, 126.6, 127.8, 128.2, 140.5, 142.2, 171.9; HRMS (ESI) calcd for $C_{15}H_{12}F_3NO_2Na$ $[M+Na]^+$ 318.0718; found 318.0735.

2-Hydroxy-*N*-(3-nitrophenyl)-2-phenylacetamide 2i: Yield 84%; colorless solid; mp = 144-146 °C (Lit.[13] mp = 142-143 °C); R_f = 0.23 (hexanes:ethyl acetate (8:2); IR (KBr) ν = 3288, 2956, 1628, 1542, 1058, 754, 695, cm^{-1}; ^1H NMR (500 MHz, DMSO-d_6) δ = 5.15 (d, J = 4.5 Hz, 1H), 6.59 (d, J = 4.5 Hz, 1H), 7.27-7.33 (m, 1H), 7.34-7.40 (m, 2H), 7.50-7.55 (m, 2H), 7.59 (t, J = 8.0 Hz, 1H), 7.91 (dd, J_1 = 8.0 Hz, J_2 = 1.5 Hz, 1H), 8.12 (dd, J_1 = 8.0 Hz, J_2 = 1.0 Hz, 1H), 8.77 (s, 1H), 10.50 (s, 1H); ^{13}C NMR (125 MHz, DMSO-d_6) δ = 74.2, 113.9, 118.1, 125.9, 126.6, 127.8, 128.2, 130.1, 139.8, 140.5, 147.9, 172.2; HRMS (ESI) calcd for $C_{14}H_{12}N_2O_4$ $[M+Na]^+$ 295.0695; found 295.0679.

4-(2-Hydroxy-2-phenylacetamido)benzamide 2j: Yield 70%; colorless solid; mp = 158-160 °C (Lit.[13] mp = 161-162 °C); R_f = 0.20 (hexanes:ethyl acetate (8:2); IR (KBr) ν = 3295, 3236, 2918, 1656, 1594, 1405, 1276, 1076, 850, 743 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6) δ = 5.12 (d, J = 4.5 Hz, 1H), 6.50 (d, J = 4.5 Hz, 1H), 7.21-7.32 (m, 2H), 7.33-7.41 (m, 2H), 7.52 (d, J = 6.8 Hz, 2H), 7.73-7.90 (m, 5H), 10.14 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6) δ = 74.0, 118.8, 126.5, 127.6, 128.1, 128.2, 129.1, 140.6, 141.1, 167.3, 171.5; HRMS (ESI) calcd for $C_{15}H_{14}N_2O_3Na$ $[M+Na]^+$ 293.0920; found 293.0909.

***N*-(2-Cyanophenyl)-2-hydroxy-2-phenylacetamide 2k:** Yield 80%; colorless solid; mp = 130-132 °C; R_f = 0.26 (hexanes:ethyl acetate (8:2); IR (KBr) ν = 3394, 3311, 2234, 1688, 1521, 1446, 1297, 918, 771 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6) δ = 5.19 (d, J = 2.0 Hz, 1H), 6.81 (d, J = 2.8 Hz, 1H), 7.20-7.34 (m, 2H), 7.35-7.40 (m, 2H), 7.52 (d, J = 7.6 Hz, 2H), 7.67 (t, J = 7.6 Hz, 1H), 7.78-7.88 (m, 2H), 10.09 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6) δ = 73.6, 105.7, 116.5, 123.7, 125.3, 126.8, 127.8, 128.2, 133.0, 133.9, 139.8, 140.4, 171.4; HRMS (ESI) calcd for $C_{15}H_{13}N_2O_2$ $[M+H]^+$ 253.0977; found 253.0981.

***N*-(4-Cyanophenyl)-2-hydroxy-2-phenylacetamide 2l:** Yield 80%; colorless solid; mp = 130-132 (Lit.[15e] mp = 131-132 °C); R_f = 0.28 (hexanes:ethyl acetate (8:2); IR (KBr) ν = 3408, 2327, 1655, 1570, 1523, 1426, 1277, 748, 717 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6) δ = 5.15 (d, J = 4.4 Hz, 1H), 6.55 (d, J = 4.4 Hz, 1H), 7.27-7.40 (m, 3H) 7.51 (d, J = 7.2 Hz, 2H), 7.75 (d, J = 8.8 Hz, 2H), 7.93 (d, J = 8.8 Hz, 2H), 10.36 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6) δ = 74.1, 105.3, 119.0, 119.8, 126.6, 127.8, 128.2, 133.1, 140.4, 142.8, 172.1.

2-Hydroxy-*N*-(naphthalen-1-yl)-2-phenylacetamide 2m: Yield 80%; colorless solid; mp = 115-117 °C (Lit.[13] mp = 113-114 °C); R_f = 0.25 (hexanes:ethyl acetate (8:2); IR (KBr) ν = 3388, 3326, 1667, 1599, 1529, 1271, 1116, 832, 594 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6) δ = 5.28 (d, J = 4.4 Hz, 1H), 6.57 (d, J = 4.4 Hz, 1H), 7.29-7.36 (m, 1H), 7.40 (t, J = 7.2 Hz, 2H), 7.45-7.56 (m, 3H), 7.57-7.66 (m, 3H), 7.78 (d, J = 8.0 Hz, 1H), 7.84-7.98 (m, 2H), 10.07 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6) δ = 74.0, 121.7, 122.2, 125.6, 126.0, 126.1, 126.7, 127.7, 127.9, 128.2, 133.0, 133.7, 141.0, 171.7.

2-Hydroxy-*N*-(4-(2-hydroxy-2-phenylacetamido)benzyl)-2-phenylacetamide 2n: Yield 80%; colorless solid; mp = 189-191 °C (Lit.[13] mp = 191-192 °C); R_f = 0.24 (hexanes:ethyl acetate (8:2); IR (KBr) ν = 3269, 3077, 1629, 1536, 1058, 850, 727, 519 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6) δ = 4.10-4.30 (m, 2H), 4.95 (d, J = 4.8 Hz, 1H), 5.08 (d, J = 4.8 Hz, 1H), 6.18 (d, J = 4.8 Hz, 1H), 6.42 (d, J = 4.4 Hz, 1H), 7.11 (d, J = 8.4 Hz, 2H), 7.23-7.29 (m, 2H), 7.30-7.32 (m, 2H), 7.33-7.38 (m, 3H), 7.39-7.44 (m, 2H), 7.47-7.53 (m, 2H), 7.55-7.61 (m, 2H), 8.48 (t, J = 6.0 Hz, 1H), 9.87 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6) δ = 41.3, 73.6, 74.0 119.5, 126.6, 127.4, 127.6, 127.9, 128.1, 134.7, 137.1, 140.9, 141.3, 171.0, 172.2; HRMS (ESI) calcd for $C_{23}H_{22}N_2O_4Na$ $[M+Na]^+$ 413.1477; found 413.1471.

2-Hydroxy-*N*-phenylbutanamide 2o: Yield 80%; colorless solid; mp = 129-131 °C (Lit.[9d] mp = 129-130 °C); R_f = 0.19 (hexanes:ethyl acetate (8:2); IR (KBr) ν = 3394, 3296, 2967, 1647, 1528, 1440, 1117, 757 cm^{-1}; ^1H NMR (500 MHz, DMSO-d_6) δ = 0.91 (t, J = 7.0, 3H), 1.55-1.66 (m, 1H) 1.68-1.79 (m, 1H) 3.93-4.10 (m, 1H), 5.67 (d, J = 5.0 Hz, 1H), 7.04 (t, J = 7.5 Hz, 1H), 7.29 (t, J = 7.5 Hz, 2H), 7.70 (d, J = 8.0, 2H), 9.60 (s, 1H); ^{13}C NMR (125 MHz, DMSO-d_6) δ = 9.5, 27.4, 72.6, 119.6, 123.3, 128.6, 138.6, 172.9; HRMS (ESI) calcd for $C_{10}H_{13}NO_2Na$ $[M+Na]^+$ 202.0844; found 202.0825.

***N*-(2,6-Dimethylphenyl)-2-hydroxybutanamide 2p:** Yield 80%; colorless solid; mp = 104-106 °C; R_f = 0.26 (hexanes:ethyl acetate (8:2); IR (KBr) ν = 3332, 2968, 2925, 1660, 1503, 1127, 772, 589 cm^{-1}; ^1H NMR (500 MHz, DMSO-d_6) δ = 0.96 (t, J =7.5 Hz, 3H), 1.60-1.71 (m, 1H), 1.72-1.83 (m, 1H), 2.13 (s, 6H), 3.99-4.10 (m, 2H), 5.58 (d, J = 5.0 Hz, 1H), 7.04-7.13 (m, 3H), 9.07 (s, 1H); ^{13}C NMR (125 MHz, DMSO-d_6) δ = 9.4, 18.1, 27.6, 72.4, 126.2, 127.5, 135.0, 135.2, 172.5; HRMS (ESI) calcd for $C_{12}H_{17}NO_2Na$ $[M+Na]^+$ 230.1157; found 230.1169.

***N*-Cyclopropyl-2-hydroxy-2-phenylacetamide 5a:** Yield 80%; colorless solid; mp = 118-120 °C; R_f = 0.20 (hexanes:ethyl acetate (8:2); IR (KBr) ν = 3299, 3220, 1658, 1570, 1533, 1349, 1068, 694, 680 cm^{-1}; ^1H NMR (500 MHz, DMSO-d_6) δ = 0.44-0.52 (m, 2H), 0.55-0.62 (m, 2H), 2.61-2.69 (m, 1H), 4.86 (d, J = 5.0 Hz, 1H), 6.05 (d, J = 5.0 Hz, 1H), 7.23-7.28 (m, 1H), 7.31-7.34 (m, 2H), 7.37-7.41 (m, 2H), 7.97 (s, 1H); ^{13}C NMR (125 MHz, DMSO-d_6) δ = 5.6, 22.3, 73.5, 126.5, 127.3, 127.9, 141.3, 173.2; HRMS (ESI) calcd for $C_{11}H_{12}NO_2Na$ $[M+Na]^+$ 214.0844; found 214.0866.

***N*-Cyclohexyl-2-hydroxy-2-phenylacetamide 5b:** Yield 80%; colorless solid; mp = 98-100 °C; R_f = 0.22 (hexanes:ethyl acetate (8:2); IR (KBr) ν = 3340, 3263, 2933, 2666, 1642, 1542, 1450, 1060, 702 cm^{-1}; ^1H NMR (500 MHz, DMSO-d_6) δ = 1.05-1.16 (m, 1H), 1.18-1.30 (m, 4H), 1.49-1.58 (m, 1H), 1.59-1.72 (m, 4H), 3.46-3.57 (m, 1H), 4.87 (d, J = 5.0 Hz, 1H), 6.08 (d, J = 5.0 Hz, 1H), 7.23-7.28 (m, 1H), 7.29-7.34 (m, 2H), 7.37-7.41 (m, 2H), 7.70 (d, J = 8.5, 1H); ^{13}C NMR (125 MHz, DMSO-d_6) δ = 24.7, 25.1, 32.2, 32.3, 47.2, 73.4, 126.5, 127.3, 127.9, 141.5, 171.0; HRMS (ESI) calcd for $C_{14}H_{19}NO_2Na$ $[M+Na]^+$ 256.1313; found 256.1330.

***N*-Allyl-2-hydroxy-2-phenylacetamide 5c:** Yield 80%; colorless solid; mp = 74-78 °C; R_f = 0.18 (hexanes:ethyl acetate (7:3); IR (KBr) ν = 3408, 2327, 1655, 1570, 1523, 1426, 1277, 748, 717 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$) δ = 3.75 (d, J = 3.6 Hz, 1H), 3.87 (tt, J_1 = 6.0 Hz, J_2 = 1.2 Hz, 2H),

5.03 (d, *J* = 3.2 Hz, 1H), 5.04-5.09 (m, 1H), 5.09-5.12 (m, 1H), 5.72-5.84 (m, 1H), 6.04 (s, 1H), 7.25-7.42 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$) δ = 41.9, 74.3, 116.6, 127.0, 128.8, 129.0, 133.7, 139.5, 172.2; HRMS (ESI) calcd for $C_{11}H_{13}NO_2Na$ $[M+Na]^+$ 214.0844; found 214.0866.

***N*-Butyl-2-hydroxy-2-phenylacetamide 5d:** Yield 80%; colorless solid; mp = 70-72 °C; R_f = 0.18 (hexanes:ethyl acetate (8:2); IR (KBr) *v* = 3334, 3263, 1659, 1563, 1410, 1061, 728, 619 cm^{-1}; ^{1}H NMR (400 MHz, DMSO-d_6) δ = 0.84 (t, *J* = 7.2 Hz, 3H), 1.17-1.29 (m, 2H), 1.33-1.44 (m, 2H), 3.07 (q, *J* = 6.8 Hz, 2H), 4.88 (d, *J* = 3.2 Hz, 1H), 6.09 (d, *J* = 4.4 Hz, 1H), 7.22-7.28 (m, 1H), 7.29-7.35 (m, 1H), 7.37-7.43 (m, 2H) 7.93 (t, *J* = 5.2 Hz, 1H); ^{13}C NMR (100 MHz, DMSO-d_6) δ = 13.7, 19.5, 31.3, 37.9, 73.5, 126.5, 127.3, 127.9 141.5, 171.9; HRMS (ESI) calcd for $C_{12}H_{17}NO_2Na$ $[M+Na]^+$ 230.1157; found 230.1168.

2-Hydroxy-*N*-(4-methoxybenzyl)-2-phenylacetamide 5e: Yield 80%; colorless solid; mp = 139-141 °C (Lit.[13] mp = 141-142 °C); R_f = 0.22 (hexanes:ethyl acetate (8:2); IR (KBr) *v* = 3356, 3256, 1655, 1662, 1289, 1061, 729, 601 cm^{-1}; ^{1}H NMR (400 MHz, DMSO-d_6) δ = 3.71 (s, 3H), 4.16-4.23 (m, 2H), 4.94 (d, *J* = 4.4 Hz, 1H) 6.17 (d, *J* = 4.4 Hz, 1H) 6.83 (d, *J* = 8.0 Hz, 2H) 7.13 (d, *J* = 8.4 Hz, 2H), 7.23-7.28 (m, 1H), 7.29-7.35 (m, 2H) 7.41 (d, *J* = 7.2 Hz, 2H), 8.44 (t, *J* = 5.2 Hz, 1H); ^{13}C NMR (100 MHz, DMSO-d_6) δ = 41.2, 55.0, 73.5, 113.6, 126.6, 127.4, 127.9, 128.5, 131.6, 141.4, 158.1, 172.0; HRMS (ESI) calcd for $C_{16}H_{17}NO_3Na$ $[M+Na]^+$ 294.1108; found 294.1085.

***N*-(2-Chlorobenzyl)-2-hydroxy-2-phenylacetamide 5f:** Yield 80%; colorless solid; mp = 123-125 °C (Lit.[13] mp = 124-125 °C); R_f = 0.20(hexanes:ethyl acetate (8:2); IR (KBr) *v* = 3293, 3214, 1653, 1595, 1410, 1308, 1070, 768, 689 cm^{-1}; ^{1}H NMR (400 MHz, DMSO-d_6) δ = 4.32-4.35 (m, 2H), 5.02 (d, *J* = 4.5 Hz, 1H), 6.29 (d, *J* = 4.5 Hz, 1H), 7.16-7.20 (m, 1H), 7.23-7.27 (m, 2H), 7.28-7.31 (m, 1H), 7.32-7.37 (m, 2H), 7.39-7.43 (m, 1H), 7.44-7.48 (m, 2H), 8.55 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6) δ = 73.6, 126.5, 127.0, 127.4, 128.2, 128.4, 129.0, 131.8, 136.4, 141.2, 172.5; HRMS (ESI) calcd for $C_{15}H_{14}NO_2ClNa$ $[M+Na]^+$ 298.0611; found 298.0612.

***N*-(2-Acetylphenyl)-2-hydroxy-2-phenylacetamide 7a:** Yield 54%; colorless solid; mp = 112-114 °C (Lit.[15e] mp = 118-119 °C); R_f = 0.26 (hexanes:ethyl acetate (8:2); IR (KBr) *v* = 3294, 3205, 2922, 1658, 1528, 1452, 1105, 749, 614, cm^{-1}; ^{1}H NMR (500 MHz, DMSO-d_6) δ = 2.67 (s, 3H), 5.10 (d, *J* = 4.0 Hz, 1H), 6.80 (d, *J* = 3.5 Hz, 1H), 7.20 (t, *J* = 7.5 Hz, 1H), 7.26-7.32 (m, 1H), 7.35 (t, *J* = 7.0 Hz, 2H), 7.47 (d, *J* = 7.5 Hz, 2H), 7.59 (d, *J* = 7.5 Hz, 1H), 8.09 (d, *J* = 7.5 Hz, 1H), 8.61 (d, *J* = 8.5 Hz, 1H), 12.43 (s, 1H); ^{13}C NMR (125 MHz, DMSO-d_6) δ = 28.8, 74.1, 119.6, 122.7, 122.8, 126.5, 127.7, 128.2, 132.4, 134.5, 139.2, 140.6, 172.3, 202.4; HRMS (ESI) calcd for $C_{16}H_{15}NO_3Na$ $[M+Na]^+$ 292.0950; found 292.0933.

***N*-(3-Acetylphenyl)-2-hydroxy-2-phenylacetamide 7b:** Yield 50%; colorless solid; mp = 117-119 °C (Lit.[13] mp = 118-119 °C); R_f = 0.24 (hexanes:ethyl acetate (8:2); IR (KBr) *v* = 3292, 3237, 1660, 1550, 1334, 1118, 1070, 845, 693 cm^{-1}; ^{1}H NMR (500 MHz, DMSO-d_6) δ = 2.54 (s, 3H), 5.12 (d, *J* = 4.0 Hz, 1H), 6.48 (d, *J* = 4.5 Hz, 1H), 7.26-7.32 (m, 2H), 7.36 (t, *J* = 8.0 Hz, 2H), 7.44 (t, *J* = 8.0 Hz, 1H), 7.52 (d, *J* = 7.5 Hz, 2H), 7.65 (d, *J* = 7.5 Hz, 1H), 7.98 (d, *J* = 7.0 Hz, 1H), 8.32 (s, 1H), 10.16 (s, 1H); ^{13}C NMR (125 MHz, DMSO-d_6) δ = 26.8, 74.1, 119.2, 123.4, 124.2, 126.6, 127.7, 128.1, 129.0, 137.2, 139.0, 140.7, 171.6, 197.7; HRMS (ESI) calcd for $C_{16}H_{15}NO_3Na$ $[M+Na]^+$ 292.0950; found 292.0933.

***N*-(4-Acetylphenyl)-2-hydroxy-2-phenylacetamide 7c:** Yield 68%; colorless solid; mp = 150-152 °C (Lit.[15e] mp = 148-149 °C); R_f = 0.23 (hexanes:ethyl acetate (8:2); IR (KBr) *v* = 3298, 3240, 1655, 1555, 1446, 1067, 754, 693 cm^{-1}; ^{1}H NMR (500 MHz, DMSO-d_6) δ = 2.51 (s, 3H) (merge with DMSO-d_6), 5.14 (d, *J* = 4.0 Hz, 1H), 6.52 (d, *J* = 4.5 Hz, 1H), 7.27-7.32 (m, 1H), 7.33-7.39 (m, 2H), 7.52 (d, *J* = 8.0 Hz, 2H), 7.86 (d, *J* = 8.5 Hz, 2H), 7.91 (d, *J* = 8.5 Hz, 1H), 10.26 (s, 1H); ^{13}C NMR (125 MHz, DMSO-d_6) δ = 26.5, 74.1, 119.0, 126.6, 127.8, 128.2, 129.3, 132.0, 140.5, 142.9, 171.9, 196.6.

***N*-(4-Benzoylphenyl)-2-hydroxy-2-phenylacetamide 7d:** Yield 66%; colorless solid; mp = 134-136 °C; R_f = 0.25 (hexanes:ethyl acetate (8:2); IR (KBr) *v* = 3315, 3163, 1650, 1544, 1488, 1396, 1059, 694, 493 cm^{-1}; ^{1}H NMR (500 MHz, DMSO-d_6) δ = 5.17 (d, *J* = 4.0 Hz, 1H), 6.52 (d, *J* = 4.5 Hz, 1H), 7.27-7.32 (m, 1H), 7.34-7.40 (m, 2H), 7.50-7.58 (m, 4H), 7.62-7.67 (m, 1H), 7.68-7.75 (m, 4H), 7.91 (d, *J* = 8.0 Hz, 2H), 10.32 (s, 1H); ^{13}C NMR (125 MHz, DMSO-d_6) δ = 74.1, 119.0, 126.6, 127.7, 128.2, 128.5, 129.4, 130.9, 131.7, 132.3, 137.5, 140.6, 142.7, 171.9, 194.6; HRMS (ESI) calcd for $C_{21}H_{17}NO_3Na$ $[M+Na]^+$ 354.1106; found 354.1131.

***N*-(4-Acetylphenyl)-2-hydroxybutanamide 7e:** Yield 65%; colorless solid; mp = 80-82 °C; R_f = 0.24 (hexanes:ethyl acetate (8:2); IR (KBr) *v* = 3347, 3266, 1656, 1533, 1188, 1057, 696, 500 cm^{-1}; ^{1}H NMR (500 MHz, DMSO-d_6) δ = 0.92 (t, *J* = 7.5 Hz 3H), 1.55-1.65 (m, 1H), 1.69-1.79 (m, 1H), 2.52 (s, 3H), 3.97-4.02 (m, 1H), 7.85-7.89 (m, 2H), 7.90-7.94 (m, 2H), 9.98 (s, 1H); ^{13}C NMR (125 MHz, DMSO-d_6) δ = 9.5, 26.5, 27.3, 72.7, 118.9, 129.3, 131.8, 143.0, 173.6, 196.6. HRMS (ESI) calcd for $C_{16}H_{15}NO_3Na$ $[M+Na]^+$ 244.0950; found 244.0961.

Acknowledgements

We thank DST (project no.: SB/S1/OC-72/2013) for financial support. GK thanks UGC, New Delhi and ALM thanks CSIR, New Delhi for Senior Research Fellowship. We also thank the Department of Chemistry, IIT Madras for instrumental facilities.

Keywords: Cesium carbonate • Metal-free• Chemoselectivity• Hydrosilylation • Green solvent

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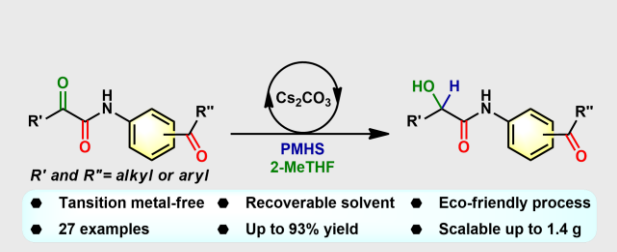

Chemoselective Hydrosilylation

*Govindharaj Kumar, Alagesan Muthukumar, Dr. G. Sekar**

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A Mild and Chemoselective Hydrosilylation of α-Keto Amides using Cs_2CO_3/PMHS/2-MeTHF System

A Cs_2CO_3-catalyzed chemoselective hydrosilylation of α-keto amides to highly important mandelamides is developed using PMHS as hydride source in eco-friendly green solvent 2-MeTHF. The mechanistic study reveals the formation of $MeSiH_3$ from the base-catalyzed degradation of PMHS that can be the active species for hydrosilylation.