Supporting Information for:-

Solvent free one-pot multi-component synthesis of β-azaarene substituted ketones via Sn-catalyzed C(sp³)-H functionalization of 2-alkylazaarenes†

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1. General Information

All reactions were carried out with the open atmosphere in flame-dried glassware. All reactions were carried out with the open atmosphere in flame-dried glassware. All solvent was used LR grade and all reagents and substrates were purchased from commercial suppliers and Sigma Aldrich, Alfa easer, Avra synthesis. All these commercially available chemicals were used without further purification.

Analytical thin layer chromatography was performed on TLC Silica gel 60 F254. And routine monitoring of reaction was performed by TLC using 0.25 mm E. Merck pre-coated silica gel TLC plates (60 F254) using UV light to visualize the course of the reactions or KMnO4 staining solutions followed by heating. Column Chromatography was performed on silica gel (60-120 mesh) by standard techniques eluting with solvents as indicated.

All compounds were fully characterized by using $^1$H and $^{13}$C NMR, the spectra were recorded at 200, 400, 500 MHz and 50 MHz spectrometer using CDCl$_3$ as solvent at room temperature. The Chemical shifts ($\delta$) values are reported in ppm with TMS as internal standard. Abbreviations for signal couplings are: s, singlet; d, doublet; t, triplet; m, multiplet. q, quartet etc.

2. General Procedures for the Optimization of the Reaction Conditions:-

To a 10 ml round bottom flask equipped with a magnetic stir bar was added 1a acetophenone (1 mmol), 2a benzaldehyde (1 mmol), 3a 2-methyl benzothiazole (1 mmol) and catalysts (20 mol
%) were taken, later RBF was capped with condenser. The reaction mixture was reflux at oil bath
120 °C, and the progress of the reaction was monitored by TLC with reaction time as shown in
reaction optimization condition (Table 1). After the completion of the reaction, the reaction
mixture was diluted with 10 mL ethyl acetate and 10 mL water, stirred for 10 minutes. The
organic layer and aqueous layer were separated. The organic layer was dried over anhydrous
Na₂SO₄. The solvent was evaporated and the crude residue was purified by column
chromatography on silica gel to afford the corresponding desired compound (4a) in moderate to
good yield.

Table 1 Optimization of the Reaction condition a,b

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*aReaction conditions: acetophenone 1a (1 mmol), benzaldehyde 2a (1.2 mmol), 2-methyl benziimidazole 3a (1 mmol), Catalyst (20 mol %), Solvent (5 mL). 120 °C for 24 h. b Isolated yield. c DTP/SiO₂ 100 mg catalyst was used, d No reaction.

3. General Experimental Procedures for the Synthesis of Compound 4a to 4p:-

![Reaction Scheme]

To a 10 ml round bottom flask equipped with a magnetic stir bar was added acetophenone 1a (1 mmol), aldehydes 2a (1 mmol), 2-methyl benzothiazole 3a (1 mmol), SnCl₂·2H₂O (20 mol %) were taken and RBF was capped with condenser. The resultant reaction solution was kept stirring at 120 °C in oil bath. The completion of the reaction was monitored by TLC. After the completion of the reaction, the reaction mixture was diluted with 10 mL ethyl acetate and 10 mL water and it was stirred for 10 minutes. Thereafter the organic layer and aqueous layer were separated. The organic layer was dried over anhydrous Na₂SO₄. The solvent was evaporated and the crude residue was purified by column chromatography on silica gel in 15-25% solution of ethyl acetate in pet ether to afford the corresponding desired compounds derivative (4a-4p) in moderate to good yields.

4. General Procedure for the Synthesis of Compound 5a:-
The general experimental procedure was used for the synthesis of compound 5a: - The resultant solution containing RBF equipped with condenser was kept for stirring at 120 °C in oil bath for 16 h. The isolated compound was found oily liquid in 74 yield of 5a.

Experimental procedure for the synthesis of 6a and 8a was carried out from literature procedure.¹,²

(E)-3-(4-fluorophenyl)-1-phenylprop-2-en-1-one: (6a)

Yellow solid, ¹H NMR (CDCl₃, 200MHz): δ = 7.92 - 8.03 (m, 2 H), 7.41 - 7.81 (m, 2 H), 7.06 - 7.14 ppm (m, 2 H); ¹³C NMR (CDCl₃, 50MHz): δ = 189.5, 166.5, 161.5, 143.3, 138.6, 138.2, 133.1, 132.7, 131.7, 131.6, 131.3, 131.2, 130.4, 130.2, 128.9, 128.6, 128.5, 126.1, 121.7, 121.7, 116.4, 115.9, 115.5, 115.0.

3-hydroxy-3-(4-methoxyphenyl)-1-phenylpropan-1-one: (8a),
White solid, $^1$H NMR (CDCl$_3$, 200MHz): $\delta = 7.94 - 7.09$ (m, 2 H), $7.27 - 7.64$ (m, 5 H), $6.88 - 6.96$ (m, 2 H), $5.27 - 5.33$ (m, 1 H), $3.82$ (s, 3 H), $3.56$ (d, $J=2.5$ Hz, 1 H), $3.36 - 3.39$ ppm (m, 2 H); $^{13}$C NMR (CDCl$_3$, 50MHz): $\delta = 200.9, 159.7, 137.2, 135.8, 134.2, 129.3, 128.8, 127.6, 114.5, 5.9, 47.9$

5) Control Experimental Procedures for the Synthesis of Compound 7a:

To a 10 ml round bottom flask equipped with a magnetic stir bar was added enone 6a (1 mmol), benzothiazole 3a (1 mmol), SnCl$_2$.2H$_2$O (20 mol %) were taken and RBF was capped with condenser. Same general procedure followed for compound. 4-(benzo[d]thiazol-2-yl)-3-(4-fluorophenyl)-1-phenylbutan-1-one: 7a

Yield: 88 %; Brown solid, mp 104-107 °C; $^1$H NMR (CDCl$_3$, 200MHz): $\delta = 7.79 - 7.95$ (m, 3 H), $7.41 - 7.60$ (m, 4 H), $7.24 - 7.40$ (m, 4 H), $6.91- 7.00$ (t, $J=8.7$ Hz, 2 H), $3.97 - 4.20$ (m, 1 H), $3.36 - 3.64$ (m, 4 H); $^{13}$C NMR (CDCl$_3$, 50MHz): $\delta = 197.6, 173.6, 155.4, 148.6, 134.3, 129.2, 128.6, 128.0, 125.9, 122.7, 121.5, 115.7, 115.3, 77.6, 76.4, 62.8, 44.5, 40.8$.

Control Experimental Procedures for the Synthesis of Compound 9a:-
To a 10 ml round bottom flask equipped with a magnetic stir bar was added aldol product 8a (1 mmol), benzothiazole 3a (1 mmol), SnCl₂·2H₂O (20 mol %) were taken and RBF was capped with condenser. Same general procedure followed for compound. 4-(benzo[d]thiazol-2-yl)-3-(4-methoxyphenyl)-1-phenylbutan-1-one: (9a)

Yield: 62 %; Brown solid, mp 132-133 °C; ¹H NMR (CDCl₃, 200MHz): d = 7.92 - 7.96 (m, 2 H), 7.73 - 7.78 (dd, J=7.8, 0.9 Hz, 2 H), 7.16 - 7.45 (m, 7 H), 6.76 - 6.80 (m, 2 H), 3.79 - 3.89 (m, 1 H), 3.73 (s, 3 H), 3.43 - 3.67 (m, 4 H); ¹³C NMR (CDCl₃, 50MHz): d = 204.4, 169.9, 159.2, 153.6, 135.9, 134.2, 129.4, 126.4, 125.3, 123.2, 122.0, 114.7, 55.7, 46.1, 41.5
6. Spectral Data of Compounds 4a to 4p and 5a:

4-(benzo[d]thiazol-2-yl)-1,3-diphenylbutan-1-one (4a)

Yield: 72%; Yellow solid, mp 108-110 °C; $^1$H NMR (500 MHz, CDCl$_3$) δ ppm 8.19 (d, J=7.02 Hz, 1 H) 8.05 (d, J=7.93 Hz, 2 H) 8.83 (d, J=7.63 Hz, 2 H) 7.50 - 7.68 (m, 2 H) 7.43 - 7.42 (m, 6 H) 7.27 (d, J=6.10 Hz, 1 H) 4.06 (d, J=6.10 Hz, 1 H) 3.17 - 3.82 (m, 2 H) 3.66 - 3.71 (m, 2 H)

$^{13}$C NMR (126 MHz, CDCl$_3$) δ ppm 197.6, 170.5, 169.8, 152.2, 141.6, 135.0, 133.5, 130.4, 129.1, 128.6, 128.0, 127.7, 126.4, 125.3, 122.7, 121.7, 46.4, 40.53

4-(benzo[d]thiazol-2-yl)-1-(4-methoxyphenyl)-3-phenylbutan-1-one (4b)

Yield: 75%; Yellow solid, mp 84-86 °C; $^1$H NMR (500 MHz, CDCl$_3$) δ ppm 8.17 (d, J=7.93 Hz, 8 H) 7.96 (d, J=7.93 Hz, 8 H) 7.63 (t, J=7.63 Hz, 10 H) 7.37 - 7.55 (m, 34 H) 4.13 - 4.25 (m, 5 H) 4.01 (s, 3 H) 3.85 - 3.93 (m, 7 H) 3.73 - 3.82 (m, 9 H)

$^{13}$C NMR (126 MHz, CDCl$_3$) δ ppm 199.9, 169.8, 161.8, 152.7, 142.6, 141.7, 135.2, 133.1, 131.2, 130.3, 129.0, 128.9, 128.5, 128.0, 127.9, 127.6, 127.2, 126.3, 126.2, 125.2, 125.1, 122.8, 122.7, 121.7, 121.6, 121.0, 119.4, 113.2, 55.7, 48.3, 46.3, 42.2.

4-(benzo[d]thiazol-2-yl)-1-(4-bromophenyl)-3-phenylbutan-1-one (4c)

Yield: 80%; Grey solid, mp 54-155 °C; $^1$H NMR (200 MHz, CDCl$_3$) δ ppm 8.03 (d, J=7.83 Hz,
2 H) 7.81 (d, J=7.71 Hz, 2 H) 7.34 - 7.52 (m, 5 H) 7.20 - 7.30 (m, 4 H) 4.56 (br. s., 2 H) 4.10 (m, 1 H) 3.56 - 3.81 (m, 2 H)

$^{13}$C NMR (101 MHz, CDCl$_3$) δ ppm 196.7, 171.5, 170.7, 142.4, 135.4, 134.4, 133.5, 131.8, 130.2, 129.8, 129.6, 128.8, 128.4, 128.3, 127.5, 127.1, 126.4, 125.3, 125.2, 122.2, 122.0, 121.5, 44.3, 41.5, 40.0.

4-(benzo[d]thiazol-2-yl)-1-(3-bromophenyl)-3-phenylbutan-1-one (4d)

Yield: 73%; Yellow solid, mp 90-91 ºC; $^1$H NMR (400 MHz, CDCl$_3$) δ ppm 8.21 (d, J=7.58 Hz, 1 H) 8.06 - 8.12 (m, 2 H) 7.82 - 7.90 (m, 2 H) 7.40 - 7.67 (m, 2 H) 7.27 - 7.43 (m, 6 H) 4.06 - 4.12 (m, 1 H) 3.79 - 3.85 (m, 2 H) 3.68 - 3.73 (m, 2 H);

$^{13}$C NMR (101 MHz, CDCl$_3$) δ ppm 199.4, 161.3, 152.2, 142.1, 141.2, 132.8, 130.7, 129.8, 128.4, 128.0, 127.5, 127.4, 127.0, 126.7, 125.8, 125.7, 124.7, 124.6, 122.3, 122.2, 121.2, 121.1, 120.5, 118.9, 112.7, 47.8, 45.8, 41.7.

4-(benzo[d]thiazol-2-yl)-1-(2-bromo-4-methoxyphenyl)-3-phenylbutan-1-one (4e)

Yield: 82%; Brown solid, mp 83-84 ºC; $^1$H NMR (500 MHz, CDCl$_3$) δ ppm 8.21 (d, J=7.93 Hz, 1 H) 8.07 (d, J=7.93 Hz, 1 H) 7.83 (d, J=7.93 Hz, 1 H) 7.66 - 7.69 (m, 1 H) 7.50 - 7.57 (m, 3 H) 7.32 - 7.43 (m, 3 H) 7.28 (m, 2 H) 4.06 - 4.09 (m, 2 H) 3.81 (s, 3 H) 3.78 (d, J=6.41 Hz, 2 H) 3.66 - 3.70 (m, 2 H)

$^{13}$C NMR (126 MHz, CDCl$_3$ d) δ ppm 199.1, 170.5, 169.8, 152.3, 141.6, 135.1, 133.4, 130.4, 130.3, 129.1, 128.6, 128.0, 127.6, 126.4, 125.3, 122.7, 121.7, 46.4, 40.5, 32.2.

4-(benzo[d]thiazol-2-yl)-1-(2,4-dichlorophenyl)-3-phenylbutan-1-one (4f)
Yield: 80%; Brown solid, mp 60-62 °C; \(^1\)H NMR (200 MHz, CDCl\(_3\)) \(\delta\) ppm 7.72 – 8.09 (m, 4 H) 7.21 - 7.42 (m, 8H) 3.94 - 4.02 (m, 1 H) 3.52 - 3.69 (m, 4 H)

\(^{13}\)C NMR (126MHz , CDCl\(_3\)) \(\delta\) ppm = 199.0, 168.4, 153.1, 152.3, 149.1, 147.5, 144.0, 134.9, 130.0, 129.0, 126.7, 125.7, 124.3, 122.9, 121.8, 96.5, 77.5, 77.3, 45.9, 40.0, 32.3

4-(benzo[d]thiazol-2-yl)-1-(4-isobutylphenyl)-3-phenylbutan-1-one (4g)

Yield: 74%; Grey solid, mp 138-139 °C; \(^{13}\)C NMR (126MHz , CDCl\(_3\)) \(\delta\) ppm = 201.8, 171.2, 170.1, 151.2, 141.1, 134.5, 133.5, 130.3, 129.7, 128.9, 128.4, 128.3, 127.8, 127.6, 126.7, 126.4, 125.3, 122.3, 121.6, 96.2, 46.2, 40.1, 36.7, 29.8, 22.8

\(^1\)H NMR (500MHz , CDCl\(_3\)) \(\delta\) ppm = 8.21 (m, 2 H), 8.09 (d, \(J = 7.6\) Hz, 2 H), 7.84 (d, \(J = 7.6\) Hz, 2 H), 7.68 (t, \(J = 6.7\) Hz, 2 H), 7.52 - 7.57 (m, 3 H), 7.44 - 7.35 (m, 2 H), 4.11 (m, 1 H), 3.86 - 3.82 (m, 2 H), 3.75 - 3.70 (m, 2 H), 2.40 (m, 2 H), 2.10 – 1.98 (m, 1 H) 0.99 - 0.93 (m, 6 H)

2-(2-(benzo[d]thiazol-2-yl)-1-phenylethyl)-2,3-dihydro-1H-inden-1-one (4h)

Yield: 64%; Brown solid, mp 81-83 °C; \(^1\)H NMR (400 MHz, CDCl\(_3\)) \(\delta\) ppm =8.11 (d, \(J=7.34\) Hz, 1 H), 8.00 - 8.08 (m, 1 H), 7.66 - 7.81 (m, 2 H), 7.41 - 7.61 (m, 4 H), 7.11 - 7.31 (m, 5 H), 3.99 - 4.12 (m, 1 H), 3.85 - 3.99 (m, 1 H), 3.56 - 3.84 (m, 2 H), 2.98 - 3.28 (m, 2 H), 2.87 - 2.98 (m, 1 H)
$^{13}$C NMR (101 MHz, CDCl$_3$) δ ppm = 207.0, 170.7, 170.3, 153.4, 150.8, 141.0, 139.9, 139.7, 137.3, 136.8, 134.8, 134.7, 134.3, 134.2, 133.3, 130.1, 129.9, 128.9, 128.7, 128.6, 128.5, 128.3, 127.8, 127.5, 127.3, 127.2, 126.7, 126.5, 126.4, 126.4, 126.3, 125.6, 125.4, 124.0, 123.7, 122.1, 122.0, 121.6, 121.6, 121.5, 96.2, 51.4, 51.2, 39.9, 37.5, 30.0.

4-(benzo[d]thiazol-2-yl)-3-(4-methoxyphenyl)-1-phenylbutan-1-one (4i)

Yield: 76%; Brown solid, mp 132-133 °C; $^1$H NMR (400MHz, CDCl$_3$) δ ppm = 8.00 (d, $J = 8.1$ Hz, 2 H), 7.76 (d, $J = 7.8$ Hz, 2 H), 7.45 (t, $J = 7.6$ Hz, 3 H), 7.40 - 7.30 (m, 2 H), 7.30 - 7.16 (m, $J = 8.3$ Hz, 2 H), 6.77 (d, $J = 8.6$ Hz, 2 H), 3.99 (m, $J = 6.6$ Hz, 1 H), 3.73 (s, 3 H) 3.87 - 3.71 (m, 2 H), 3.65 - 3.50 (m, 2 H)

$^1$H NMR (500MHz, CDCl$_3$) δ ppm = 195.5, 170.5, 158.8, 150.5, 134.2, 132.7, 128.8, 126.6, 125.5, 122.0, 121.6, 114.3, 96.2, 77.3, 55.0, 45.3, 40.1, 29.7

4-(benzo[d]thiazol-2-yl)-3-(4-chlorophenyl)-1-phenylbutan-1-one (4j)

Yield: 82%; Yellow solid, mp 97-98 °C; $^1$H NMR (500MHz, CDCl$_3$) δ ppm = 8.09 (d, $J = 8.2$ Hz, 2 H), 7.85 (d, $J = 7.9$ Hz, 2 H), 7.55 (t, $J = 7.5$ Hz, 2 H), 7.45 (t, $J = 7.5$ Hz, 2 H), 7.35 - 7.29 (m, 5 H), 4.23 (m, 1 H), 3.85 (dd, $J = 6.1$, 14.6 Hz, 2 H), 3.74 (dd, $J = 8.5$, 14.6 Hz, 2 H)

$^{13}$C NMR (126MHz, CDCl$_3$) δ ppm = 197.1, 170.1, 149.3, 142.4, 138.8, 133.5, 133.3, 129.0, 128.9, 126.8, 125.7, 121.6, 121.5, 96.0, 76.7, 76.5, 45.1, 39.2, 34.5

4-(benzo[d]thiazol-2-yl)-3-(4-nitrophenyl)-1-phenylbutan-1-one (4k)
Yield: 80%; Yellow solid, mp 158-160 °C; \(^1\)H NMR (500MHz , CDCl\(_3\)) \(\delta\) ppm = 8.09 - 8.13 (m, 2 H), 7.96 (d, \(J = 8.2\) Hz, 2 H), 7.78 (d, \(J = 7.9\) Hz, 2 H), 7.56 - 7.42 (m, 5 H), 7.42 - 7.33 (m, 2 H), 4.32 - 4.21 (m, 1 H), 3.75 (dd, \(J = 6.4, 15.0\) Hz, 2 H), 3.62 (dd, \(J = 8.5, 15.0\) Hz, 2 H)

\(^{13}\)C NMR (126MHz , CDCl\(_3\)) \(\delta\) ppm = 198.7, 168.1, 152.1, 148.9, 147.3, 134.6, 128.8, 126.5, 125.4, 124.0, 122.6, 121.6, 96.2, 45.7, 39.7, 32.0

3-(benzo[d][1,3]dioxol-5-yl)-4-(benzo[d]thiazol-2-yl)-1-phenylbutan-1-one (4l)

Yield: 70%; Yellow solid, mp 102-104 °C; \(^1\)H NMR (200 MHz , CDCl\(_3\)) \(\delta\) ppm = 8.00 (d, \(J = 7.2\) Hz, 2 H), 7.89 - 7.69 (m, 2 H), 7.60 - 7.15 (m, 5 H), 6.97 - 6.55 (m, 2 H), 5.92 (s, 1 H), 4.09 - 3.80 (m, 1 H), 3.90 - 3.50 (m, 4 H);

\(^{13}\)C NMR (126 MHz, CDCl\(_3\)) \(\delta\) ppm = 199.9, 170.4, 151.3, 149.4, 148.5, 134.7, 133.6, 128.8, 128.4, 126.7, 125.6, 122.4, 121.8, 119.9, 96.4, 45.9, 40.4, 30.0

4-(benzo[d]thiazol-2-yl)-3-(3,4-dimethoxyphenyl)-1-phenylbutan-1-one (4m)

Yield: 71%; Yellow solid, mp 107-109 °C; \(^1\)H NMR (500MHz , CDCl\(_3\)) \(\delta\) ppm = 7.99 (d, \(J = 7.9\) Hz, 2 H), 7.84 - 7.73 (m, 2 H), 7.56 - 7.32 (m, 5 H), 6.93 - 6.79 (m, 1 H), 6.79 - 6.69 (m, 2 H), 3.96 (d, \(J = 6.1\) Hz, 1 H), 3.80 (s, 4 H), 3.76 - 3.58 (m, 7 H)

\(^{13}\)C NMR (126MHz , CDCl\(_3\)) \(\delta\) ppm = 199.3, 170.1, 151.1, 149.1, 148.2, 134.4, 133.4, 128.5,
4-(benzo[d]thiazol-2-yl)-3-(3-phenoxyphenyl)-1-phenylbutan-1-one (4n)

Yield: 77%; Brown solid, mp 52-54 °C; $^1$H NMR (500MHz , CDCl$_3$) δ ppm = 8.15 - 8.08 (m, 2 H), 8.15 - 7.91 (m, 2 H), 7.64 - 7.45 (m, 6 H), 7.25 (s, 1 H), 7.29 (s, 1 H), 7.23 - 7.15 (m, 2 H), 7.08 - 6.88 (m, 4 H), 4.19 - 4.03 (m, 1 H), 3.87 - 3.63 (m, 3 H), 3.59 (t, $J$ = 5.8 Hz, 1 H)

$^{13}$C NMR (126MHz , CDCl$_3$) δ ppm = 197.2, 168.9, 157.1, 156.8, 156.8, 151.8, 143.1, 134.6, 132.8, 130.0, 129.8, 129.6, 129.5, 129.5, 129.4, 129.3, 128.3, 127.9, 126.1, 126.0, 125.9, 124.9, 124.9, 123.0, 122.8, 122.3, 122.1, 121.8, 121.3, 121.2, 121.2, 118.8, 118.7, 118.4, 118.4, 118.3, 118.0, 117.9, 117.6, 117.3, 95.9, 76.7, 76.5, 45.8, 41.1, 39.9

4-(benzo[d]thiazol-2-yl)-3-(naphthalen-1-yl)-1-phenylbutan-1-one (4o)

Yield: 80%; Yellow solid, mp 86-87 °C; $^1$H NMR (200MHz , CDCl$_3$) δ ppm = 8.22 - 8.07 (m, 1 H), 7.85 - 7.71 (m, 2 H), 7.55 - 7.12 (m, 13 H), 4.85 (t, $J$ = 6.6 Hz, 1 H), 3.69 (d, $J$ = 7.2 Hz, 4 H)

$^{13}$C NMR (126MHz , CDCl$_3$) δ ppm = 199.9, 169.5, 161.8, 152.7, 141.8, 135.2, 133.3, 133.3, 130.3, 129.0, 128.9, 128.0, 127.6, 126.3, 125.2, 122.8, 121.7, 119.5, 96.4, 48.3, 42.2, 40.7

4-(benzo[d]thiazol-2-yl)-1-phenyl-3-(thiophen-2-yl)butan-1-one (4r)
Yield: 81%; Brown solid, mp 61-63 °C; $^1$H NMR (200MHz , CDCl$_3$) δ ppm = 8.03 - 7.99 (m, 2 H), 7.81 - 7.77 (m, 2 H), 7.64 - 7.22 (m, 5 H), 7.16 (dd, $J$ = 1.3, 4.9 Hz, 1 H), 6.90 - 6.85 (m, 2 H), 4.43 - 4.13 (m, 2 H), 3.82 - 3.56 (m, 3 H)

$^{13}$C NMR (50MHz , CDCl$_3$) δ ppm = 199.8, 168.8, 160.9, 152.2, 143.8, 135.0, 126.9, 126.2, 125.5, 125.1, 124.2, 122.6, 121.5, 96.2, 77.6, 76.4, 46.2, 41.3, 29.8

2-(4-methylpyridin-2-yl)-1-phenylethan-1-one (5a)

Yield: 74%; Colorless oil; $^1$H NMR (200MHz , CDCl$_3$) δ ppm = 8.06 - 8.02 (m, 2 H), 7.67 - 7.48 (m, 3 H), 7.10 (d, $J$ = 6.9 Hz, 1 H), 6.42 (s, 1 H), 6.08 (dd, $J$ = 1.9, 6.9 Hz, 1 H), 5.34 (s, 2 H), 2.24 (s, 3 H)

$^{13}$C NMR (101MHz , CDCl$_3$) δ ppm = 192.3, 162.2, 151.6, 137.0, 134.9, 134.0, 128.9, 128.3, 119.3, 108.6, 96.2, 77.3, 76.7, 53.6, 21.5

References:-


7. $^1$H NMR and $^{13}$C NMR Spectra of Product:-

![NMR Spectra Image](image-url)