Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Online Supporting Information for

Light driven carbon dioxide reduction coupled with conversion of acetylenic group to ketone by a functional Janus catalyst based on Keplerate $\{Mo_{132}\}$

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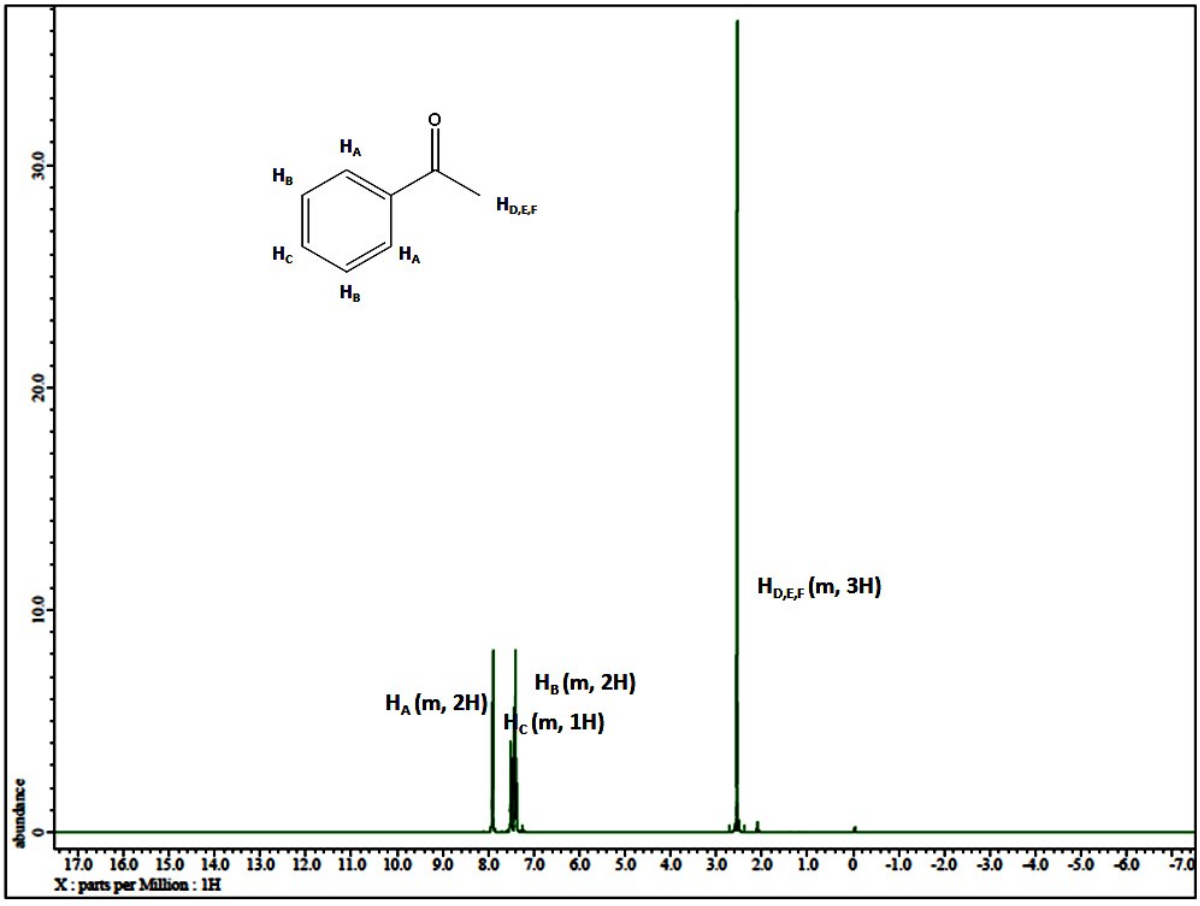
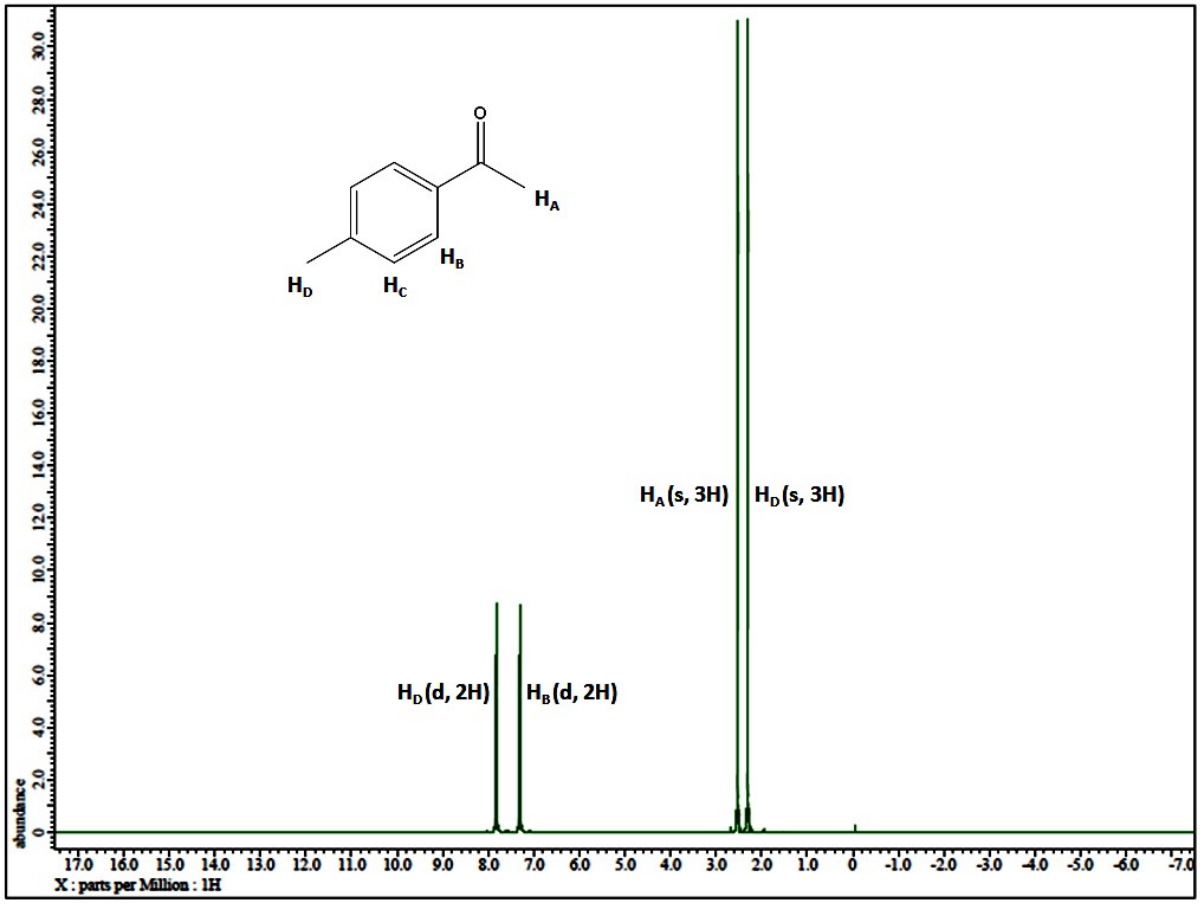
All the reactions have been performed as per the experimental procedure mentioned in the article:

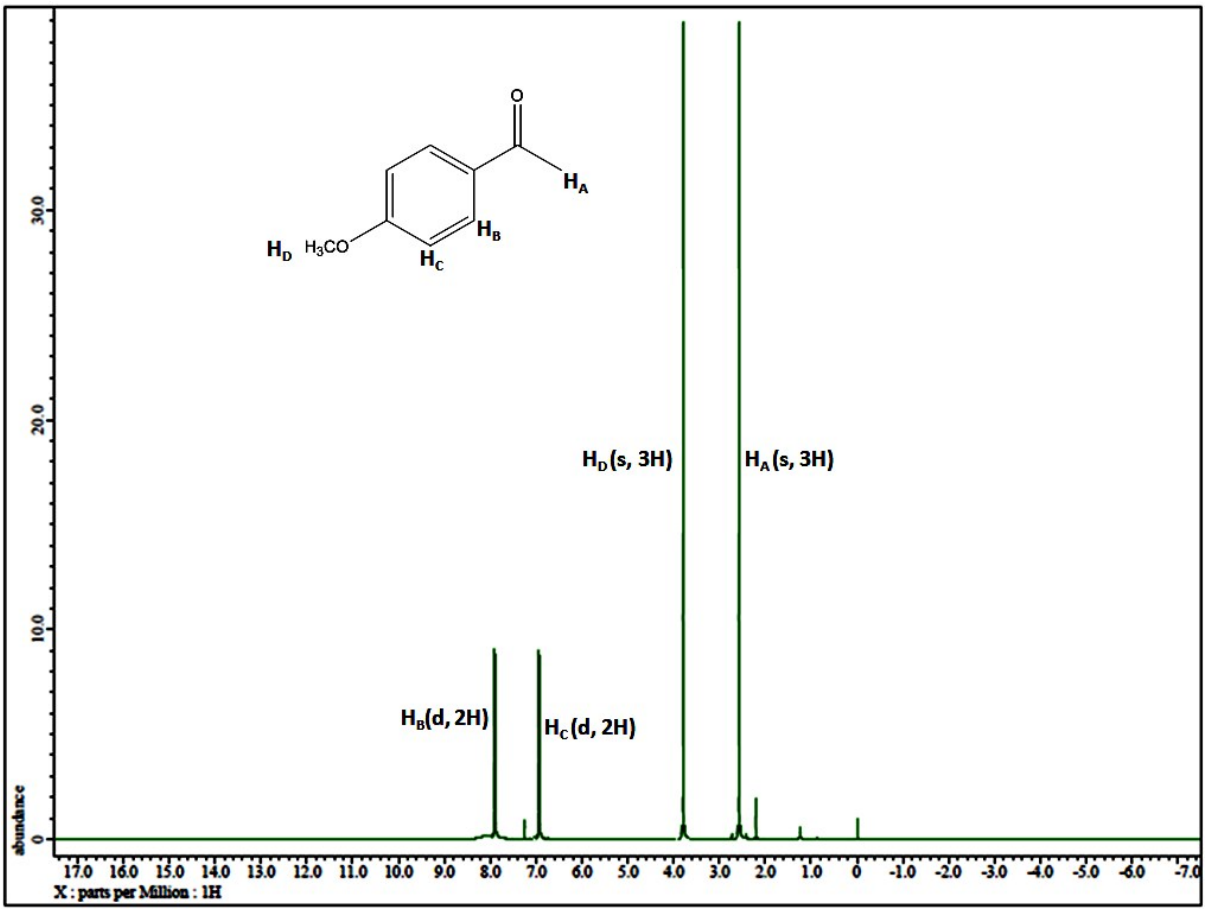
Acetophenone ^{1}H NMR (500 MHz, $CDCl_3$): δ 7.98- 7.96 (m, 2H), 7.59-7.55 (m, 1H), 7.49-7.45 (m, 2H), 2.61 (s, 3H)



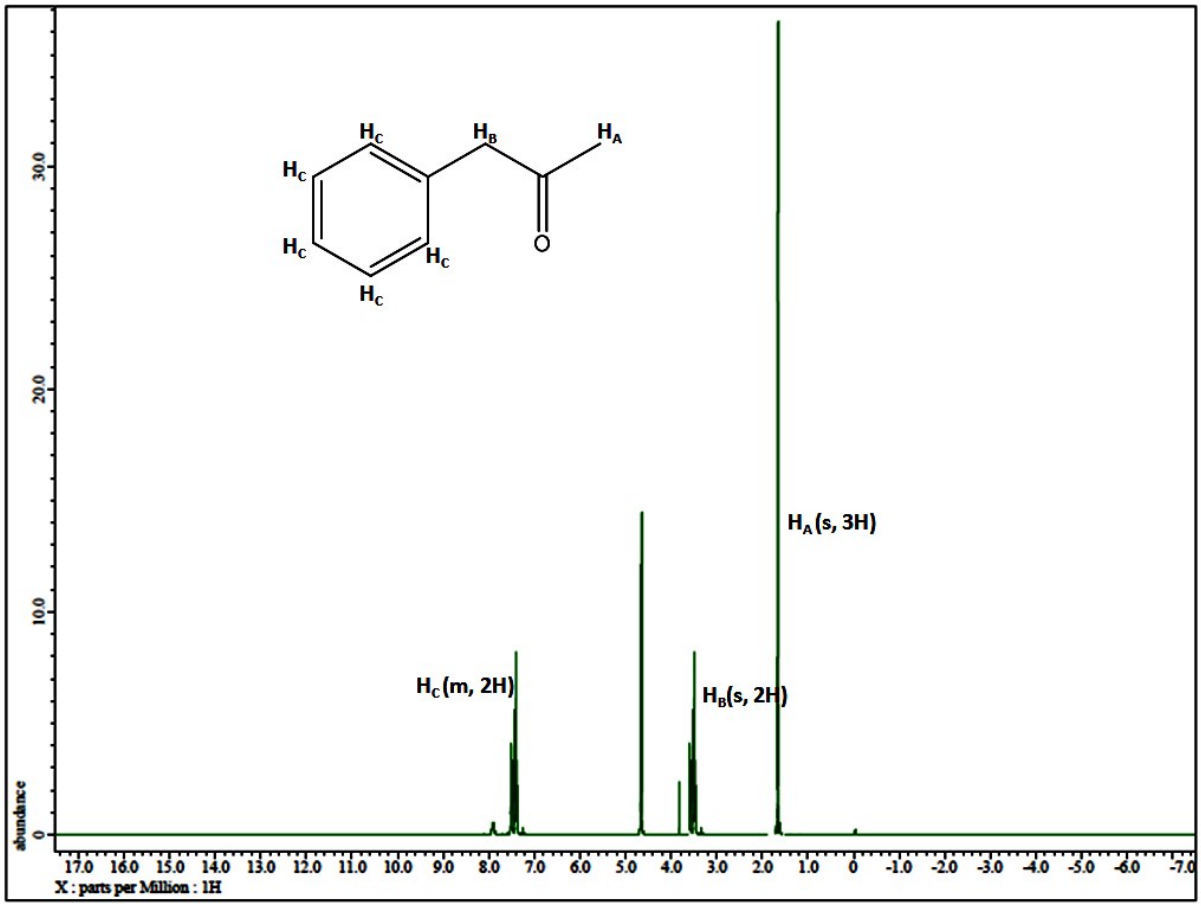
4-Methylacetophenone ^{1}H NMR (500 MHz, $CDCl_3$): δ (ppm) = 7.75 (d, 3 J= 7.9 Hz, 2 H), 7.14 (d, 3 J = 7.9 Hz, 2 H), 2.46 (s, 3 H), 2.29 (s, 3 H).



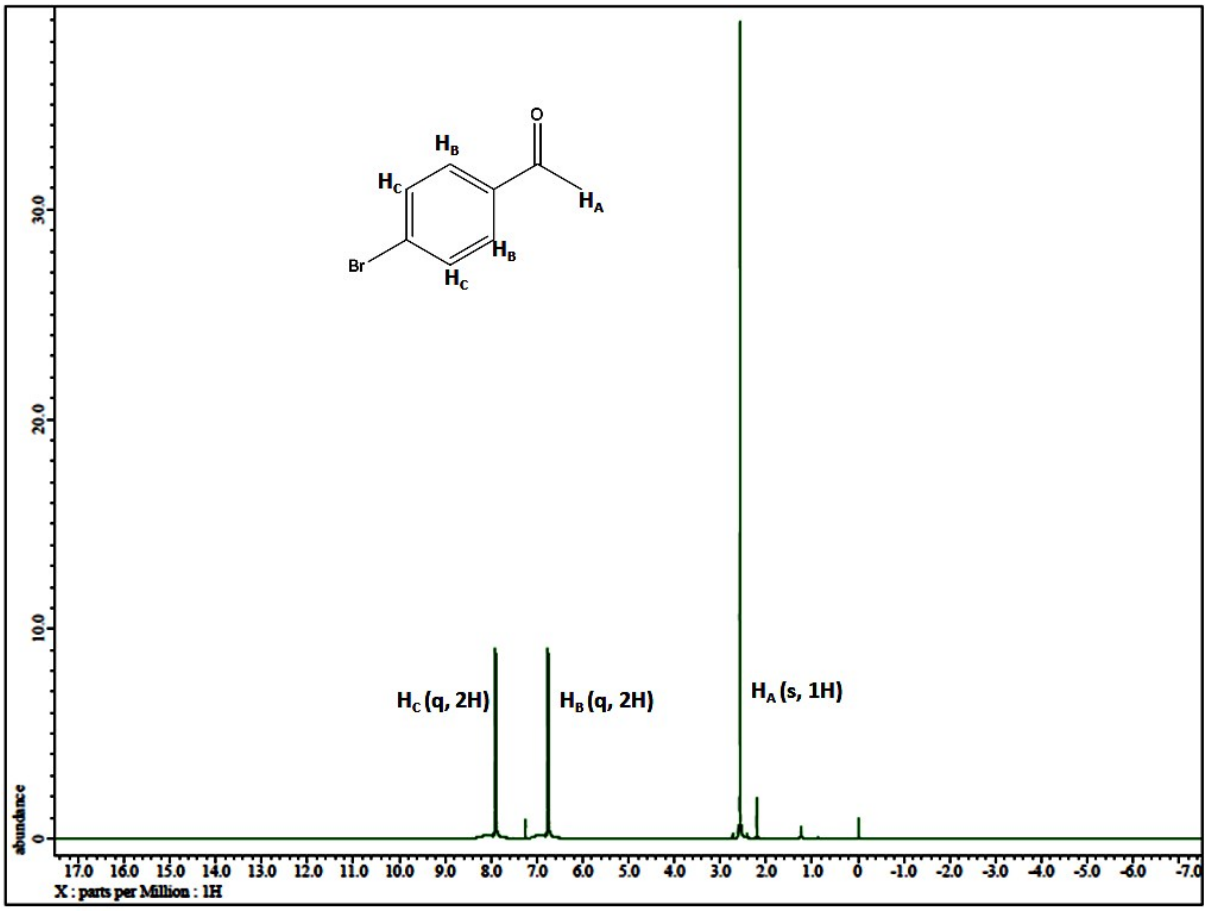
4-Methoxyacetophenone ^{1}H NMR (500 MHz, $CDCl_3$): δ (ppm) = 7.84–7.79 (m, 2 H), 6.84–6.74 (m, 2 H), 3.74 (s, 3 H), 2.42 (s, 3 H).



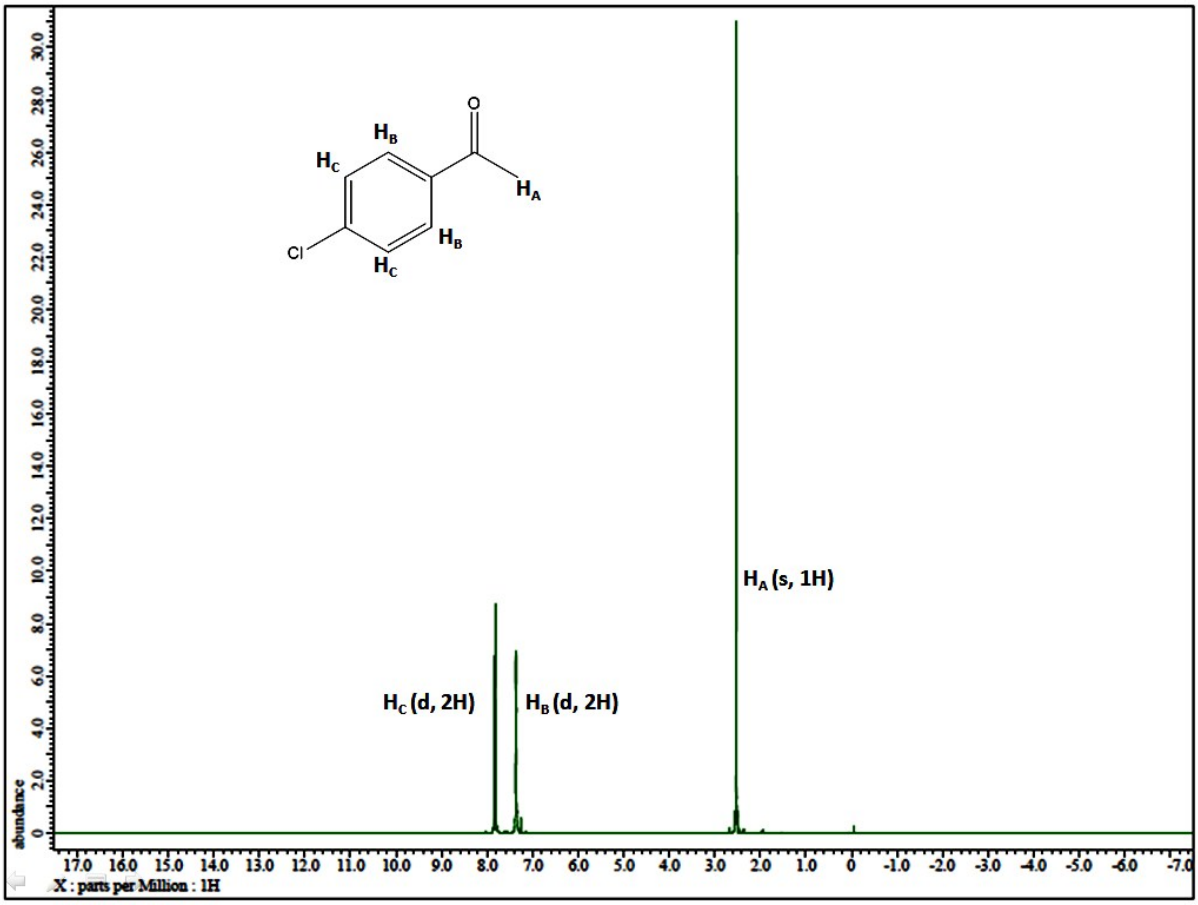
1-Phenylpropan-2-one ^{1}H NMR (500 MHz, $CDCl_3$): δ (ppm) = 7.15-7.40 (m, 5H), 3.68 (s, 2H), 2.14 (s, 3H).



4-Bromoacetophenone ^{1}H NMR (500 MHz, $CDCl_3$): δ (ppm) = 2.60 (s, 3H), 7.61-7.63 (q, 2H), 7.83-7.84 (q, 2H)



4-Chloroacetophenone ^{1}H NMR (500 MHz, $CDCl_3$): δ (ppm) = 2.61 (s, 3H), 7.45 (d, J = 8.5 Hz, 2H), 7.91 (d, J = 8.5 Hz, 2H).



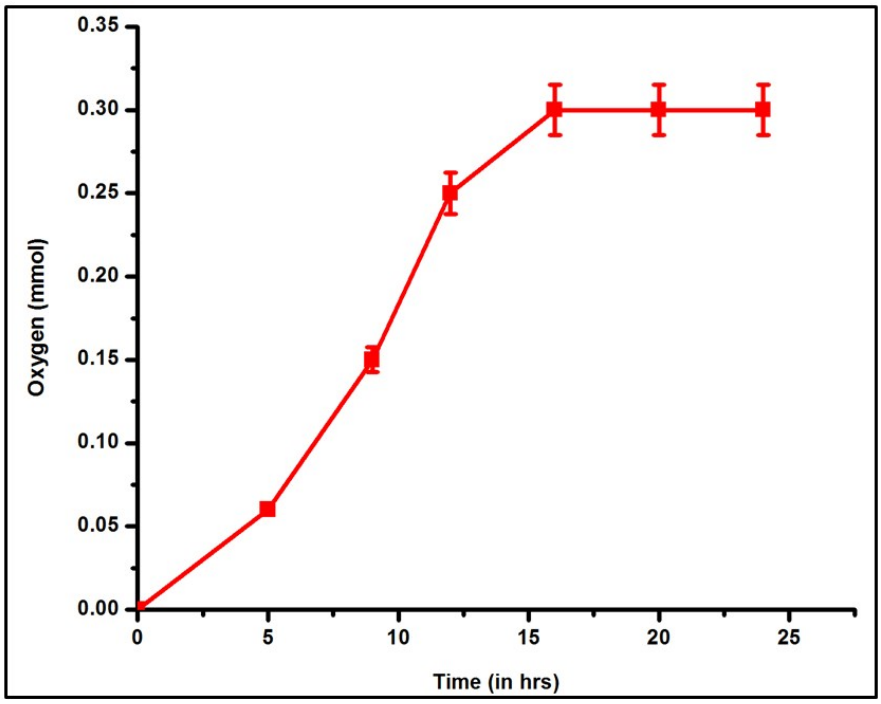


Fig. S1 Time dependent oxygen evolution at varying pH.

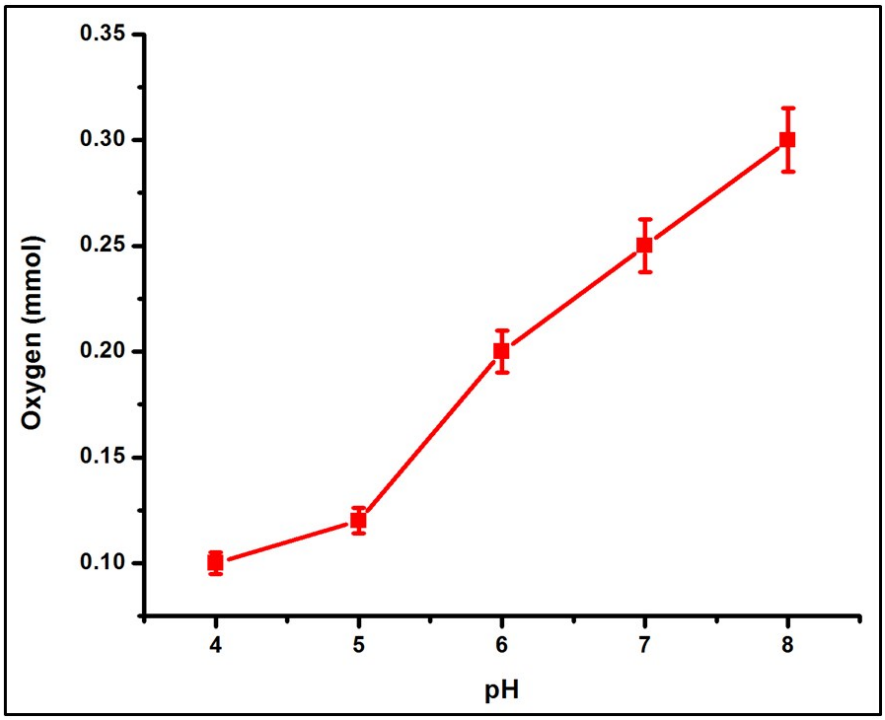


Fig. S2 pH dependent O_2 formation

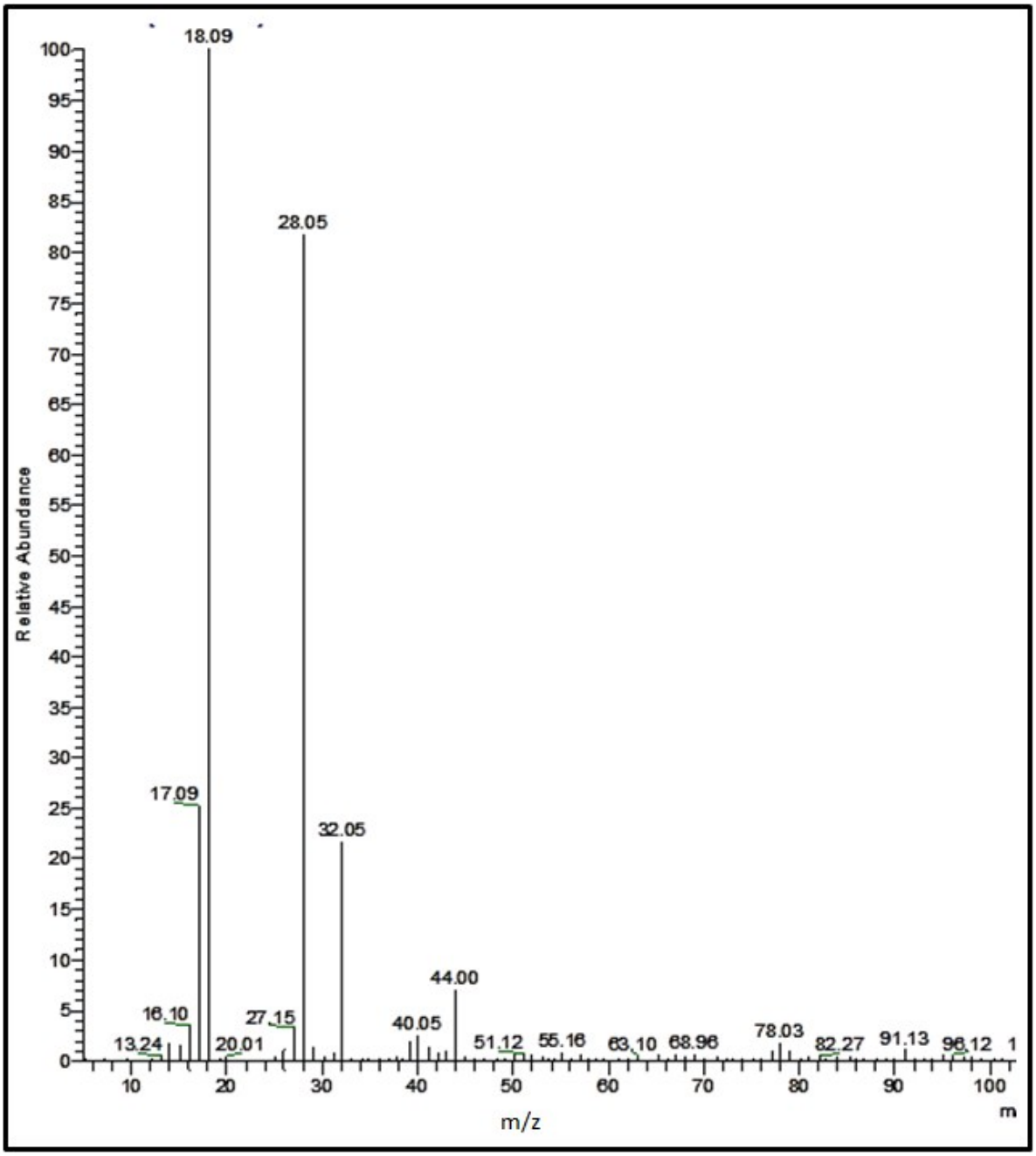


Fig. S3 Mass Spectra of Ethyl formate obtained during esterification

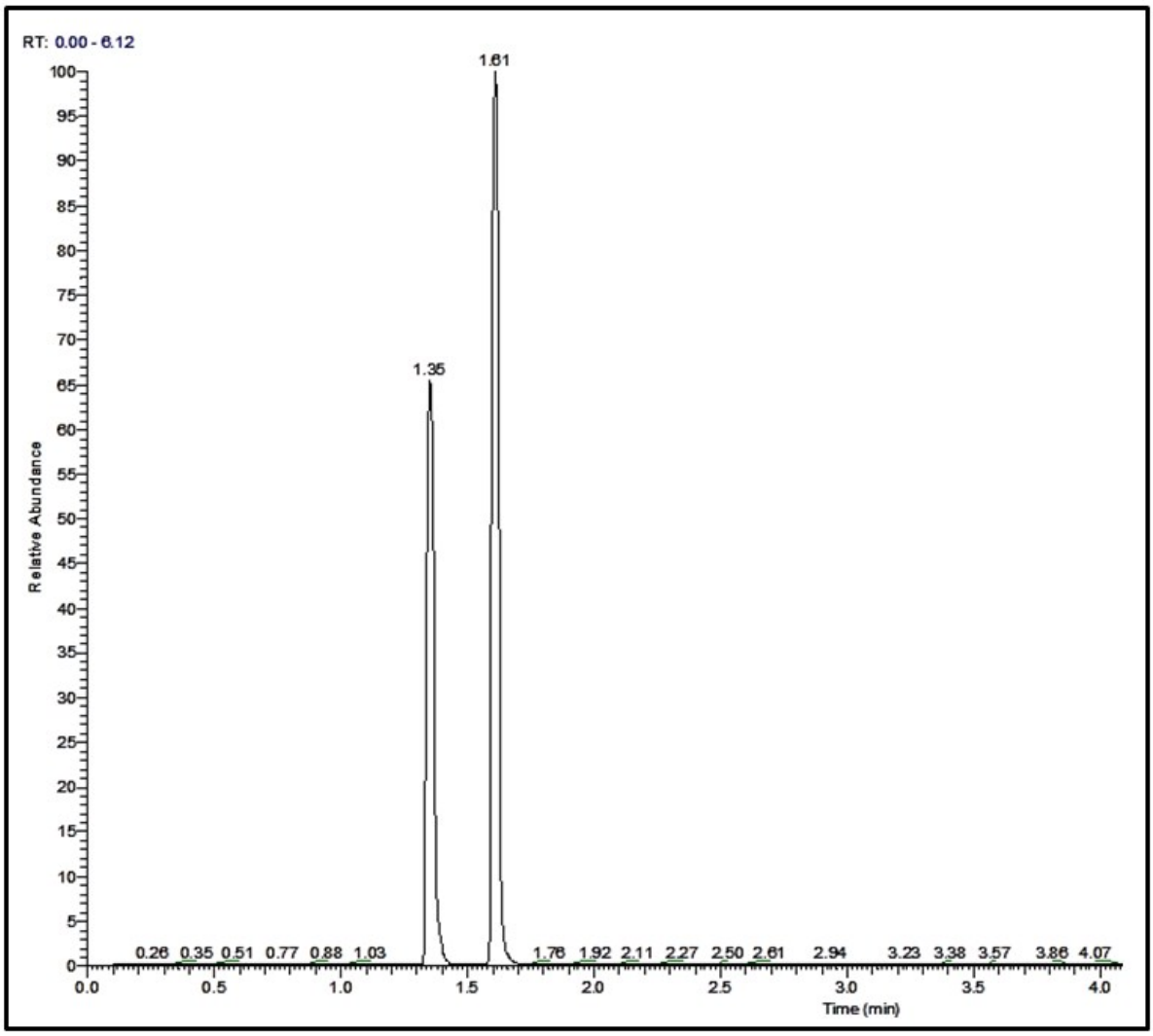


Fig. S4 Retention time of ethyl formate after esterification from GC-MS.

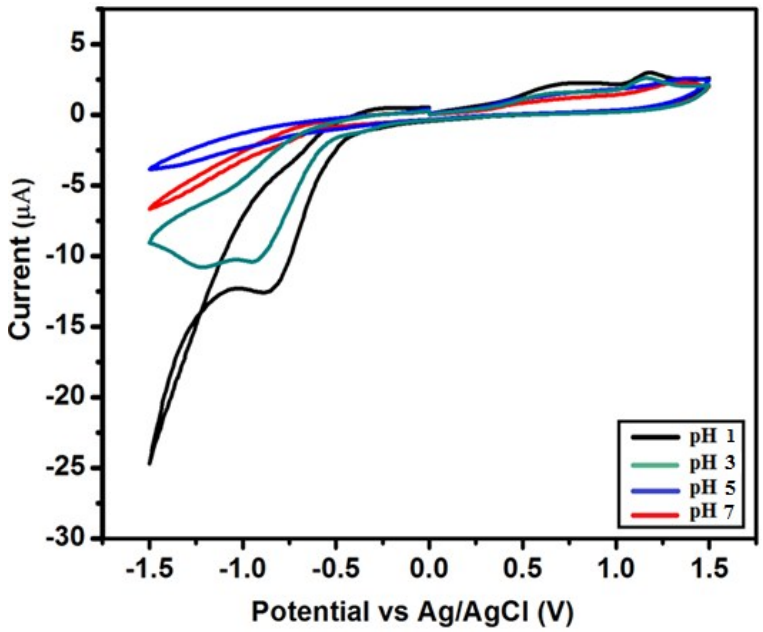


Fig. S5 Cyclic Voltammetry Graph at different pH .

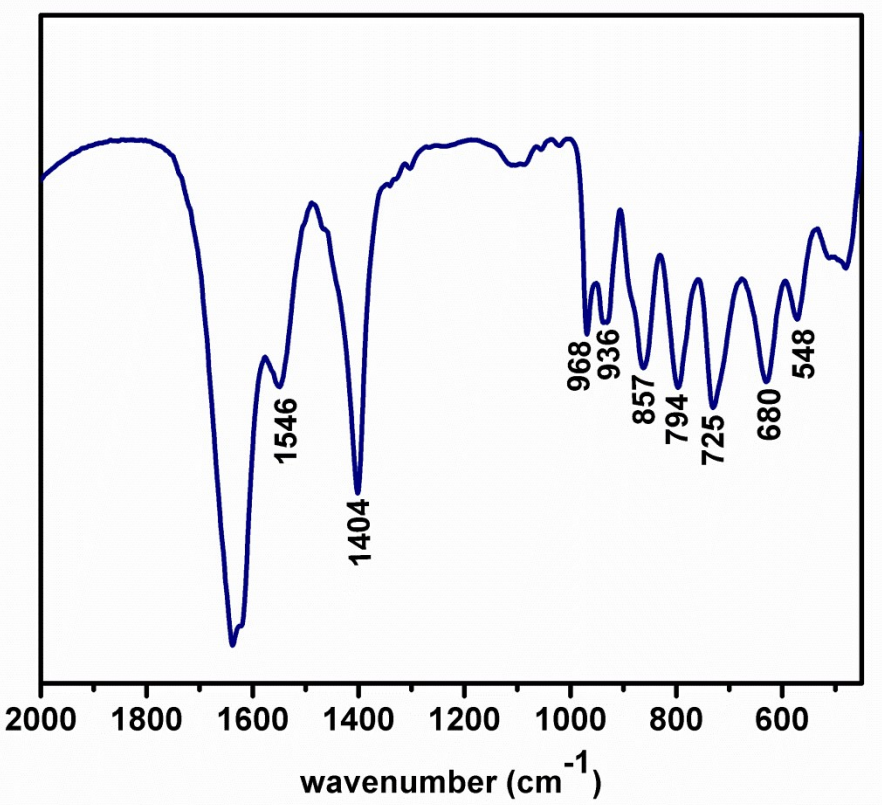


Fig. S6 FT-IR spectra for $\{Mo_{132}\}$

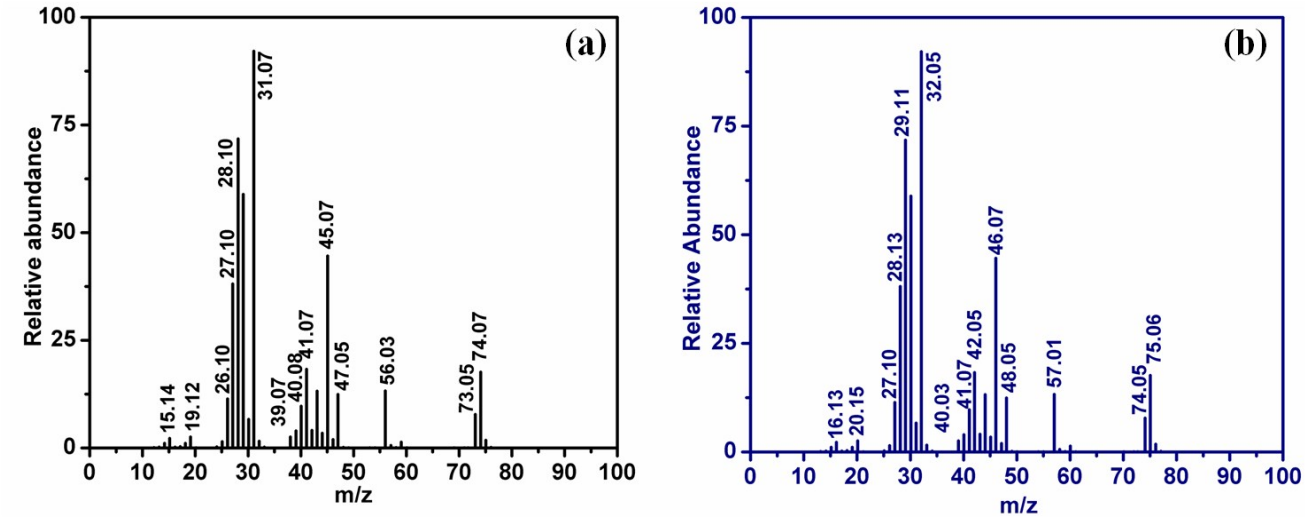


Fig.5 S7 Gas chromatogram analysis of formic acid formed from (a) $^{12}CO_2$ and (b) $^{13}CO_2$

TON & TOF for Formic acid

Turn over Number (TON) = Moles of product/ Moles of catalyst $\{Mo_{132}\}$ = 0.12/0.4 x 10^{-3}=300

Turn over Frequency (TOF) = TON/ Total time taken for the catalytic reaction = 300/24 h=12.5 h^{-1}.

TON & TOF for Acetophenone

Turn over Number (TON) = Moles of product/ Moles of catalyst $\{Mo_{132}\}$ = 0.79/0.4 x 10^{-3} =1975

Turn over Frequency (TOF) = TON/ Total time taken for the catalytic reaction = 1975/24 h = 82.29 h^{-1}.