Supplementary Information (SI) for New Journal of Chemistry.

Pyridinium Based Carboxyl Functionalized Porphyrin: An Easy Gateway to Afford Substituted Benzyl Aryl Ethers

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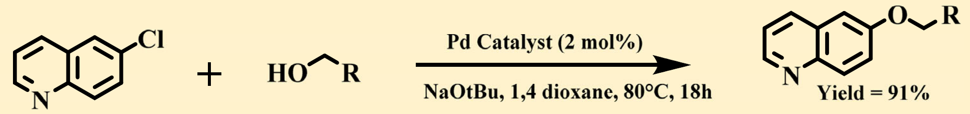
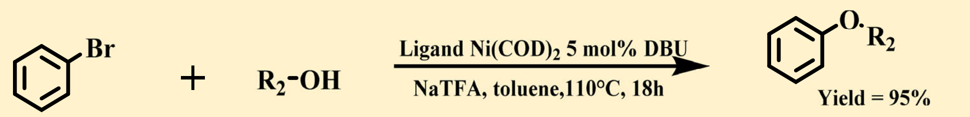
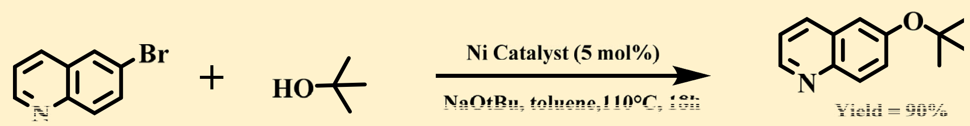
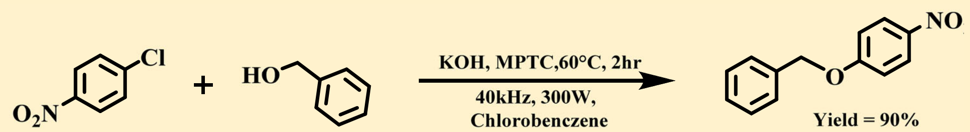
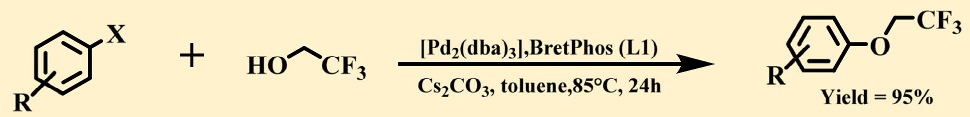
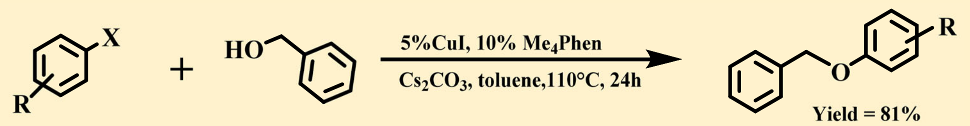
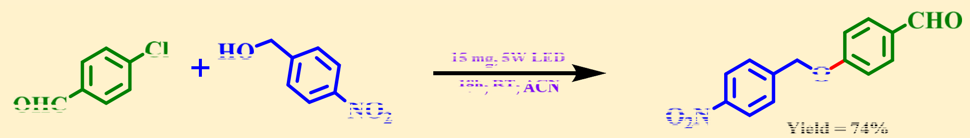
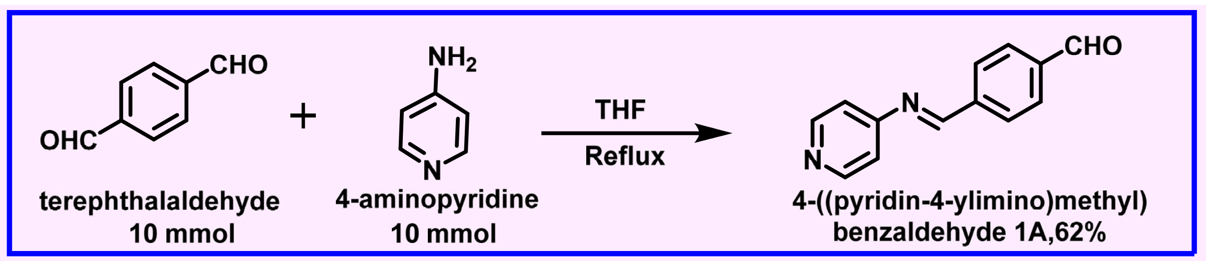
Supplementary Information

Table S. 1 Literature report

S.N.	Literature Report	Ref.
1		[22]
2		[51]
3		[52]
4		[30]
5		[21]
6		[19]
7		Current work

2.3 Synthesis Route of pyridinium-based carboxyl-functionalised porphyrin photocatalyst

2.3.1 Preparation of 4-((pyridin-4-ylimino) methyl)benzaldehyde (1A)

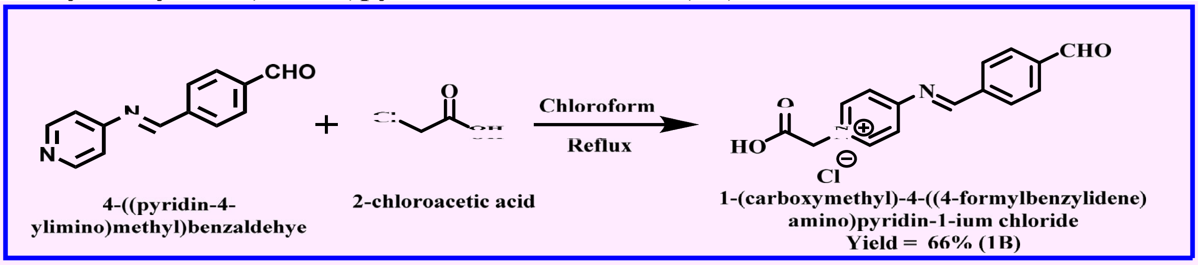


Scheme. S1 Preparation of (1A)

Separately dissolve terephthalaldehyde (0.68 g, 5 mmol) and p-aminopyridine (0.475 g, 5 mmol) in a beaker with 10 mL THF, then transfer to a 50 mL RB flask. The solution was

refluxed for 45 hours with constant stirring. We subsequent stirred the resulting liquid nonstop for 26 hours to acquire the necessary yellow precipitate. The solid product was wash away with aqueous ethanol, earlier acetone (3 x 10 mL), and dried in a hot air oven. [1] The greater compound (1A) was well-known by 1H NMR. (SI Fig. S12, Pg.14) ^{13}C NMR, (SI Fig. S13, Pg.14), FT-IR (SI Fig. S14, Pg.15) and HR-MS analysis (SI Fig. S15, Pg.15), (1.337 g) (Scheme 1). (Yield = 62%).
400 MHz, DMSO-d6: δ 10.02 (s, 1H), 8.07 (s, 1H), 7.97 (d, J = 8.00 Hz, 2H), 7.79 (d, J = 8.00 Hz, 2H), 7.35 (d, J = 6.80 Hz, 2H), 6.61 (d, J = 6.00 Hz, 2H).
100 MHz, DMSO-d_6: δ 193.54, 156.06, 151.18, 148.97, 140.21, 136.59, 130.46, 127.85, 109.47 ppm.
FT-IR (cm^{-1}): 1709.34, 1612.67, 1507.53, 1195.17.

2.3.2 Preparation of precursor of photocatalyst 1-(carboxymethyl)-4-((4-formylbenzylidene)amino)pyridin-1-ium chloride (1B)



Scheme. S2 Preparation of (1B)

The resultant intermediate 1A (1.051 g, 5 mmol) was carefully transferred into a 50 mL RB flask containing 10 mL chloroform and kept at freezing temperature with constant agitation. The resulting solution was progressively combined with chloroacetic acid (0.5825 g, 5 mmol) and refluxed for 42 hours. After the reaction was complete, the solvent was evaporated under decreased pressure to produce a viscous orange liquid. To remove unreacted substrates, the sticky ionic liquid precursor 1B was rinsed with acetone (2 x 10 mL) before being dried in the oven.[2] The creation of compound was (1B) confirmed by ^{1}H NMR (SI Fig. S16, Pg.16) ^{13}C NMR, (SI Fig. S17, Pg.16), FT-IR (SI Fig. S18, Pg.17) and HR-MS analysis (SI Fig. S19, Pg.17), Yielding 53.21% (0.878 g) (Scheme 2).
400 MHz, DMSO-d6: δ 10.14 (s, 1H), 8.43 (s, 1H), 8.21 (d, J = 8.00 Hz, 2H), 8.13 (d, J = 6.80 Hz, 2H), 8.07 (d, J = 9.60 Hz, 2H), 6.85 (d, J = 7.20 Hz, 2H), 5.04 (s, 2H).
100 MHz, DMSO-d_6: δ 193.59, 174.54, 169.32, 160.32, 159.39, 144.41, 140.21, 140.07, 130.47, 109.20, 59.97.

2.3.3 Preparation of Porphyrin based photocatalyst (PCFPc) (C)

Using previously published material, we attempted to build a PCFPc photocatalyst. [2] Precursor 1B (1.3070 g, 4 mmol) was diluted in 5 mL acetic acid and transferred to a 100-mL RBF. Pyrrole (0.2683 g, 4 mmol) was mixed with 5 mL of acetic acid in a dropping funnel. The pyrrole solution was gradually added to the RBF while being continuously agitated, and the entire mixture heated up for 35–45 minutes. Shortly after the process of reaction finished, the resultant mixture was constantly agitated at a comfortable temperature for a period of 12 hours. The resultant substance was afterwards rinsed several times utilizing water until it tested negative on blue litmus paper as a medium, then with methanol and acetone (3 x 10 mL). To achieve the PCFPc photocatalyst (C), this dark brown powder form had been dried in an oven using hot air at 60°C during the requisite time. The formation of was demonstrated by several spectral scrutiny (C) such as ^{1}H NMR (SI Fig. S1), Solid ^{13}C NMR (Fig.S2) Comparative FT-IR of precursor 1B and photocatalyst (Manuscript Fig. 2, Pg.5), Hammett acidity (Manuscript Fig. 3, Pg.6), BET (Manuscript Fig. 4, Pg.7) UV- Visible Spectrum and Fluorescence Emission Spectrum (Manuscript Fig. 5, Pg.8), Powder XRD (Manuscript Fig. 6, Pg.9), Electrochemical cyclic voltammetry (Fig. S7), SEM and EDAX (Fig. 8), XPS (Fig. 9), (HRMS(M+1)= 1266. Yield 47.03% (2.756 g) (Scheme 1).

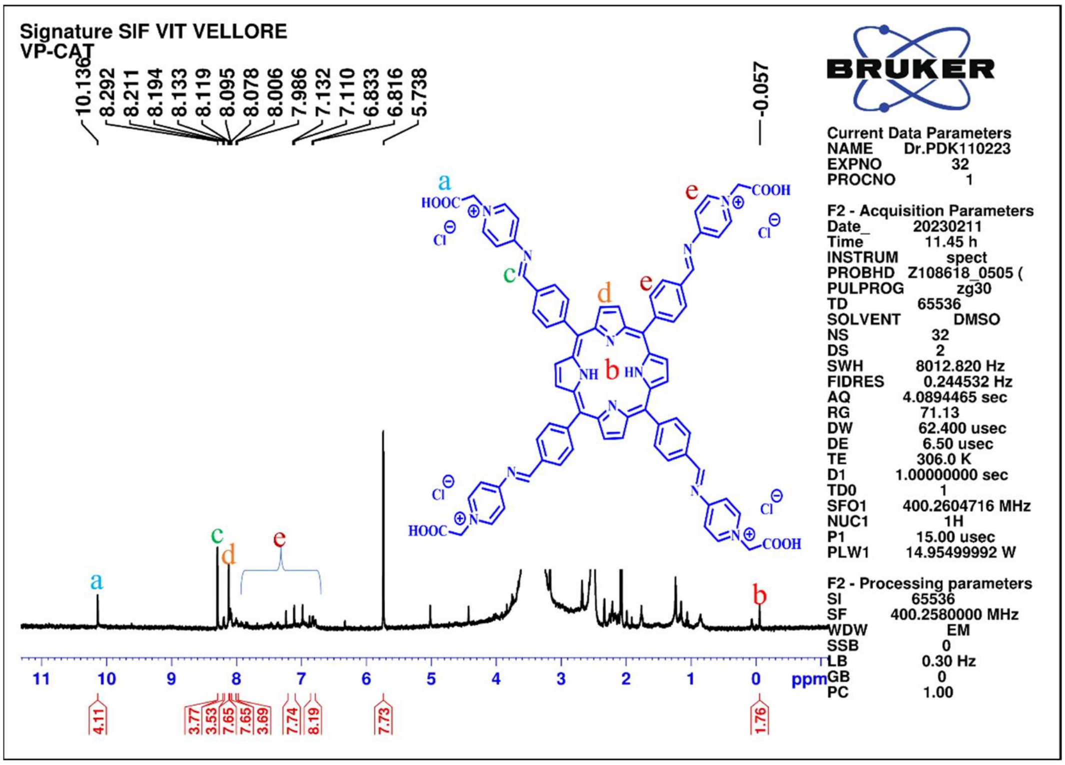


Fig. S1. ^{1}H NMR Spectrum of PCFPc photocatalyst

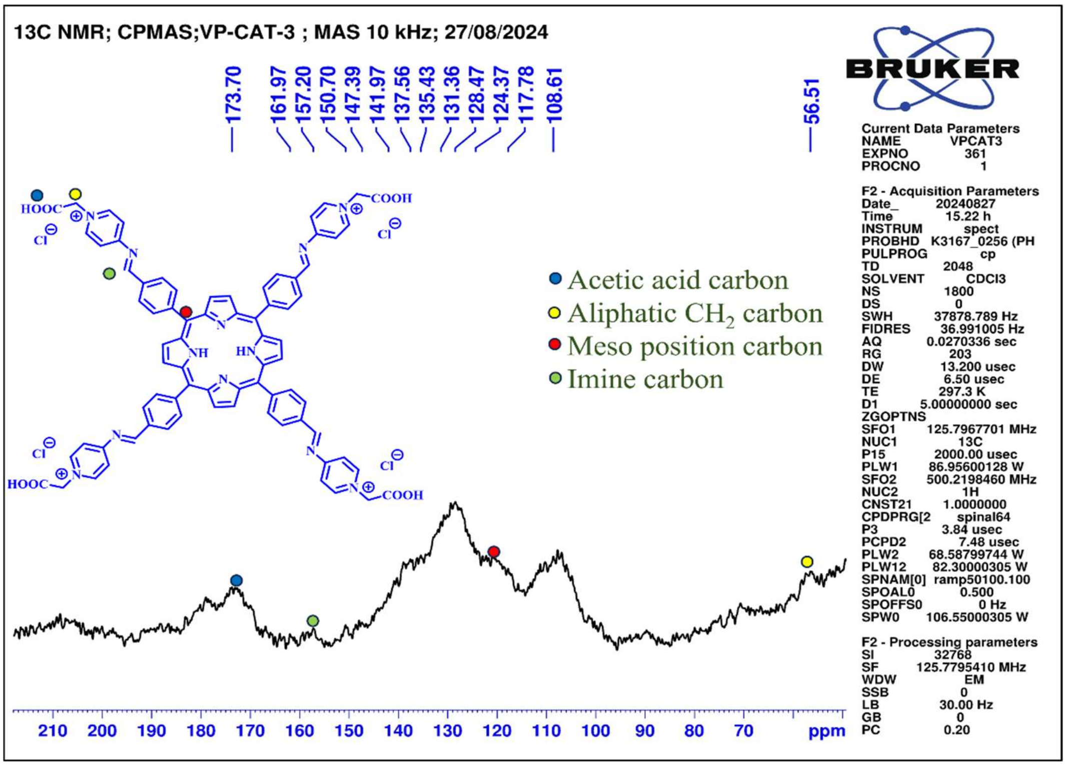


Fig. S2. ^{13}C NMR Spectrum of PCFPc photocatalyst

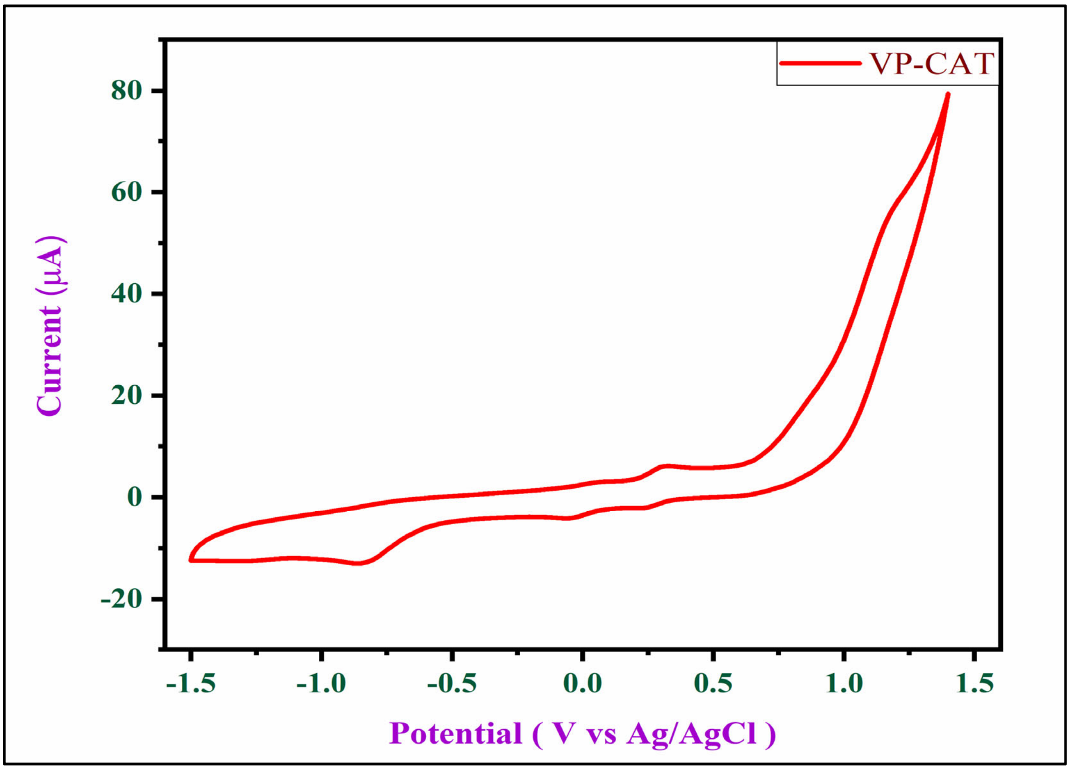


Fig. S3. CV of PCFPc photocatalyst

Table S.2

Electrochemical onset potentials and electronic energy levels of PCFPc Photocatalyst.

Compound	E_{ox}^{onset}/V	E_{red}^{onset}/V	E_{HOMO}/eV	E_{LUMO}/eV	E_g^{ec}/V
PCFPc	1.18	-0.86	6.223	4.213	2.01

E_{HOMO} = - [$E_{ox\ vs.\ Fc}$ + 5.043] eV, E_{LUMO} = - [$E_{red\ vs.\ Fc}$ + 5.043] eV, E_g^{ec}/V = E_{LUMO} - E_{HOMO}

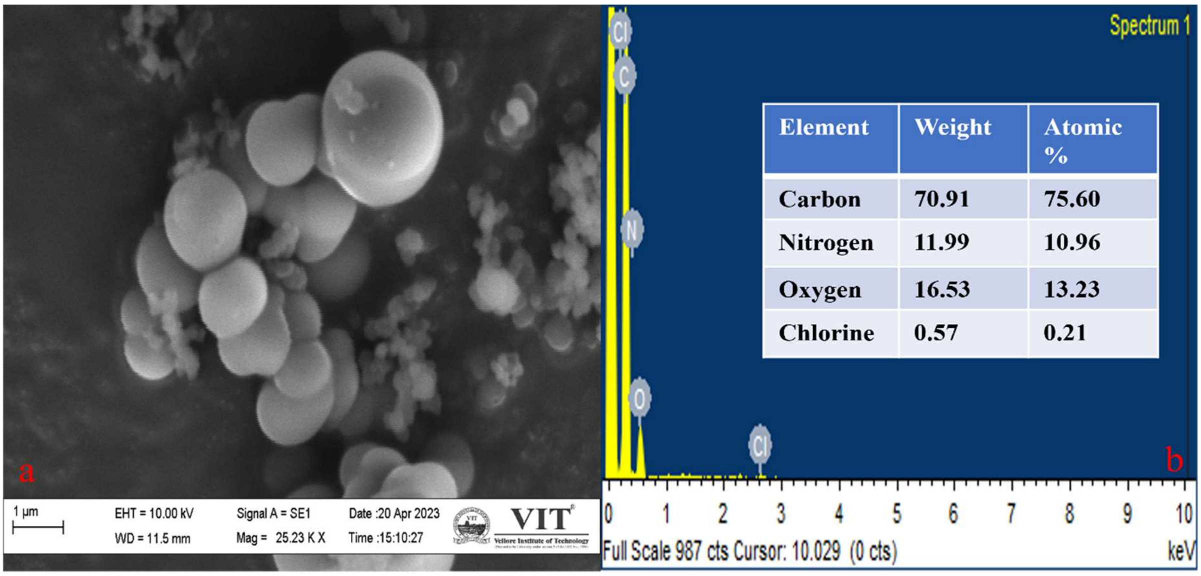


Fig. S4. a. SEM images of PCFPc photocatalyst b. EDAX of PCFPc photocatalyst

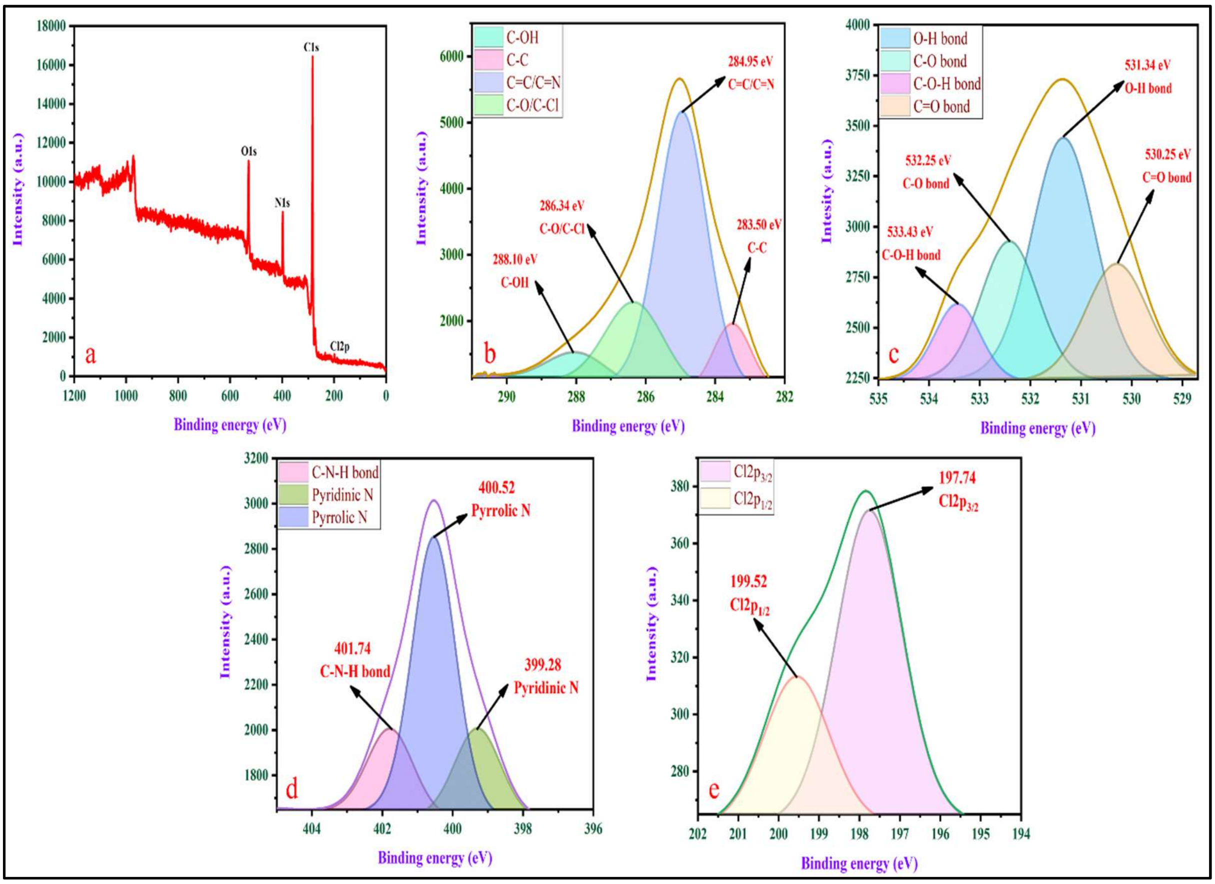


Fig. S5. a) XPS Survey of PCFPc Photocatalyst b) High resolve XPS Spectrum of C1s of PCFPc photocatalyst c) High resolve XPS Spectrum of O1s of PCFPc photocatalyst d) High-resolve XPS Spectrum of N1s of PCFPc photocatalyst e) High-resolve XPS Spectrum of Cl2p of PCFPc photocatalyst.

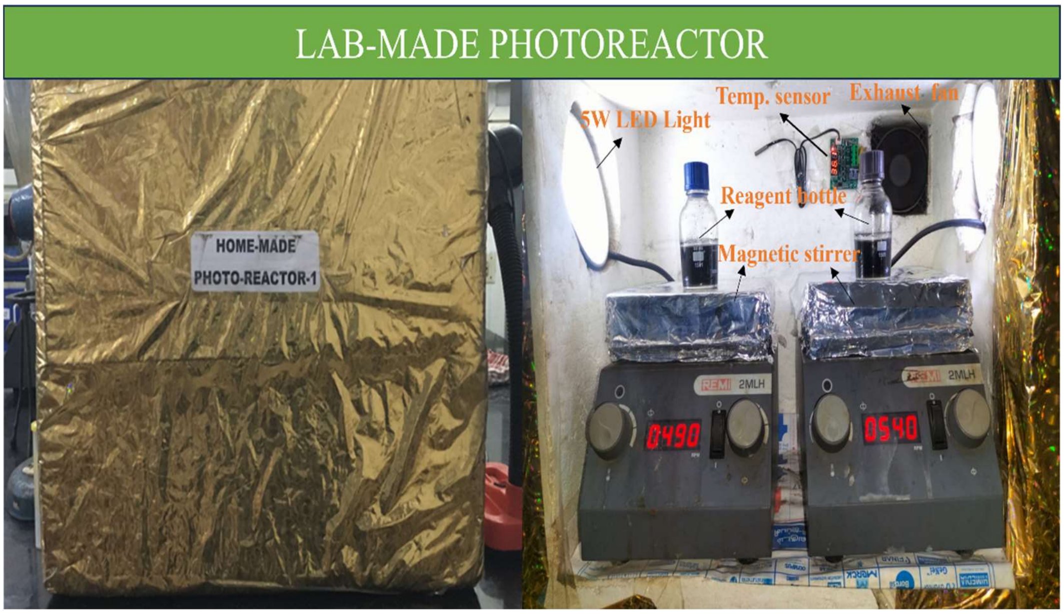


Fig. S6. Lab-made photoreactor (Outer View and Inner View)

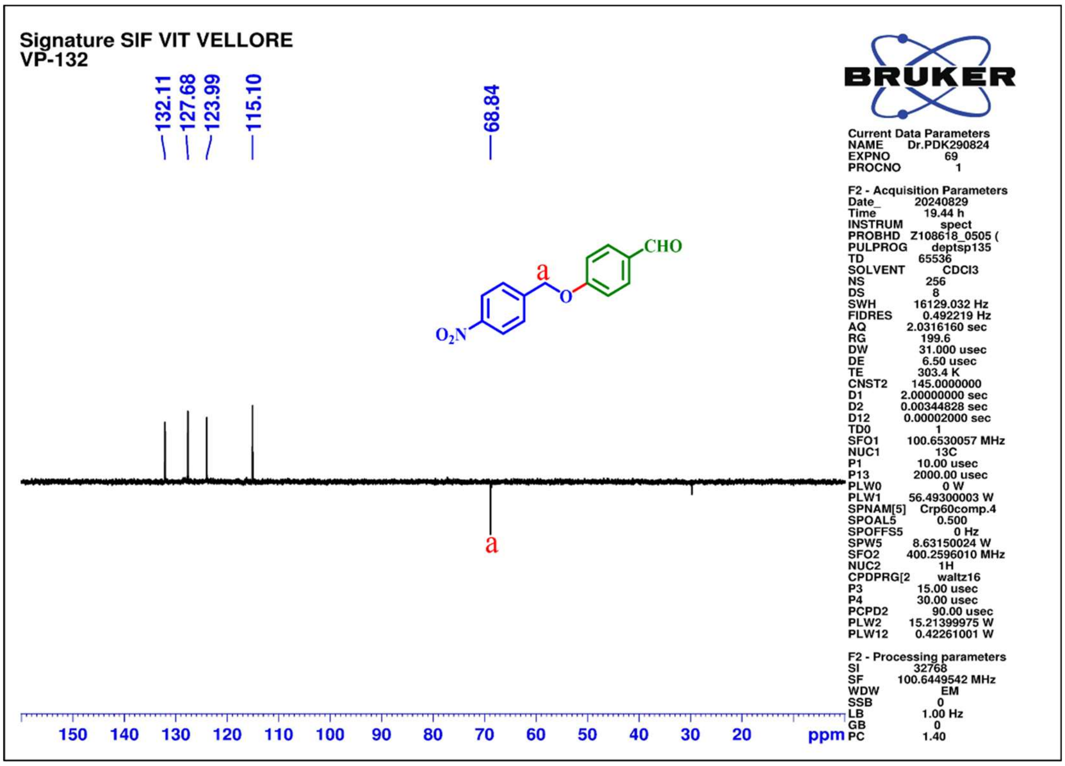


Fig. S7. DEPT-135 NMR Spectrum of 4-((4-nitrobenzyl)oxy)benzaldehyde

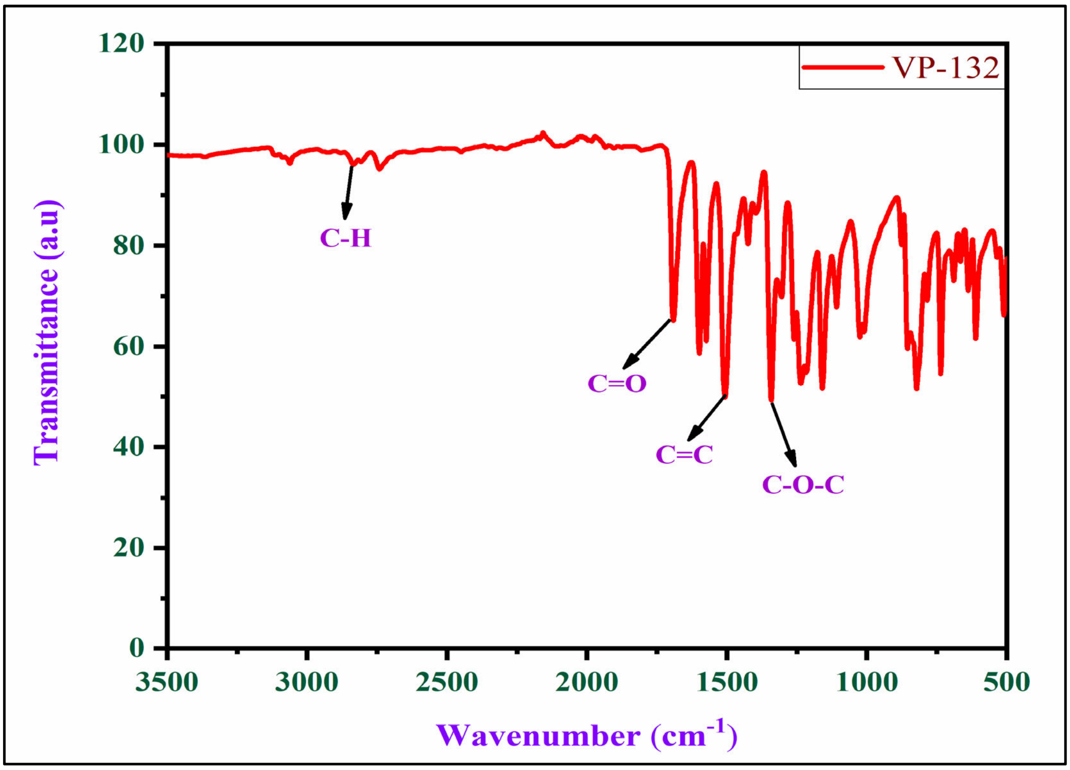


Fig. S8. FT-IR Spectrum of 4-((4-nitrobenzyl)oxy)benzaldehyde

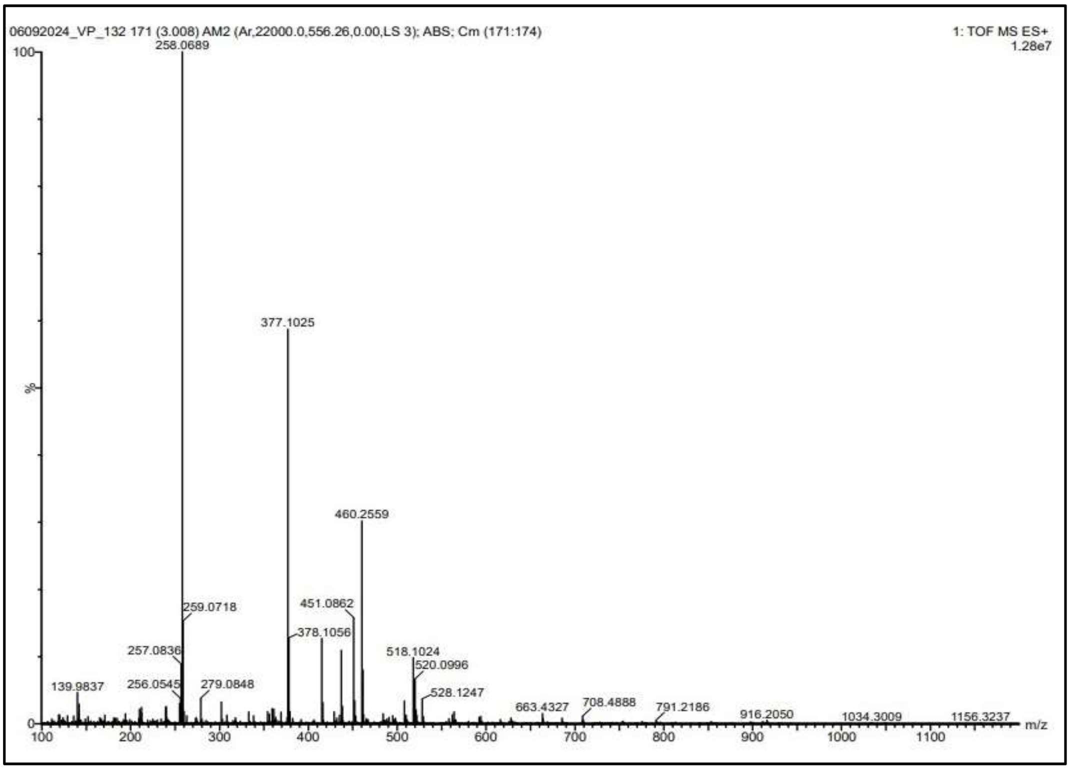


Fig. S9. HR-MS Spectrum of 4-((4-nitrobenzyl)oxy)benzaldehyde

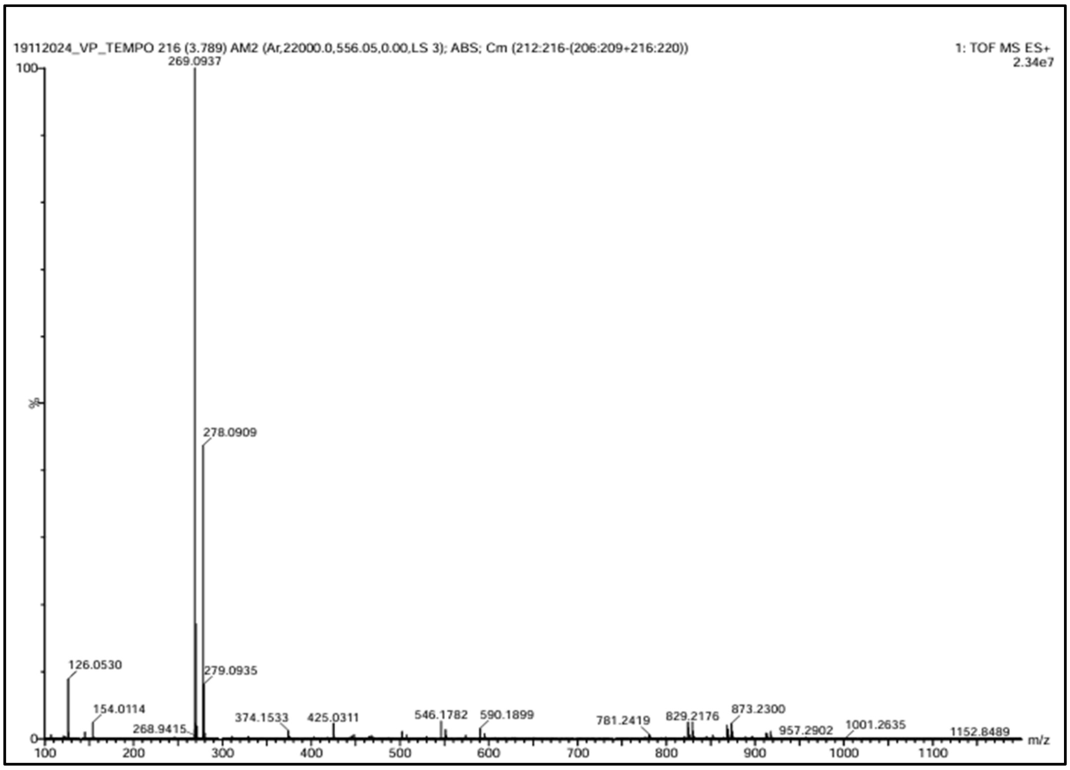


Fig. S10. HR-MS Spectrum of Tempo

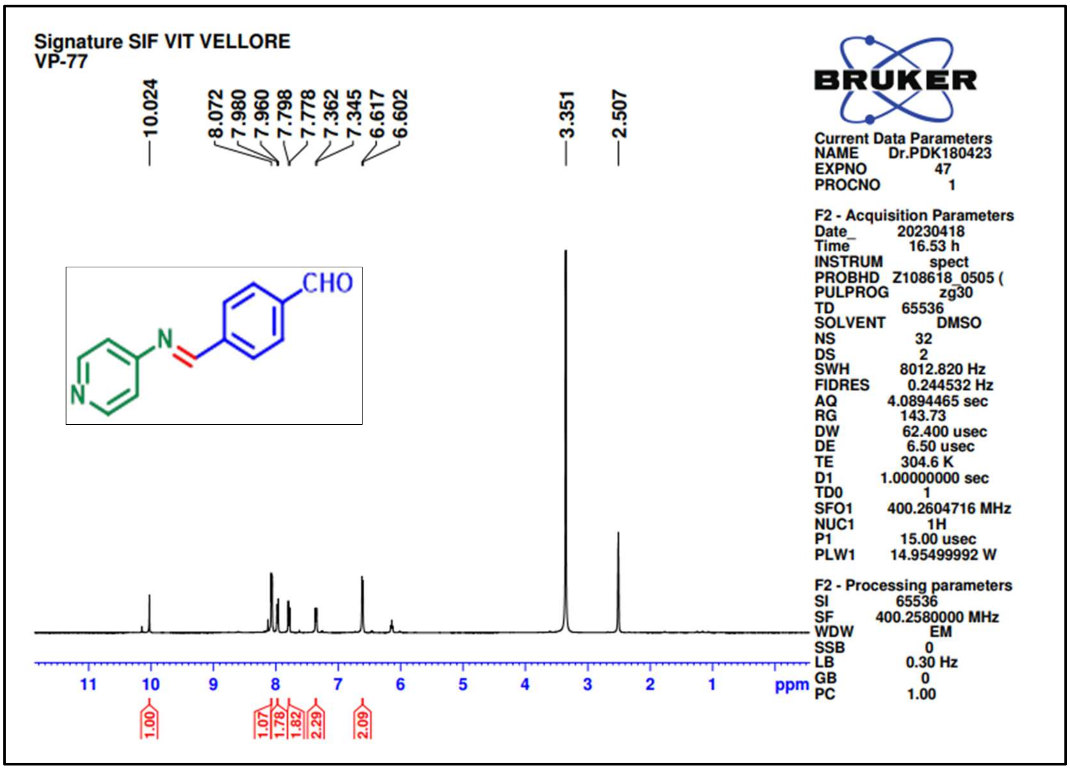


Fig. S11. [1]H NMR spectrum of (E)-4-((pyridine-4-ylimino) methyl) benzaldehyde (1A)

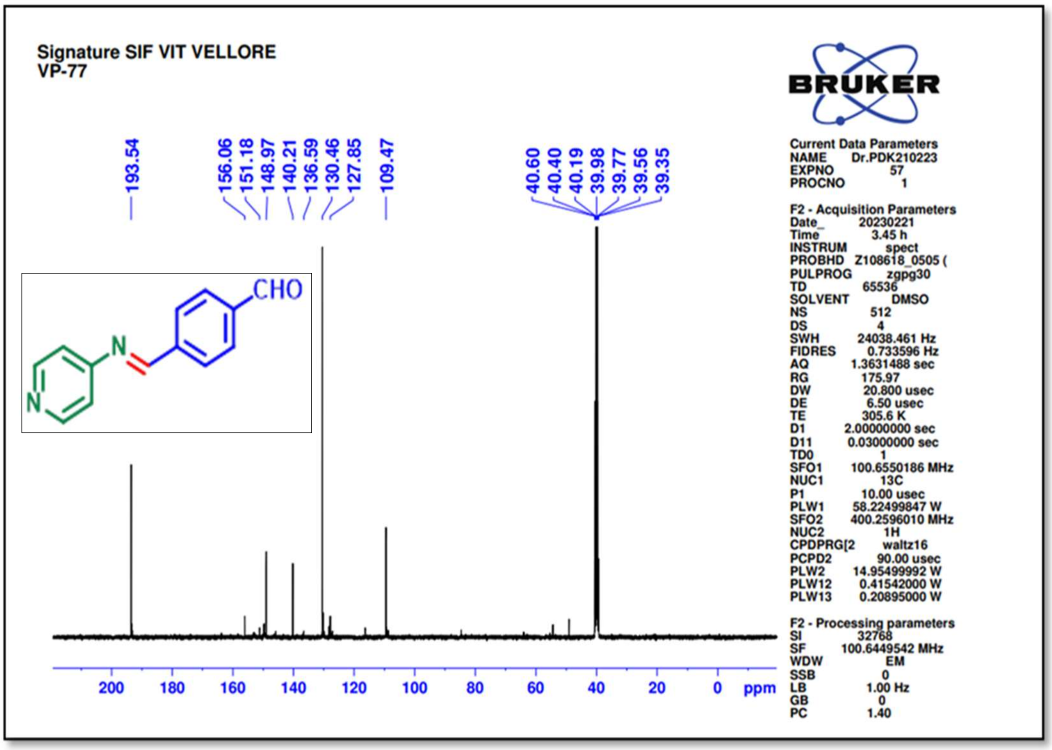


Fig. S12. ^{13}C NMR spectrum of (E)-4-((pyridine-4-ylimino) methyl) benzaldehyde (1A)

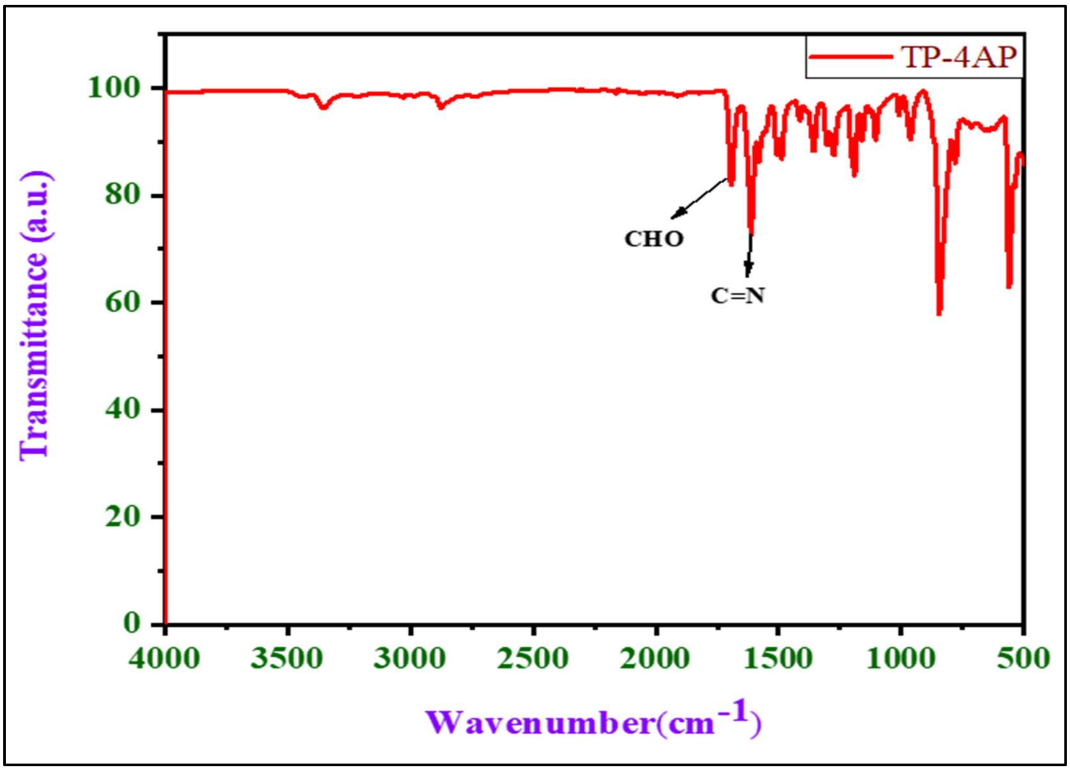


Fig. S13. FT-IR spectrum of (E)-4-((pyridine-4-ylimino) methyl) benzaldehyde (1A)

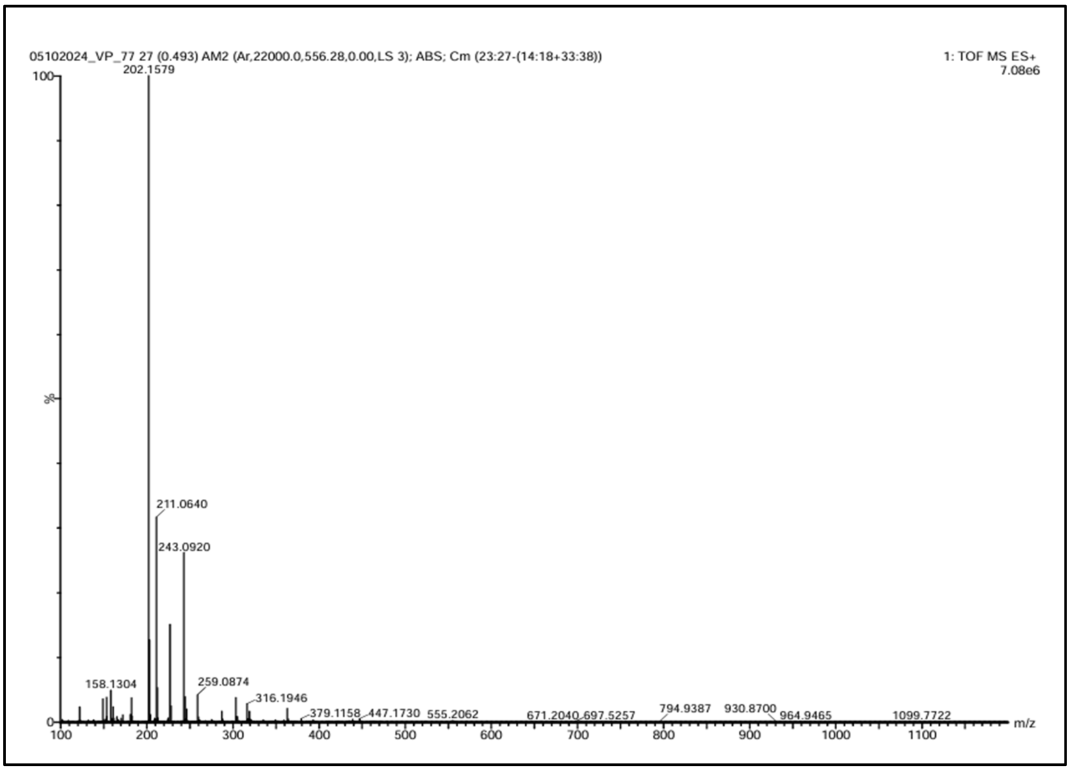


Fig. S14. HR-MS spectrum of (E)-4-((pyridine-4-ylimino) methyl) benzaldehyde (1A

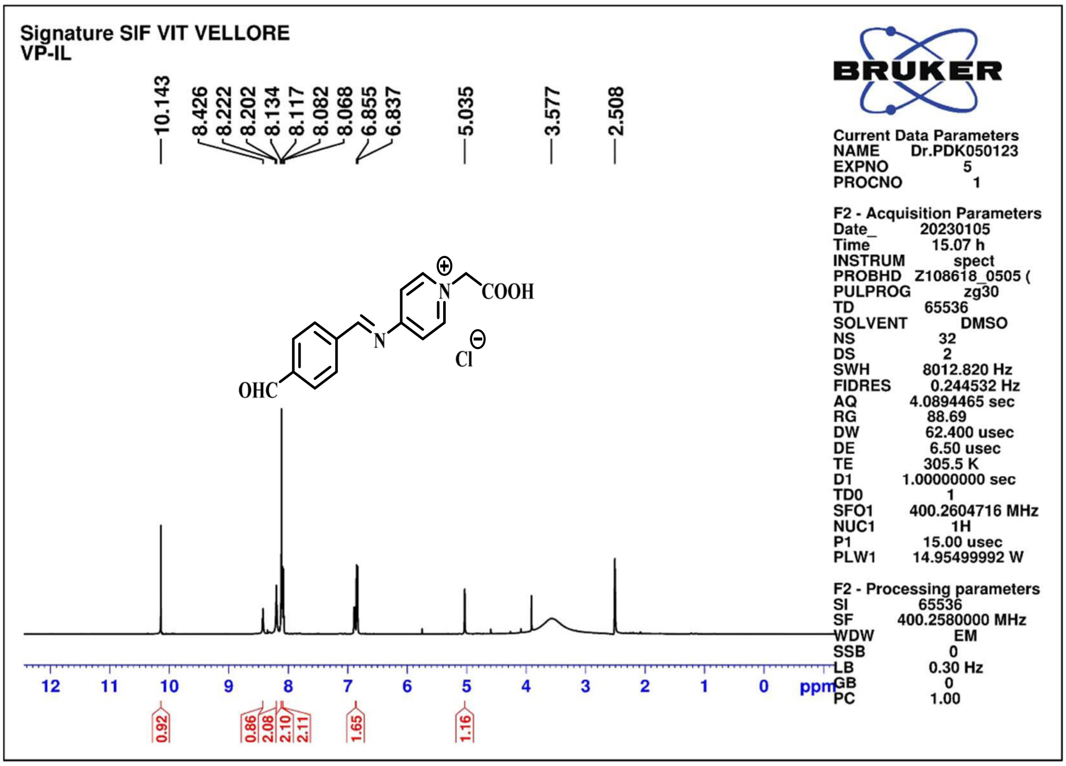


Fig. S15. [1]H NMR spectrum of 4-((4-formylbenzylidene)amino)-1-sulfopyridin-1-ium chloride(1B)

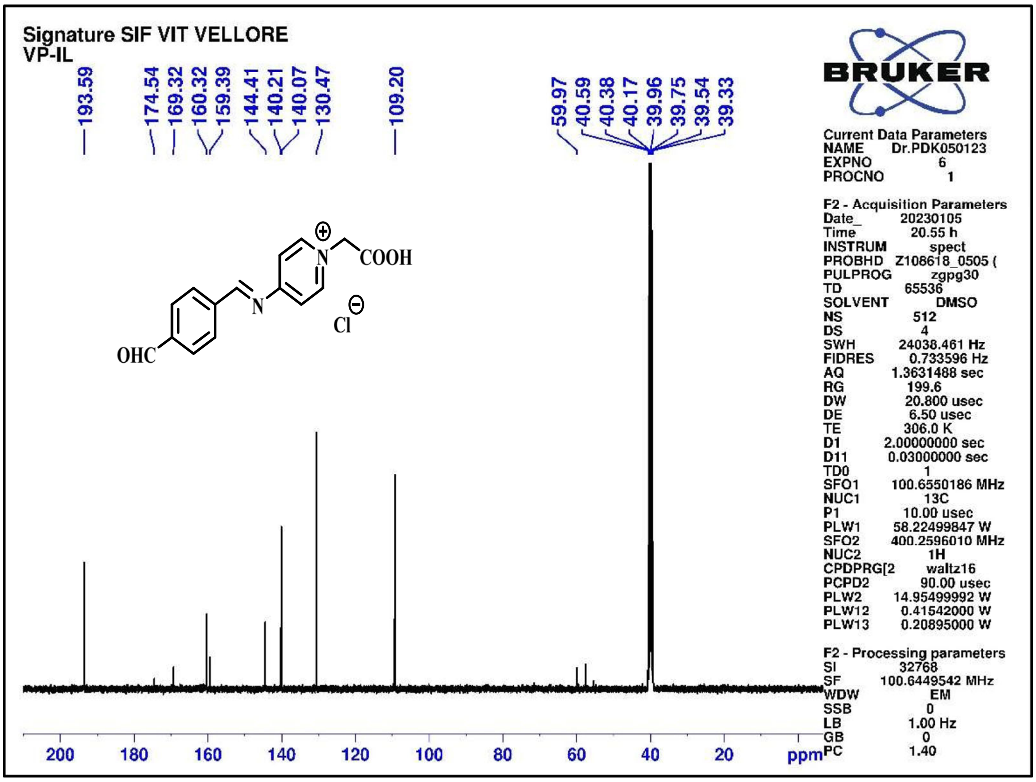


Fig.S16. ^{13}C NMR spectrum of 4-((4-formylbenzylidene)amino)-1-sulfopyridin-1-ium chloride(1B)

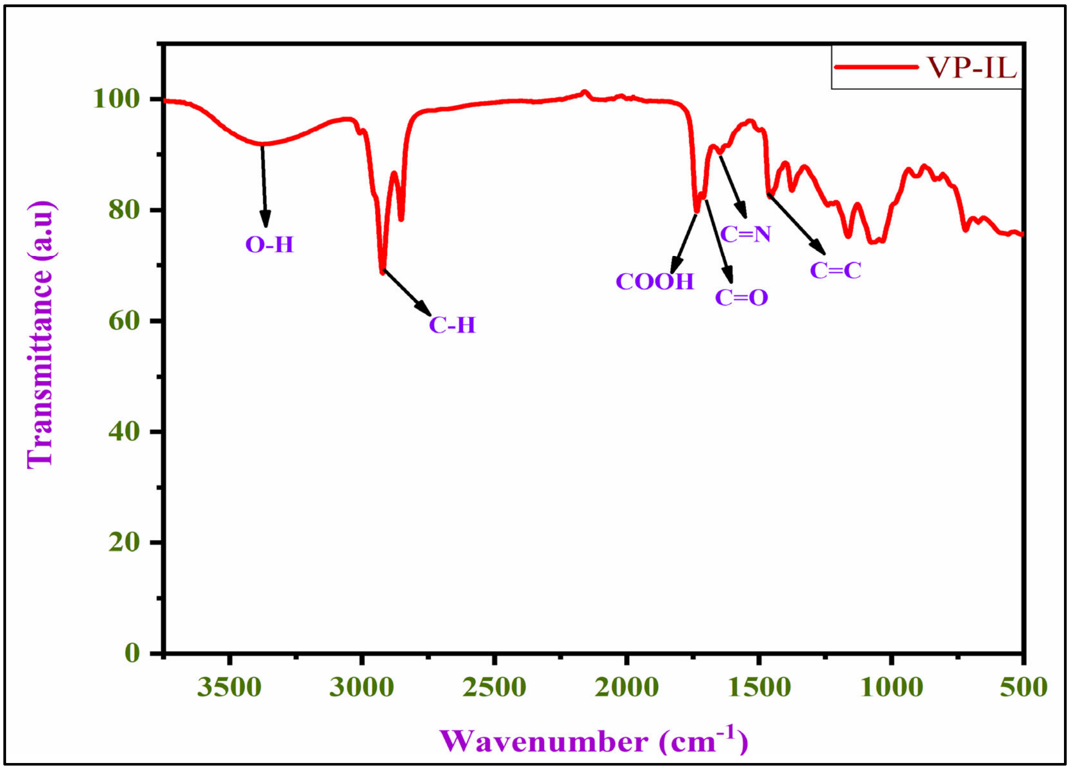


Fig. S17. FT-IR spectrum 1-(carboxymethyl)-4-((4-formylbenzylidene)amino)pyridin-1-ium chloride (1B)

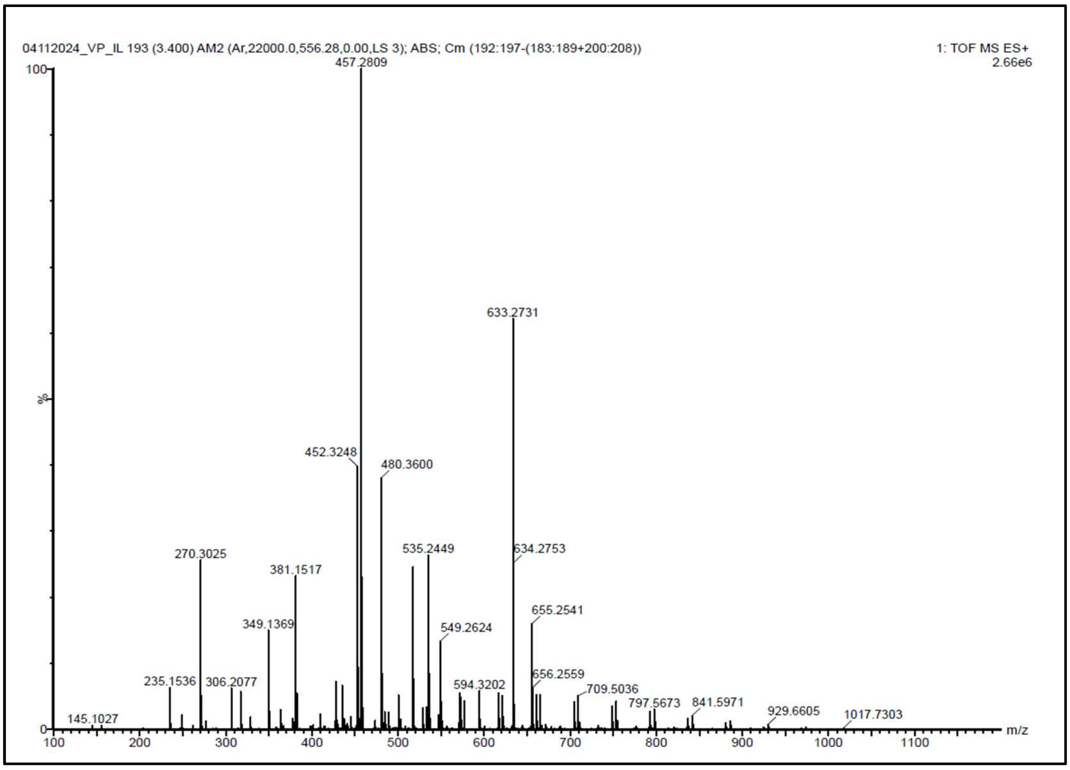


Fig. S18. HR-MS spectrum of 1-(carboxymethyl)-4-((4-formylbenzylidene)amino)pyridin-1-ium chloride (1B)

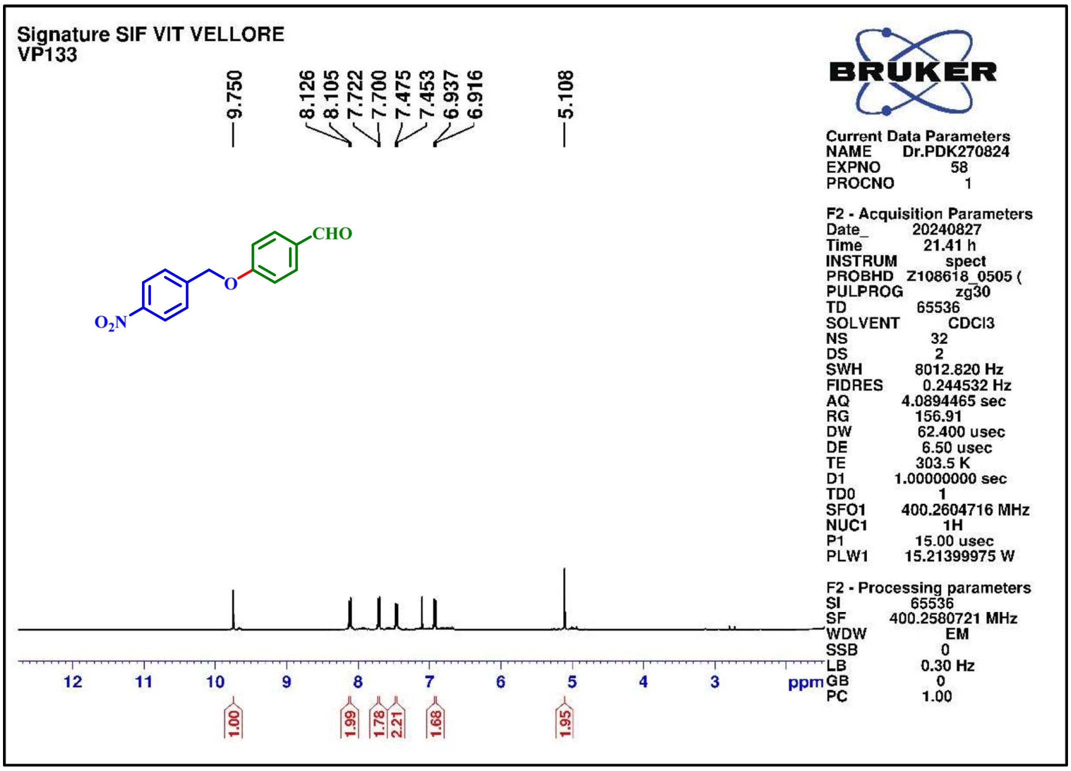


Fig. S19. ^{1}H NMR spectrum of 4-((4-nitrobenzyl)oxy)benzaldehyde

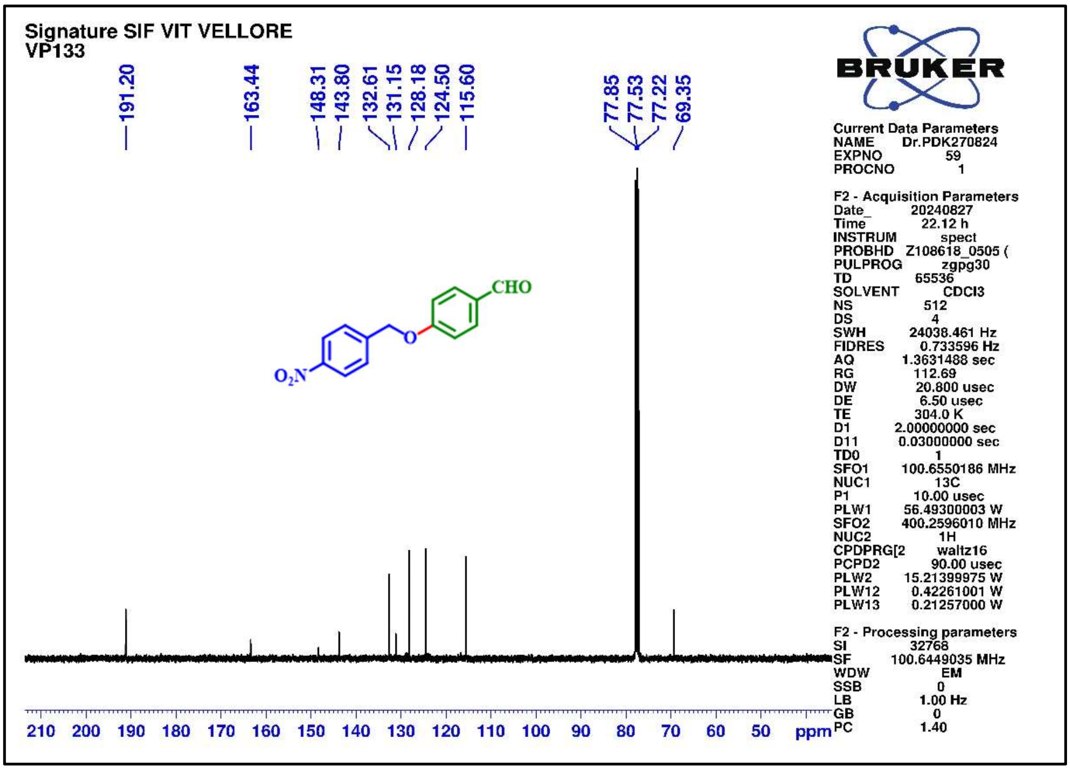


Fig. S20. ^{13}C NMR spectrum of 4-((4-nitrobenzyl)oxy)benzaldehyde

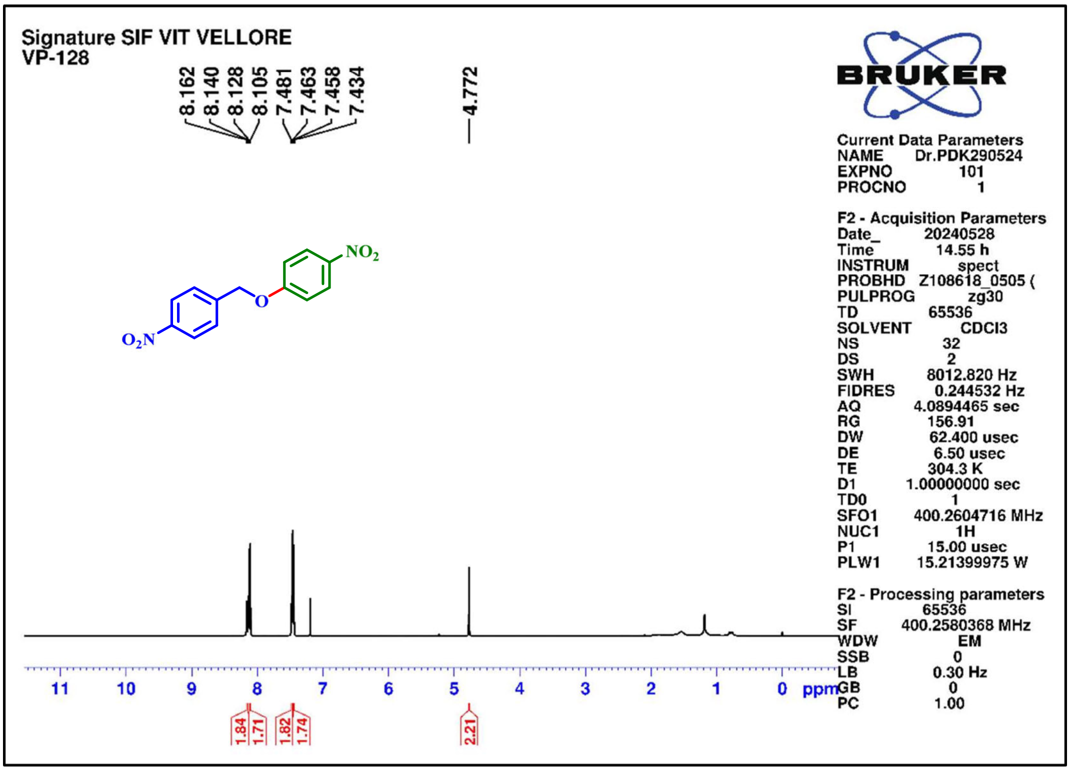


Fig. S21. ^{1}H NMR spectrum of 1-nitro-4-((4-nitrobenzyl)oxy)benzene

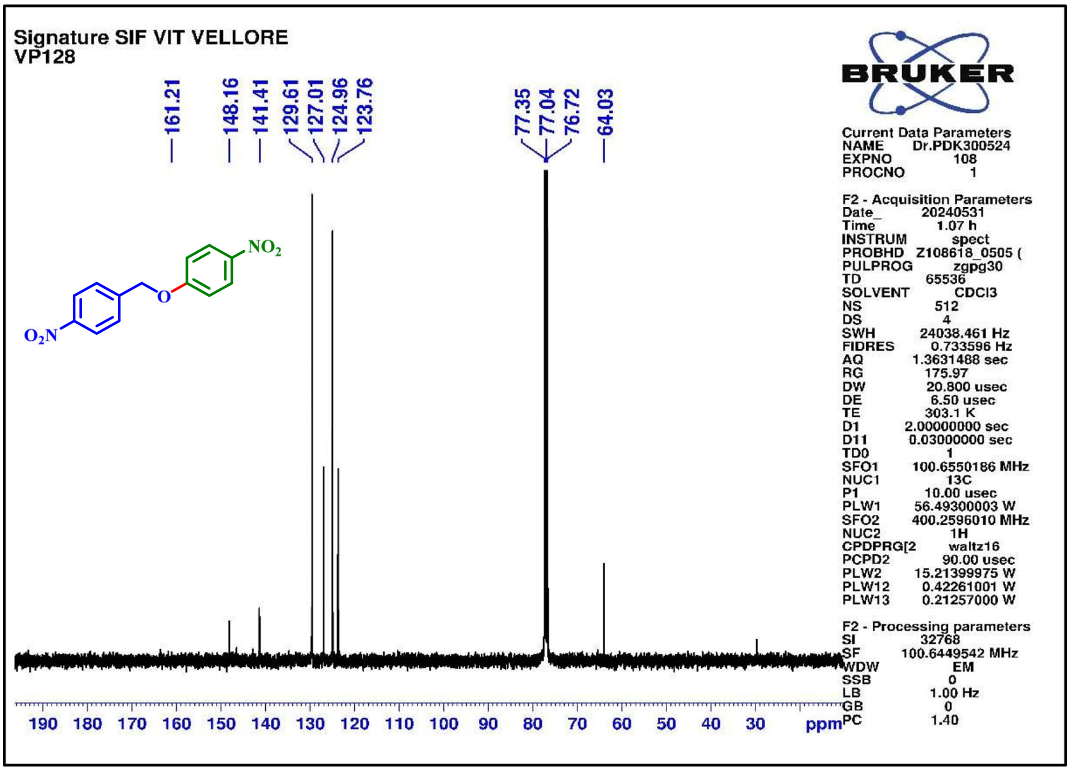


Fig S22. [13]C NMR spectrum of 1-nitro-4-((4-nitrobenzyl)oxy)benzene

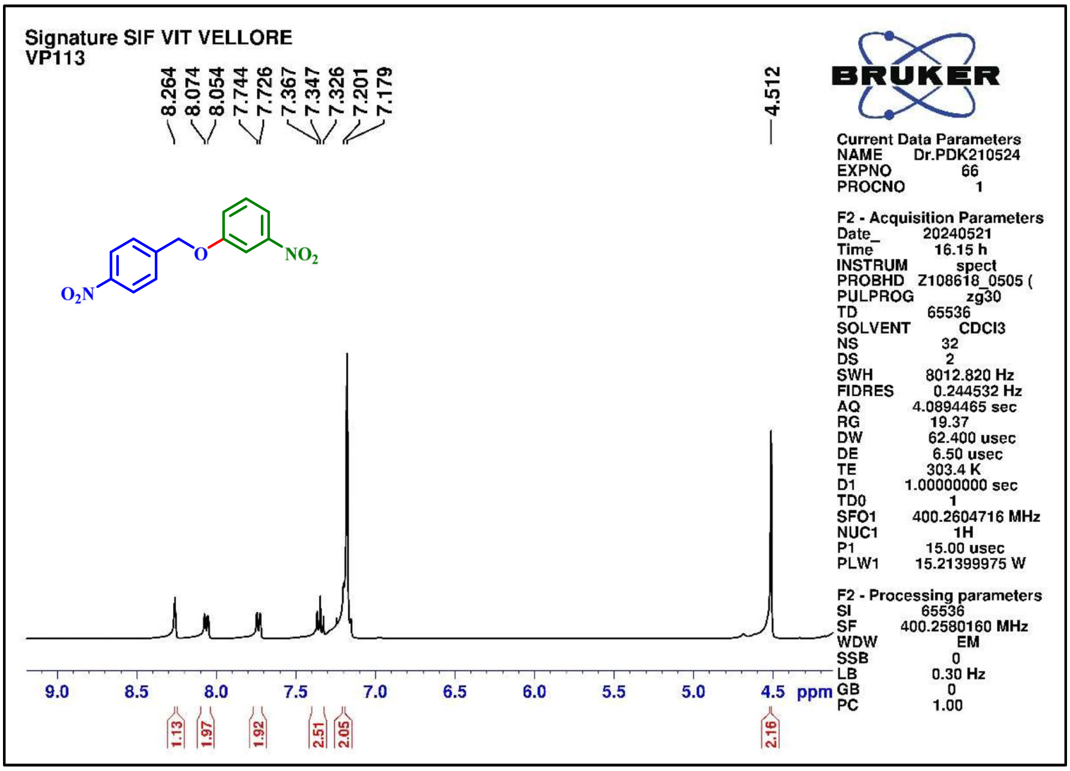


Fig. S23. [1]H NMR spectrum of 1-nitro-3-((4-nitrobenzyl)oxy)benzene

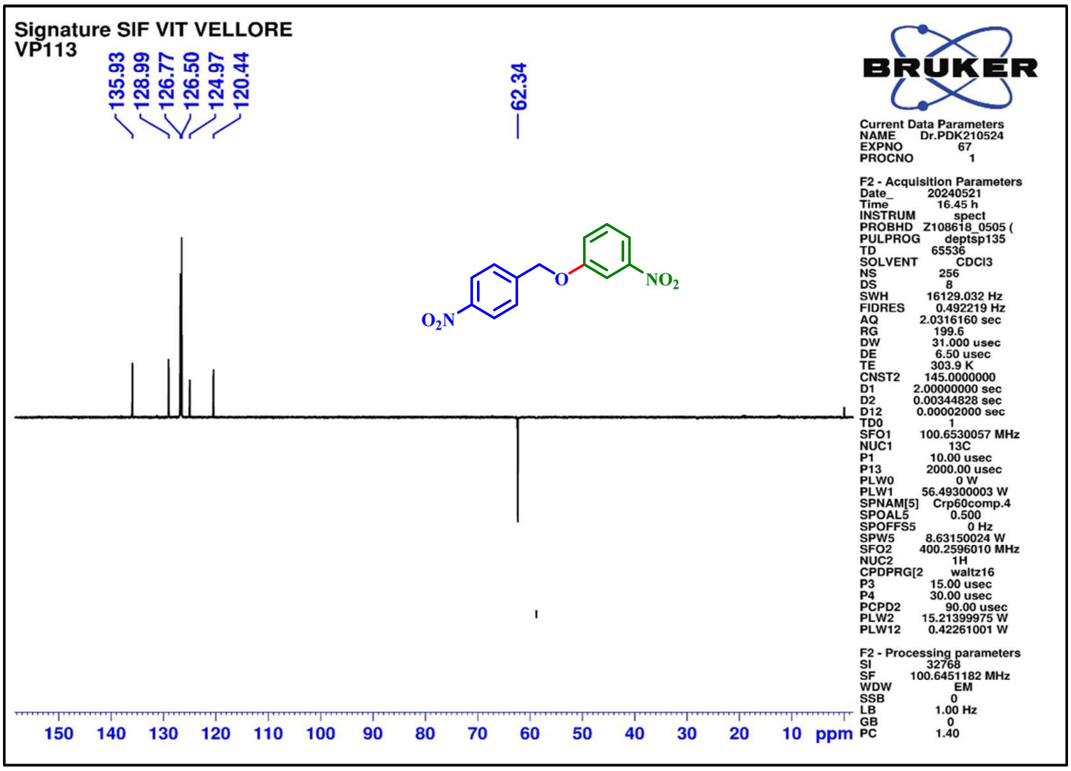


Fig. S24. DEPT-135 spectrum of 1-nitro-3-((4-nitrobenzyl)oxy)benzene

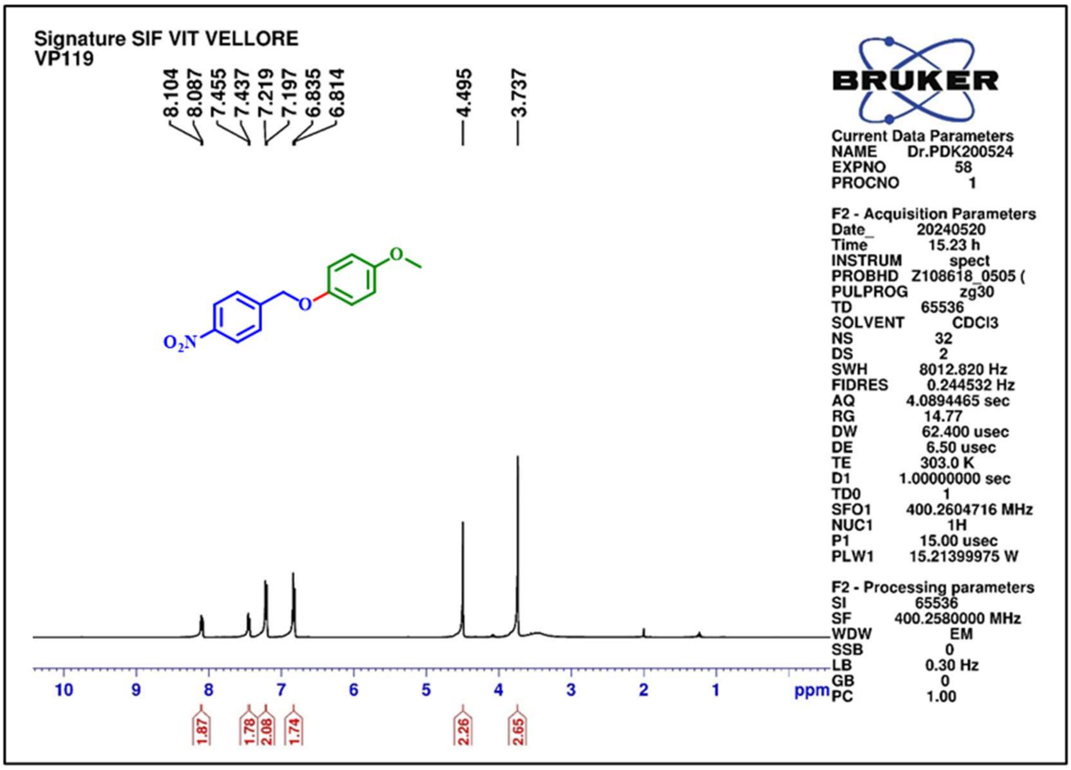


Fig. S25. [1]H NMR spectrum of 1-methoxy-4-((4-nitrobenzyl)oxy)benzene

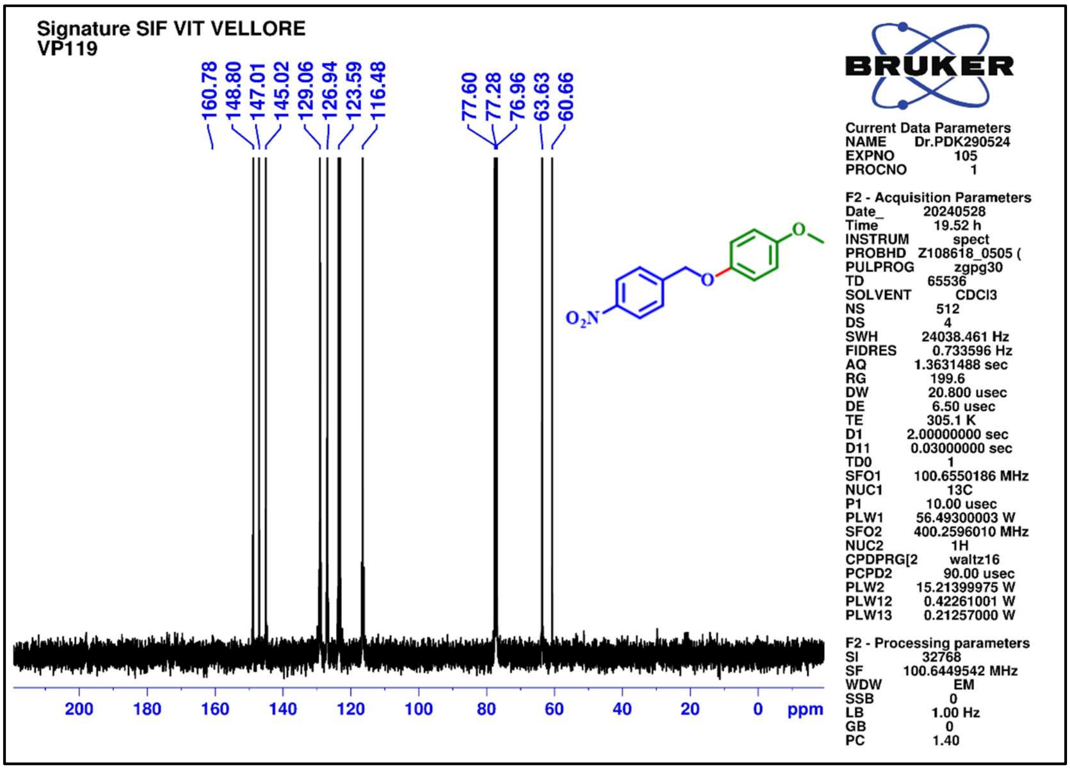


Fig. S26. ^{13}C NMR spectrum of 1-methoxy-4-((4-nitrobenzyl)oxy)benzene

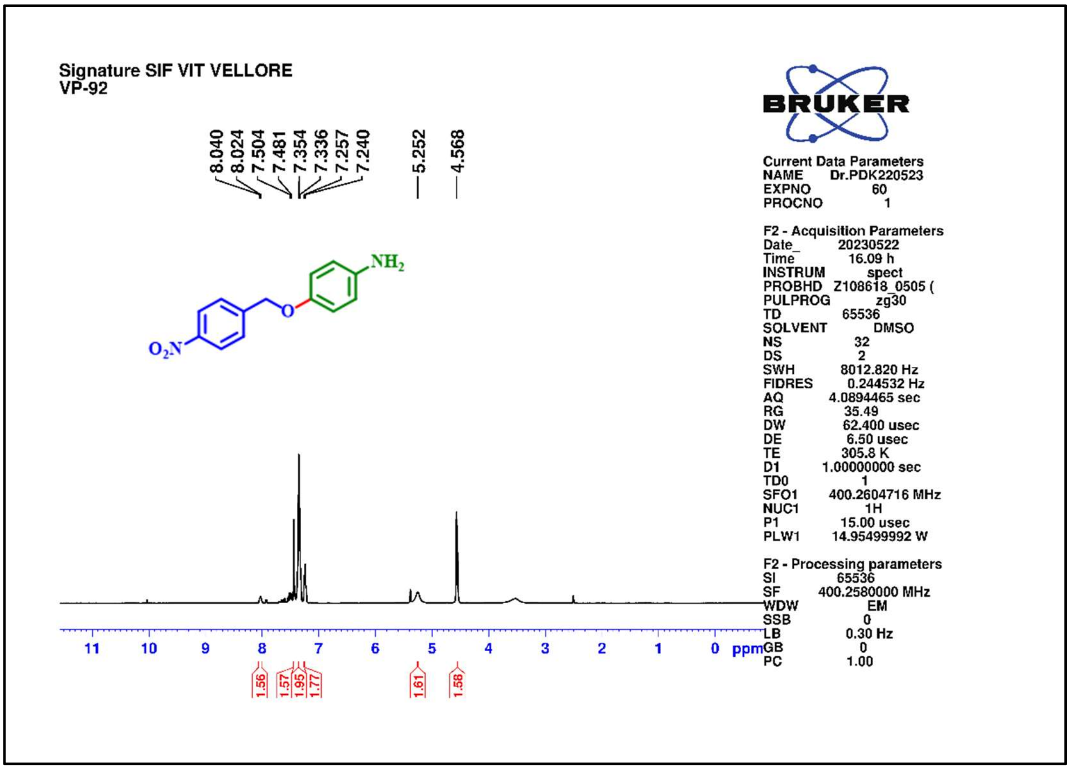


Fig. S27. ^{1}H NMR spectrum of 4-((4-nitrobenzyl)oxy)aniline

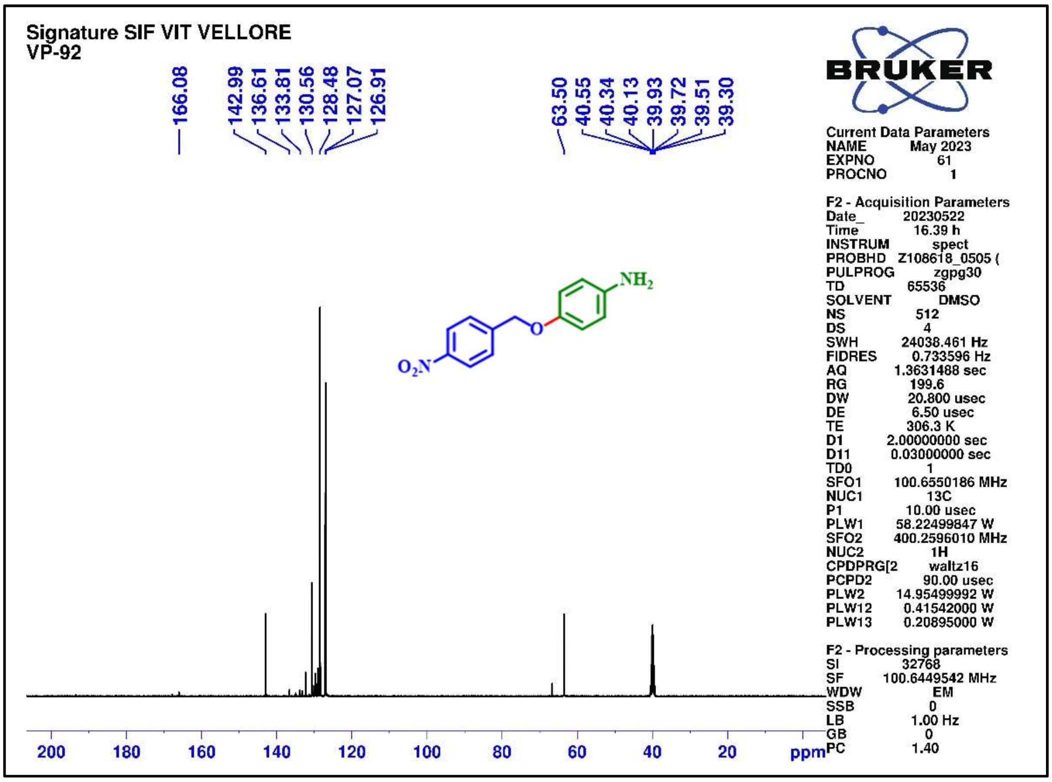


Fig. S28. ^{13}C NMR spectrum of 4-((4-nitrobenzyl)oxy)aniline

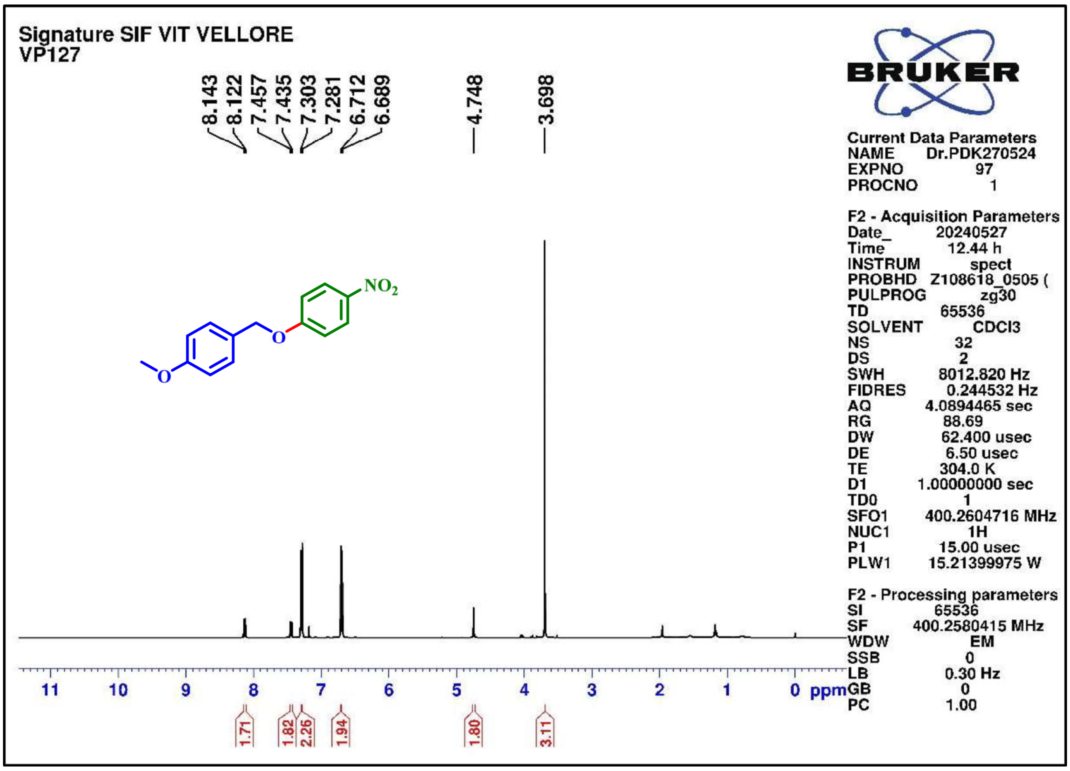


Fig. S29. ^{1}H NMR spectrum of 1-methoxy-4-((4-nitrophenoxy)methyl)benzene

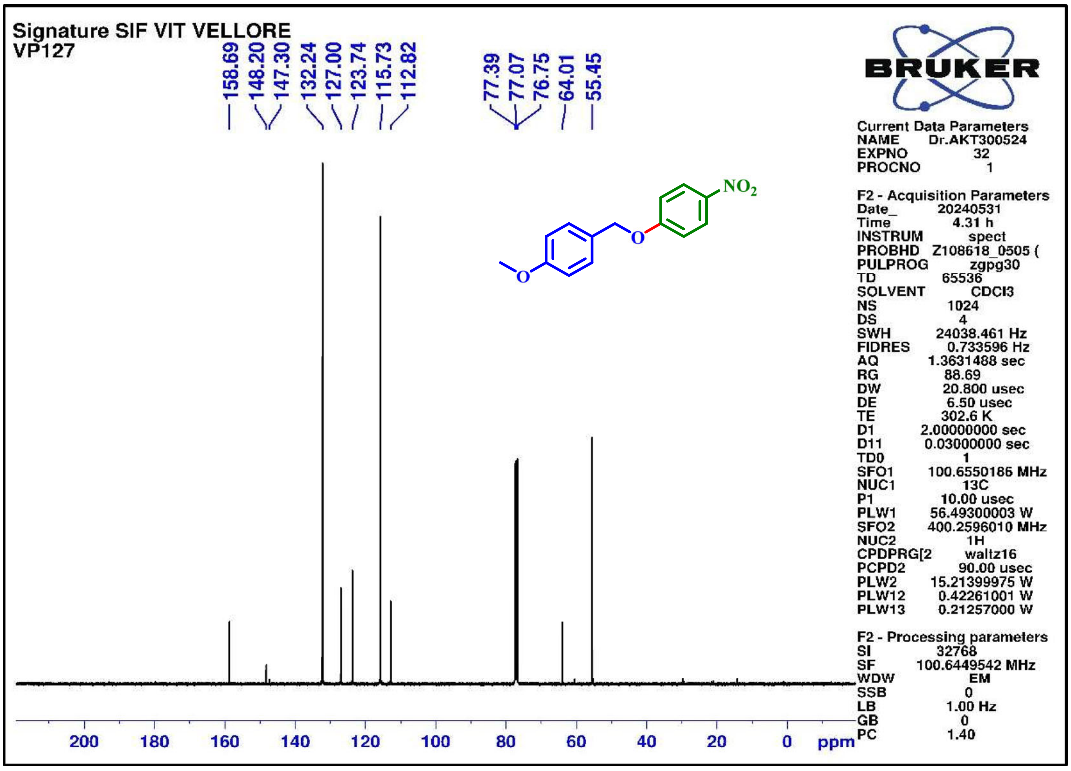


Fig. S30. ^{13}C NMR spectrum of 1-methoxy-4-((4-nitrophenoxy)methyl)benzene

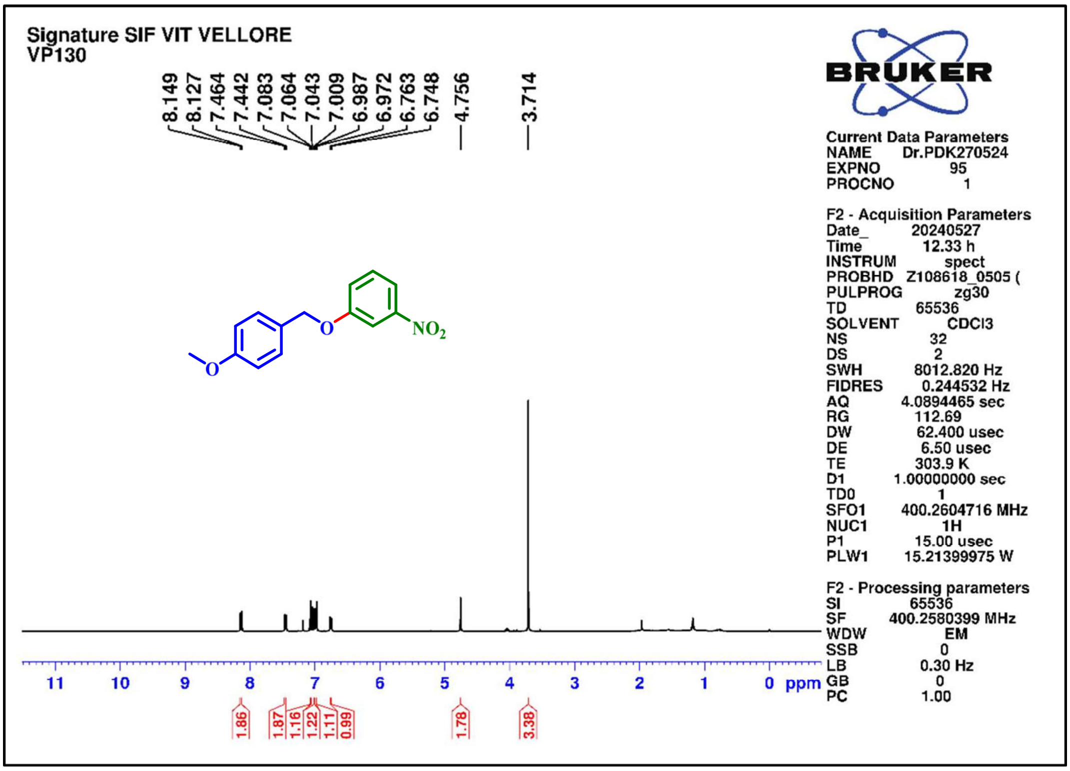


Fig. S31. [1]H NMR spectrum of 1-((4-methoxybenzyl)oxy)-3-nitrobenzene

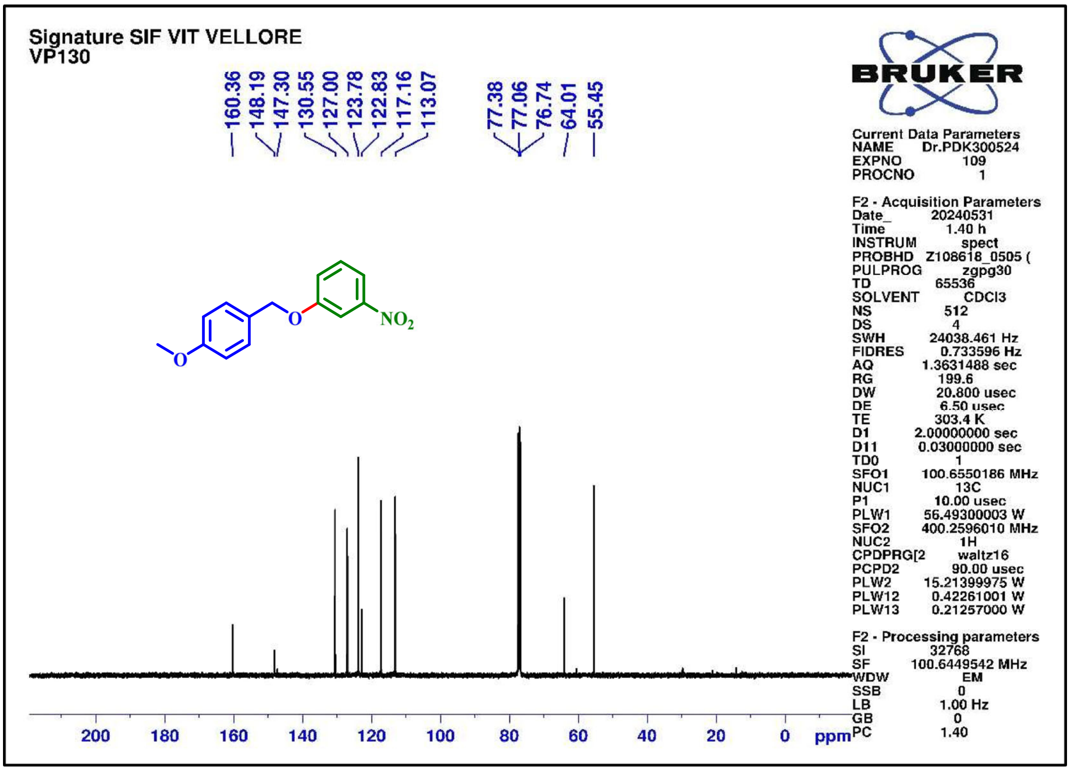


Fig. S32 [13]C NMR spectrum of 1-((4-methoxybenzyl)oxy)-3-nitrobenzene

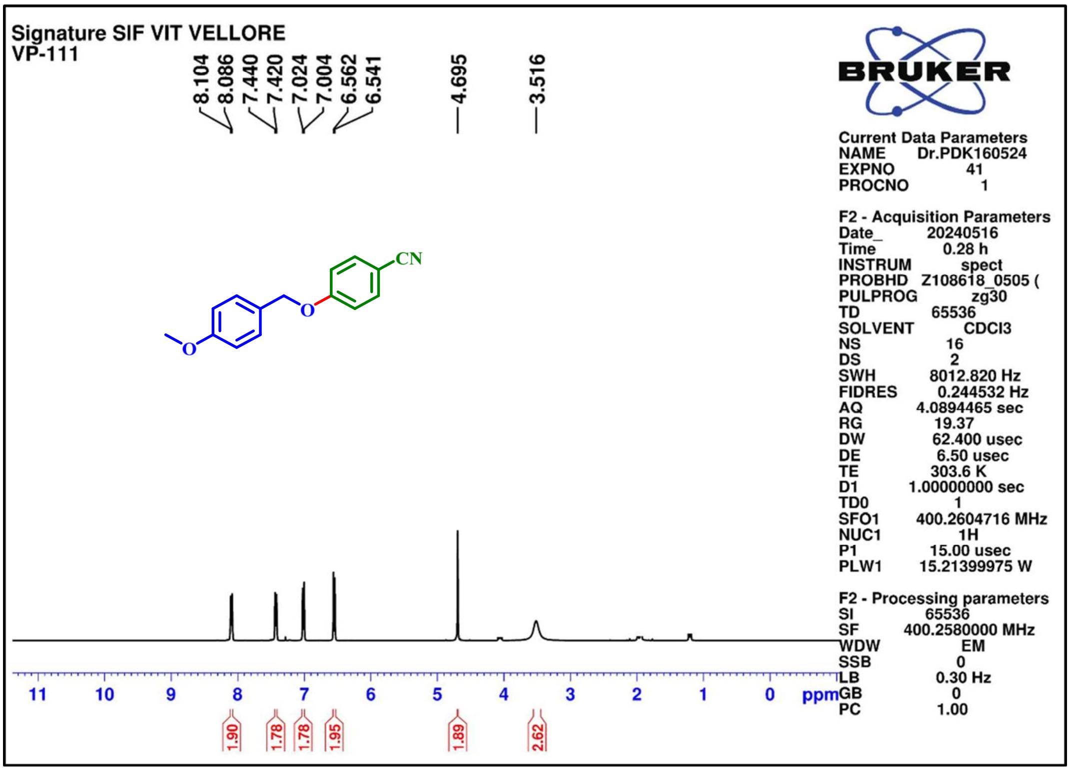


Fig. S33. ^{1}H NMR spectrum of 4-((4-methoxybenzyl)oxy)benzonitrile

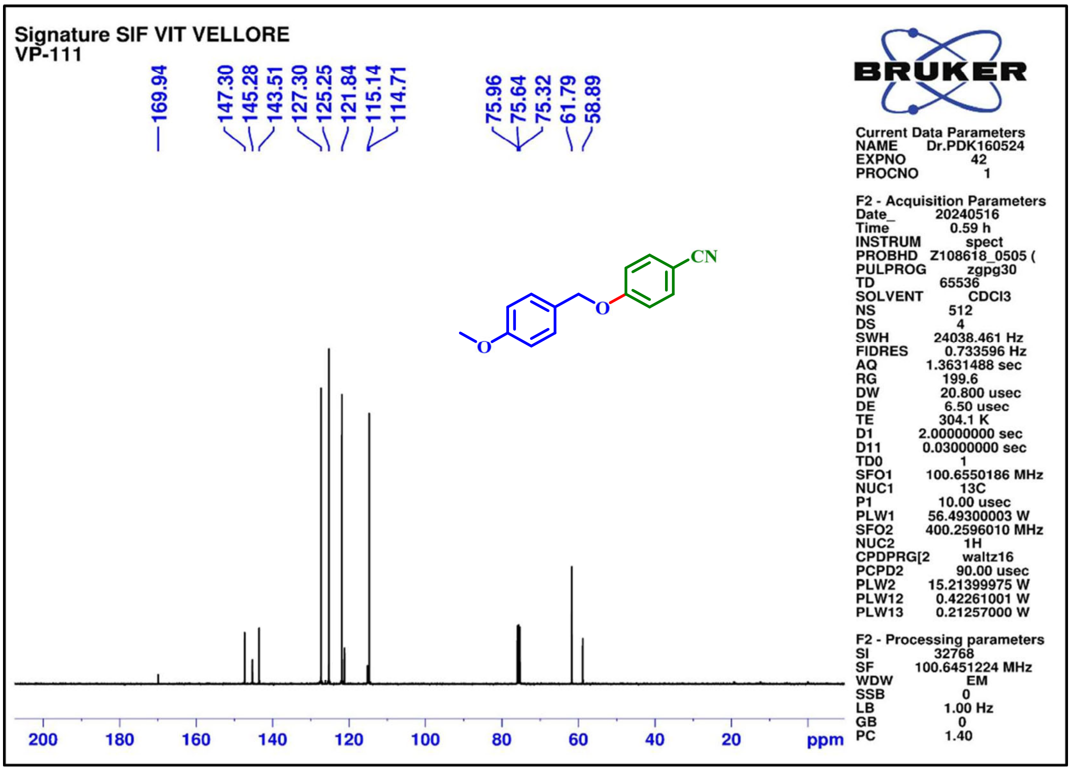


Fig. S34. ^{13}C NMR spectrum of 4-((4-methoxybenzyl)oxy)benzonitrile

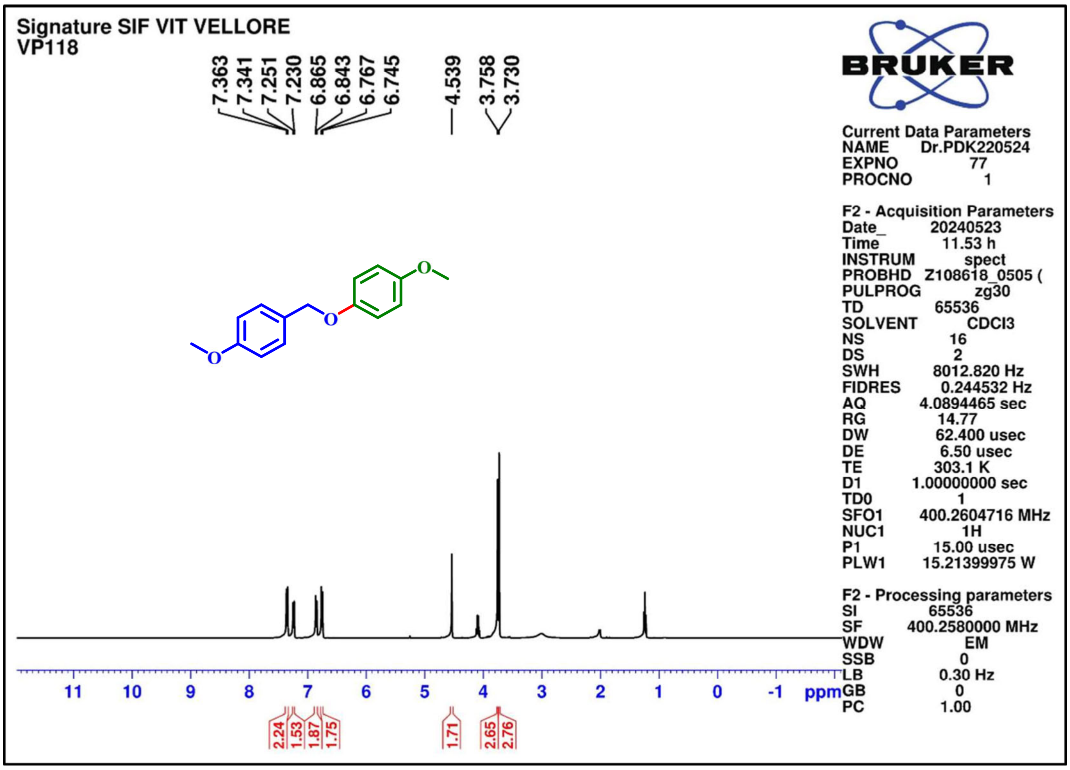


Fig. S35. ^{1}H NMR spectrum of 1-methoxy-4-((4-methoxybenzyl)oxy)benzene

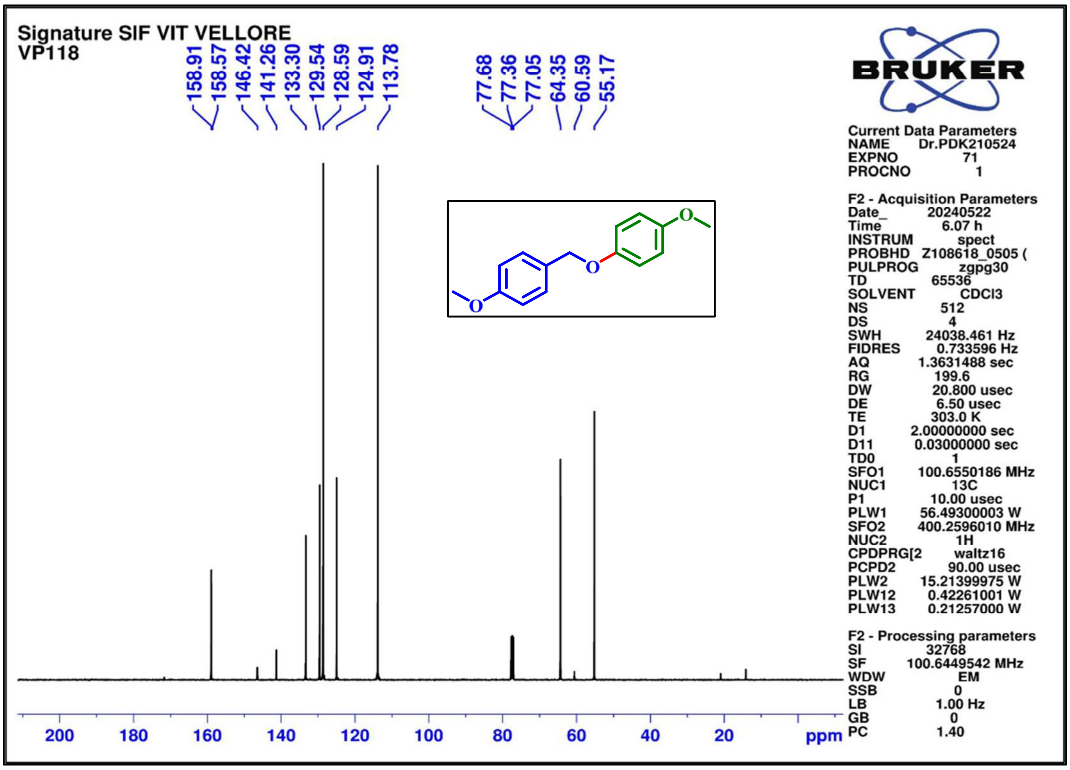


Fig. S36. ^{13}C NMR spectrum of 1-methoxy-4-((4-methoxybenzyl)oxy)benzene

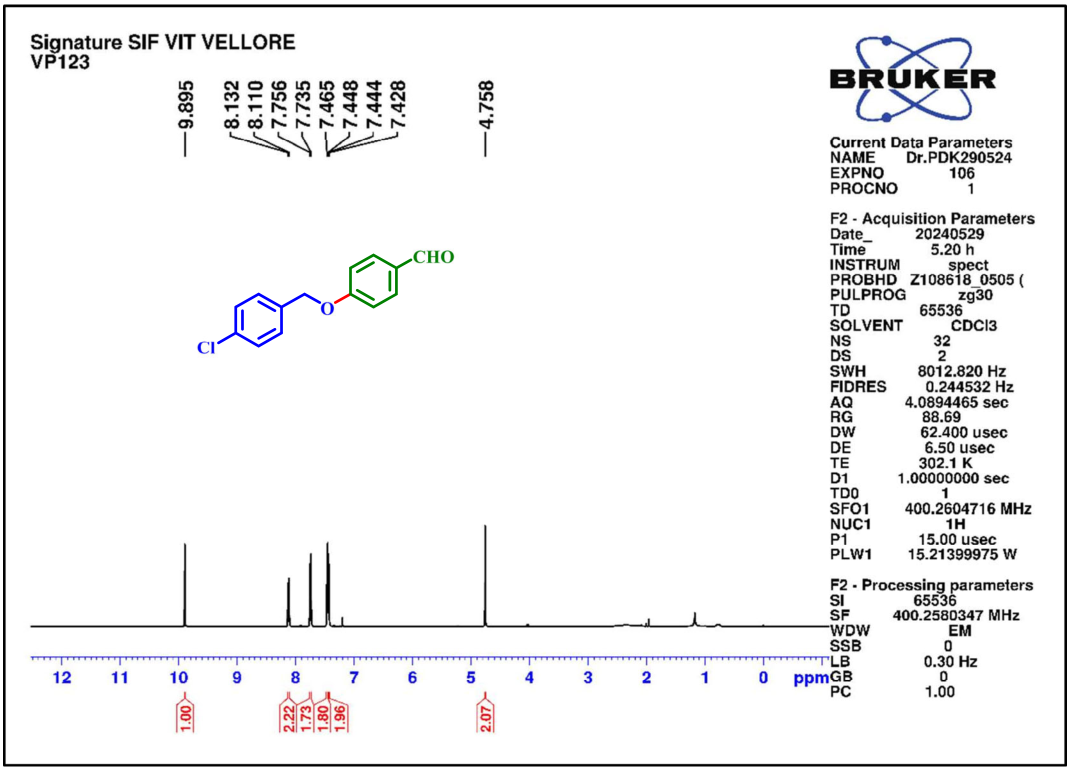


Fig. S37. ^{1}H NMR spectrum of 4-((4-chlorobenzyl)oxy)benzaldehyde

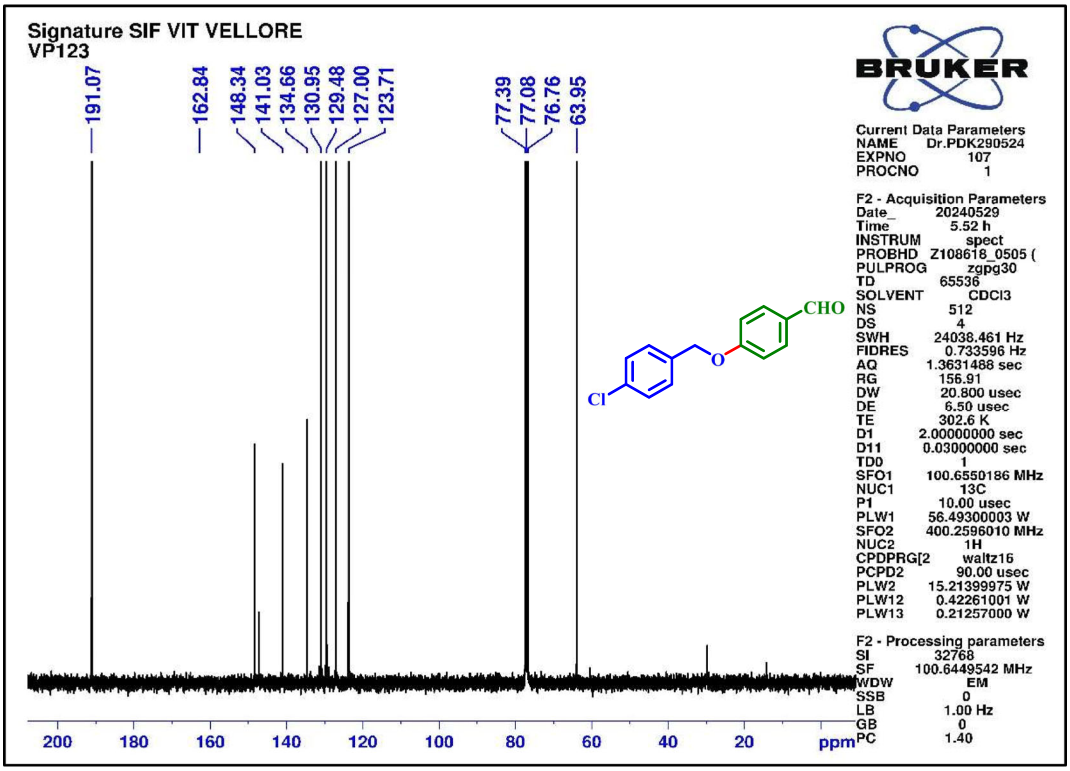


Fig. S38. ^{13}C NMR spectrum of 4-((4-chlorobenzyl)oxy)benzaldehyde

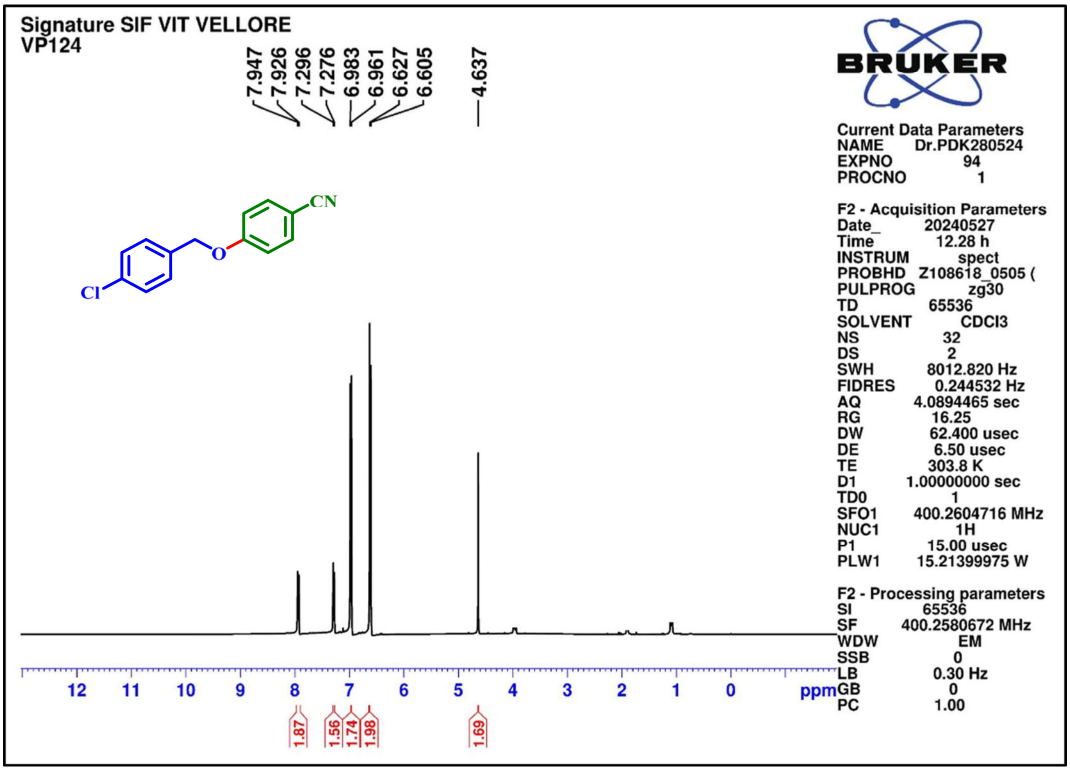


Fig. S39. ^{1}H NMR spectrum of 4-((4-chlorobenzyl)oxy)benzonitrile

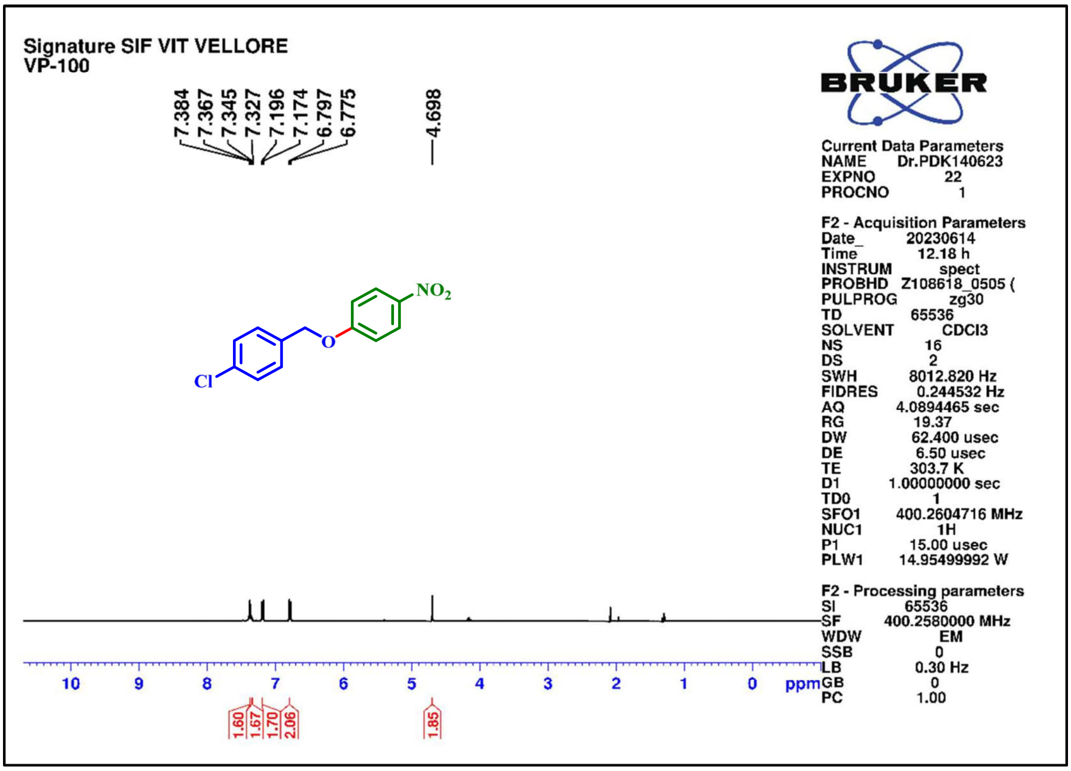


Fig. S40. ^{1}H NMR spectrum of 1-chloro-4-((4-nitrophenoxy)methyl)benzene

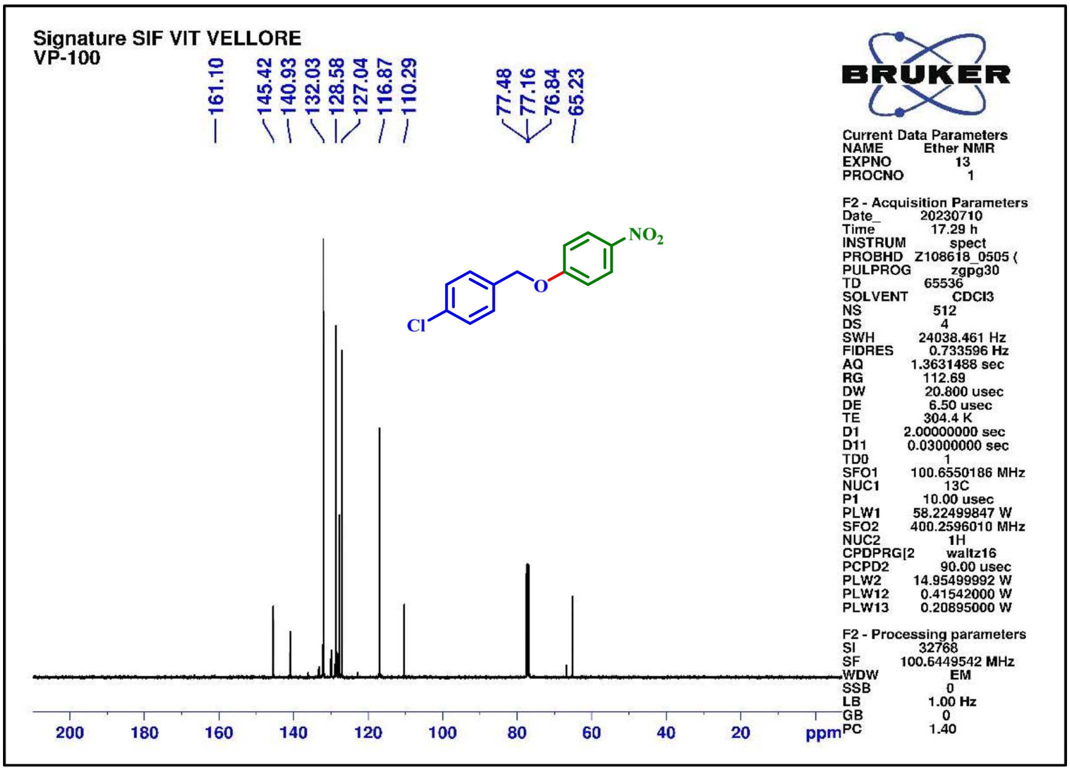


Fig. S41. ^{13}C NMR spectrum of 1-chloro-4-((4-nitrophenoxy)methyl)benzene

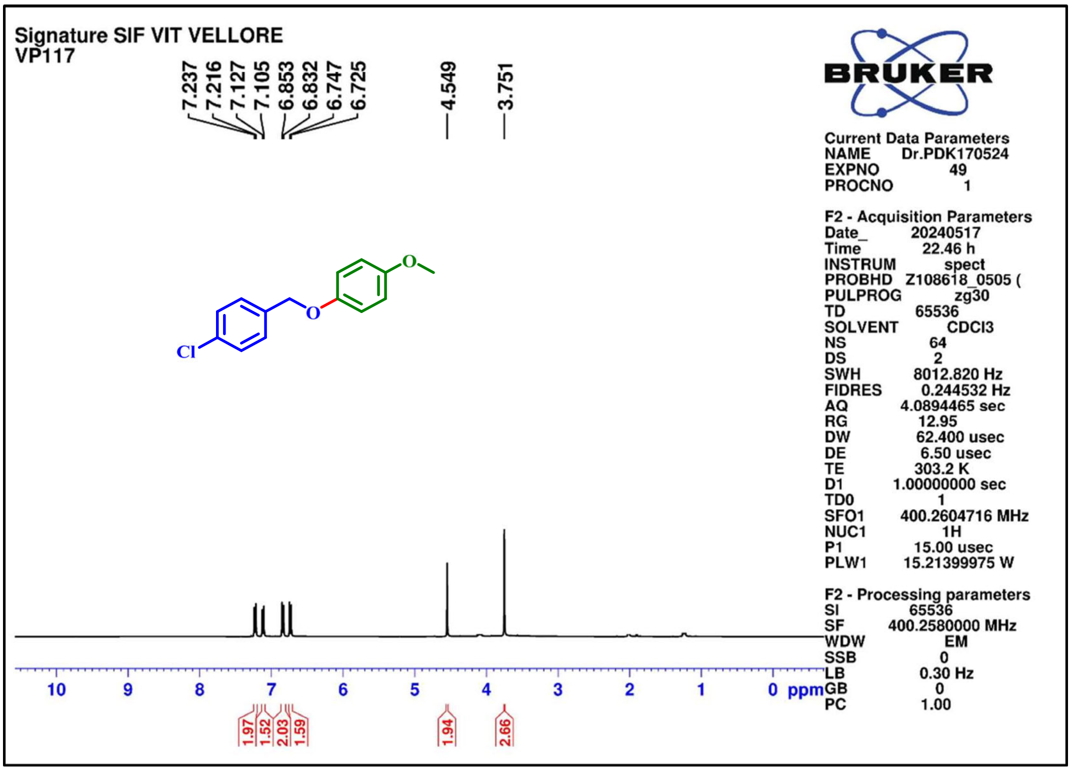


Fig. S42. ^{1}H NMR spectrum of 1-chloro-4-((4-methoxyphenoxy)methyl)benzene

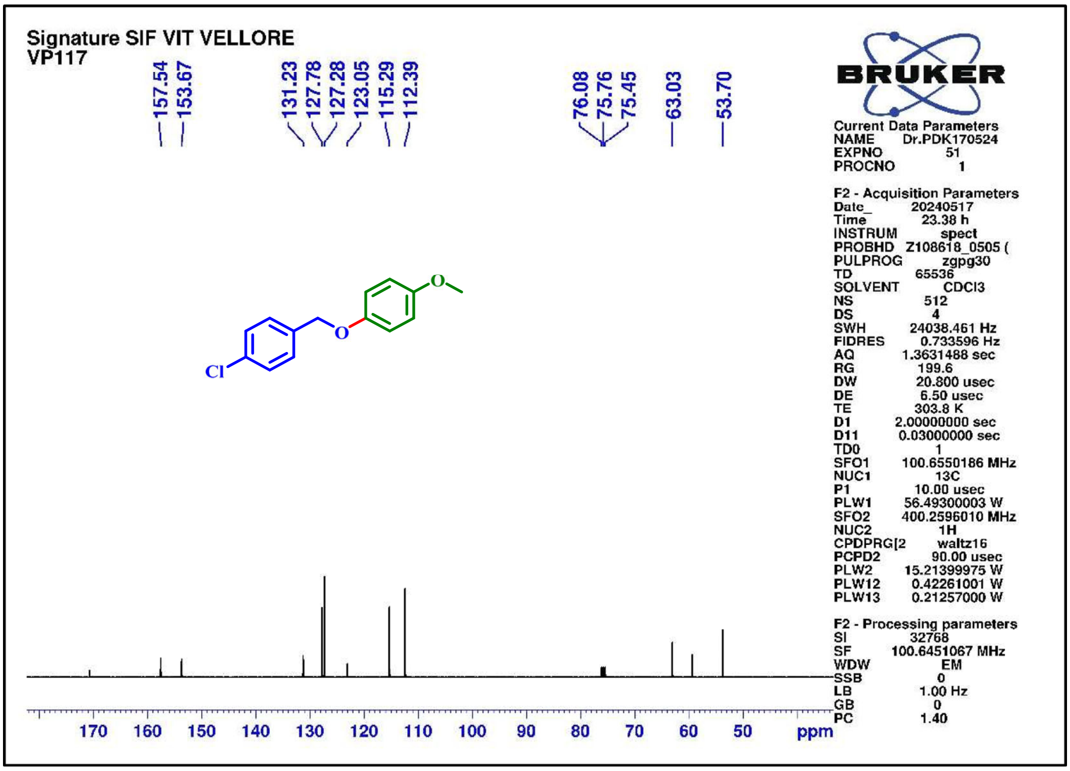


Fig. S43. ^{13}C NMR spectrum of 1-chloro-4-((4-methoxyphenoxy)methyl)benzene

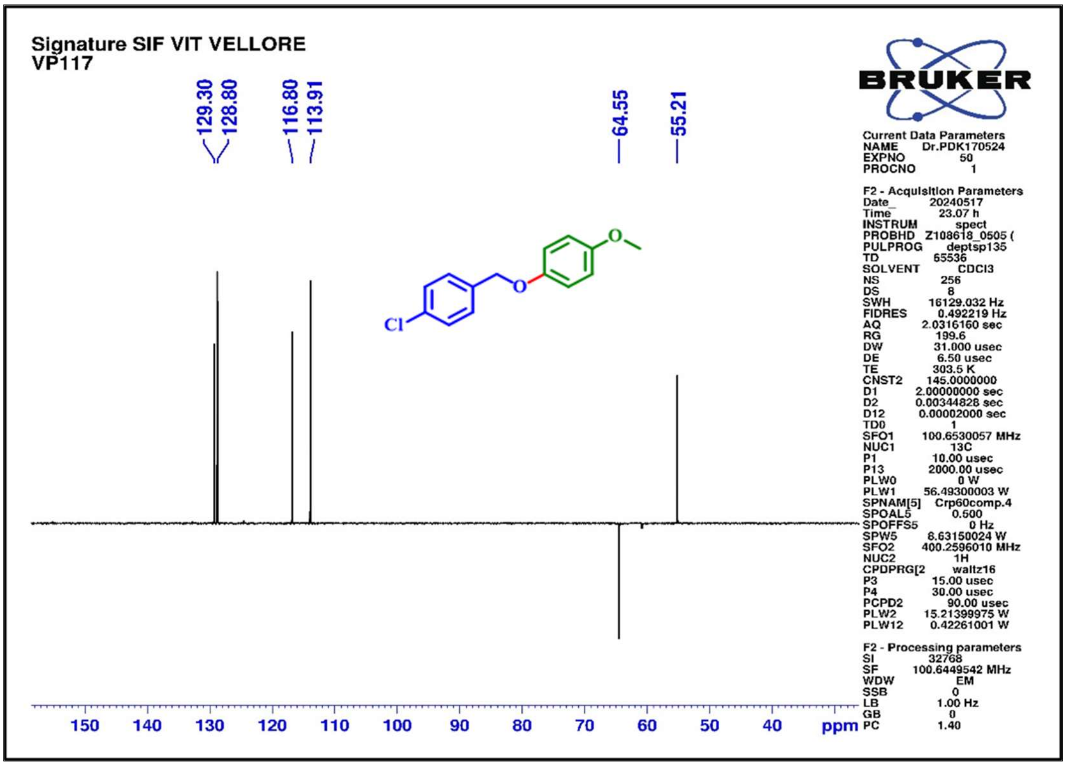


Fig. S44. DEPT-135 spectrum of 1-chloro-4-((4-methoxyphenoxy)methyl)benzene

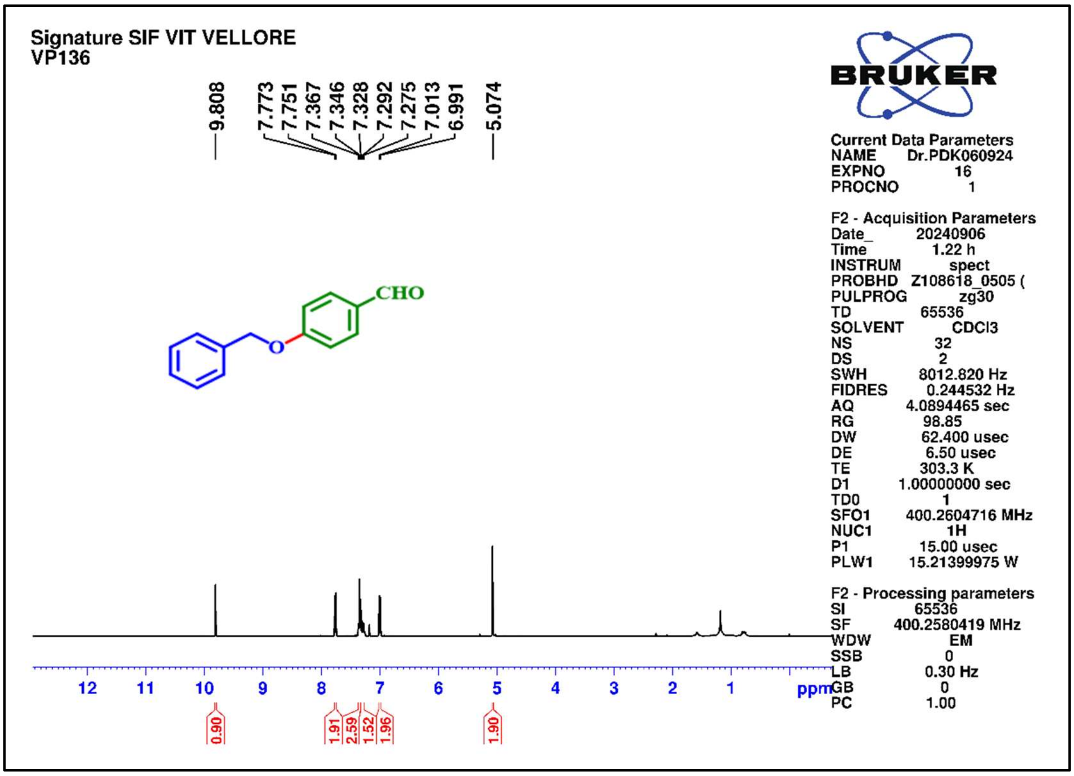


Fig. S45. ^{1}H NMR spectrum of 4-(benzyloxy)benzaldehyde

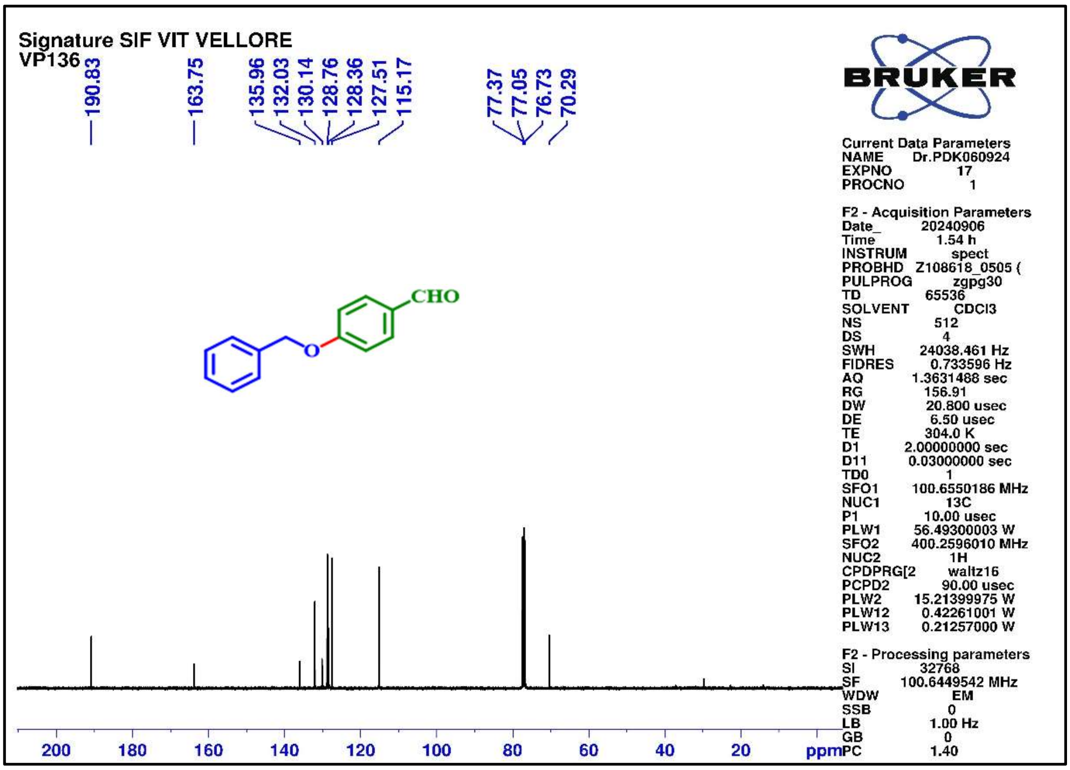


Fig. S46. ^{1}NMR spectrum of 4-(benzyloxy)benzaldehyde

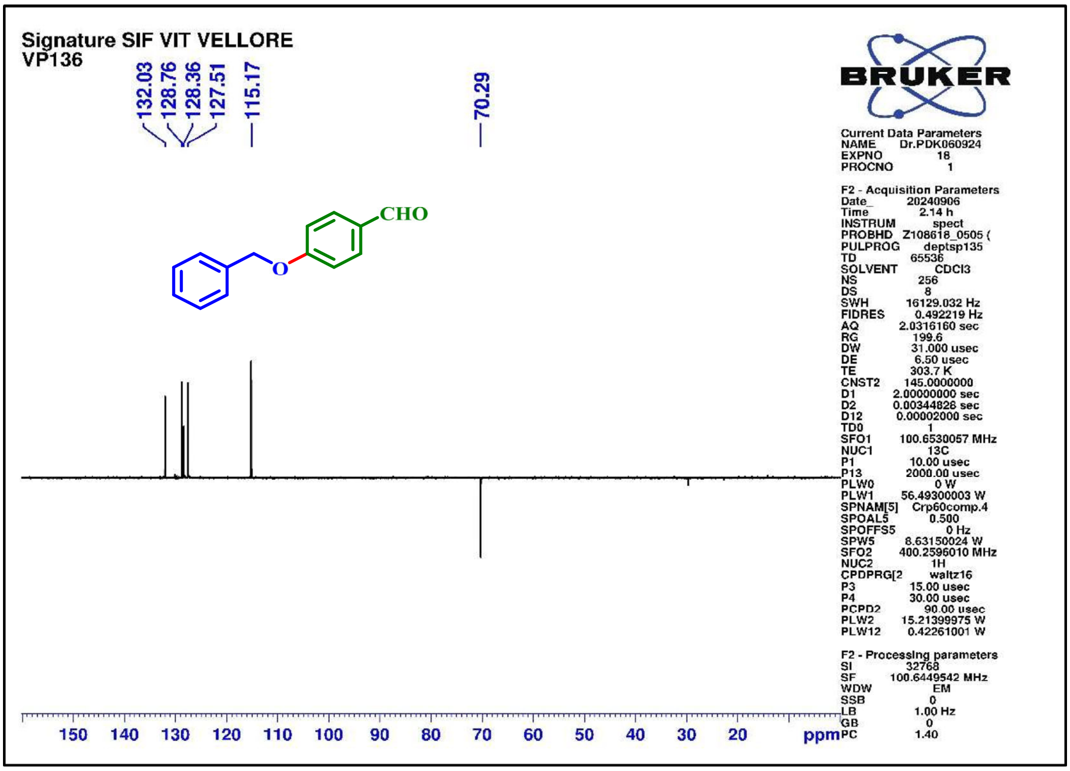


Fig. S47. DEPT-135 spectrum of 4-(benzyloxy)benzaldehyde

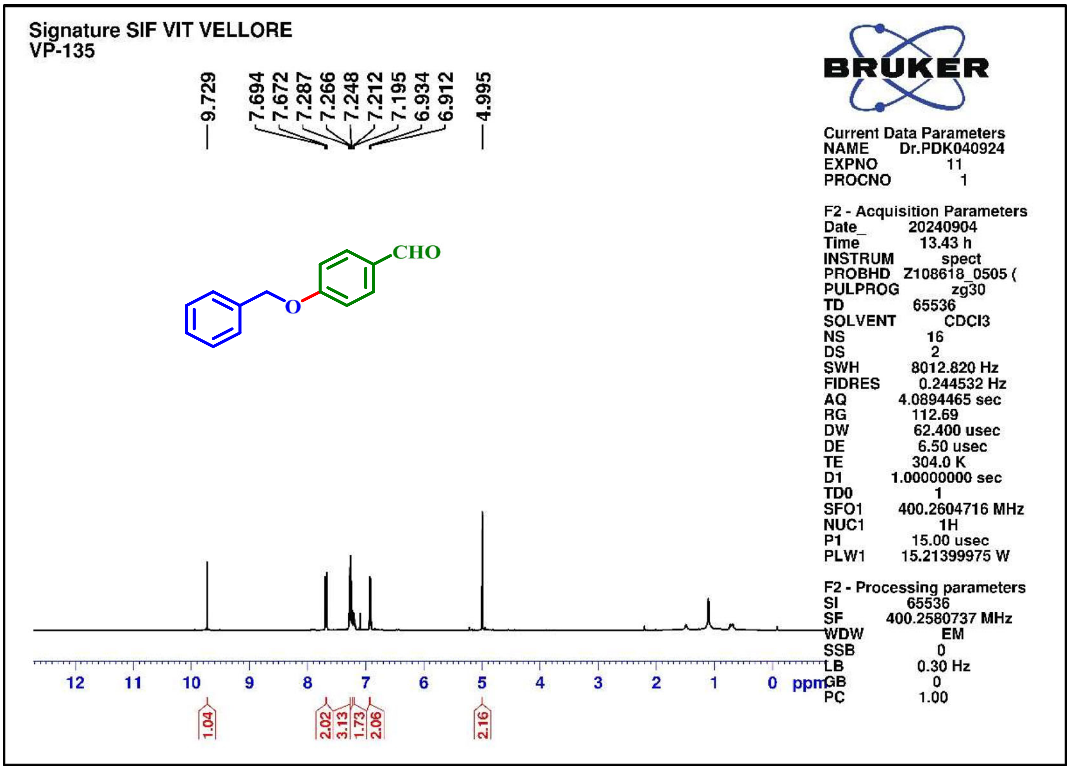


Fig. S48. [1]H NMR spectrum of 4-(benzyloxy)benzaldehyde

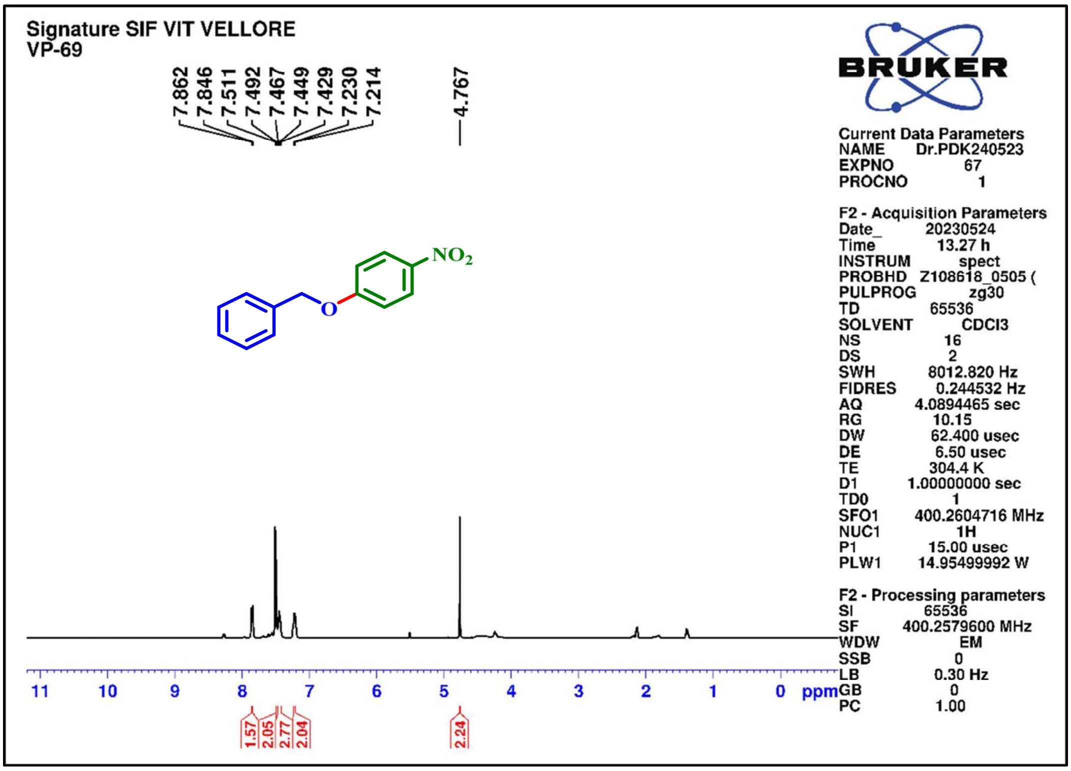


Fig. S49. ^{1}H NMR spectrum of 1-(benzyloxy)-4-nitrobenzene

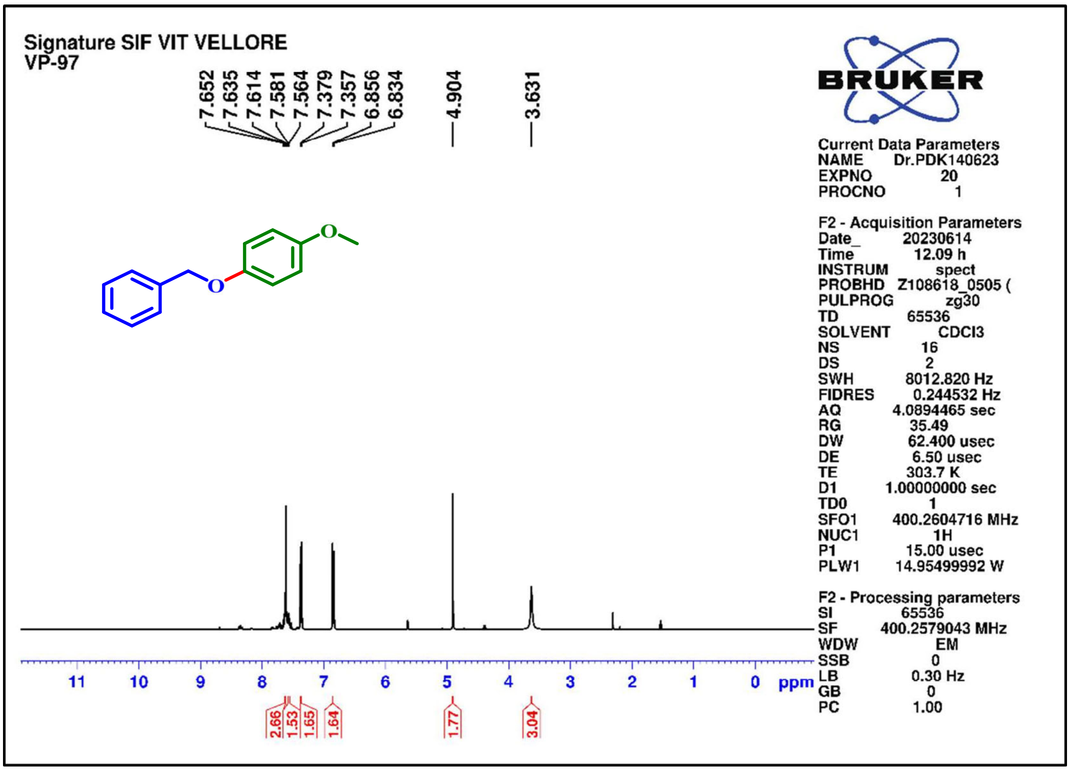


Fig. S50. ^{1}H NMR spectrum of 1-(benzyloxy)-4-mithoxybenzene

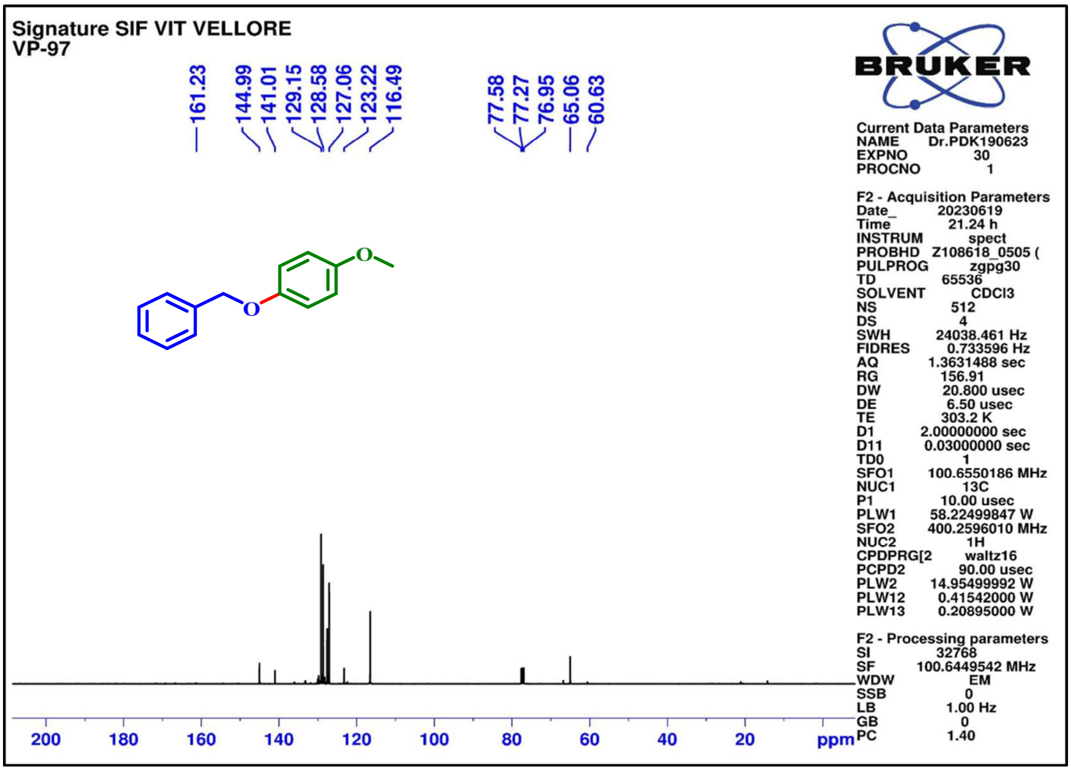


Fig. S51. [13]C NMR spectrum of 1-(benzyloxy)-4-mithoxybe

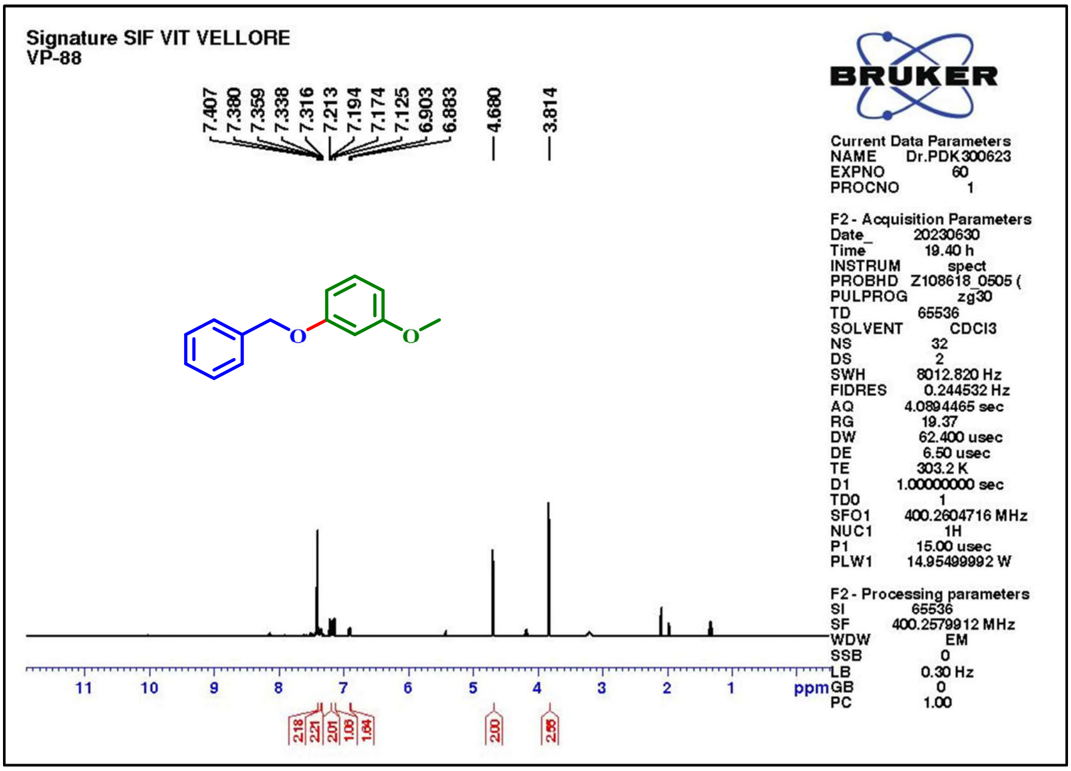


Fig. S52. [1]H NMR spectrum of 1-(benzyloxy)-3-mithoxybenzene

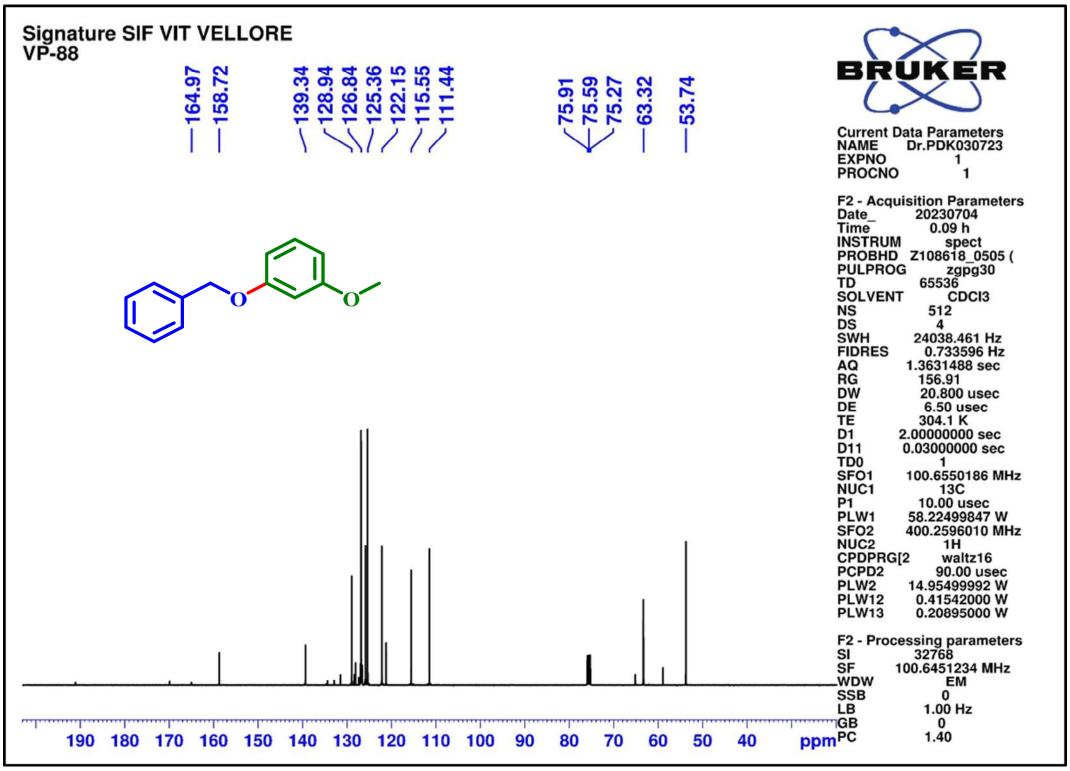


Fig. S53. ^{13}C NMR spectrum of 1-(benzyloxy)-3-mithoxybenzene

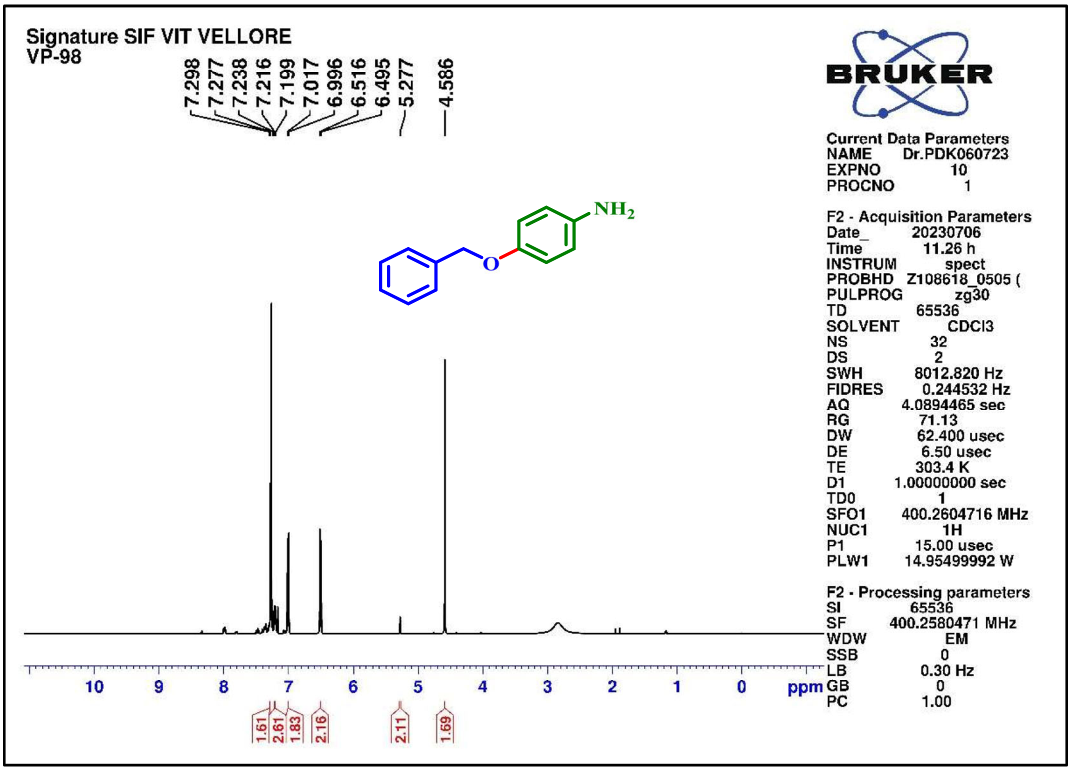


Fig. S54. ^{1}H NMR spectrum of 4-(benzyloxy)aniline

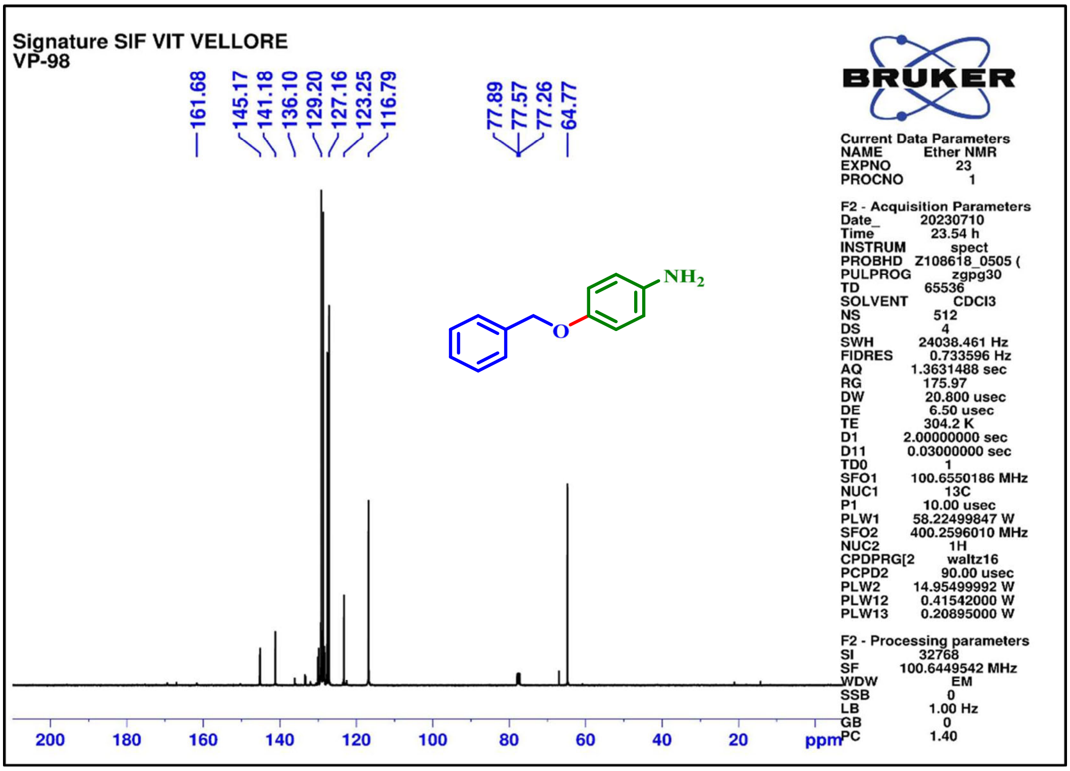


Fig. S55. ^{13}C NMR spectrum of 4-(benzyloxy)aniline

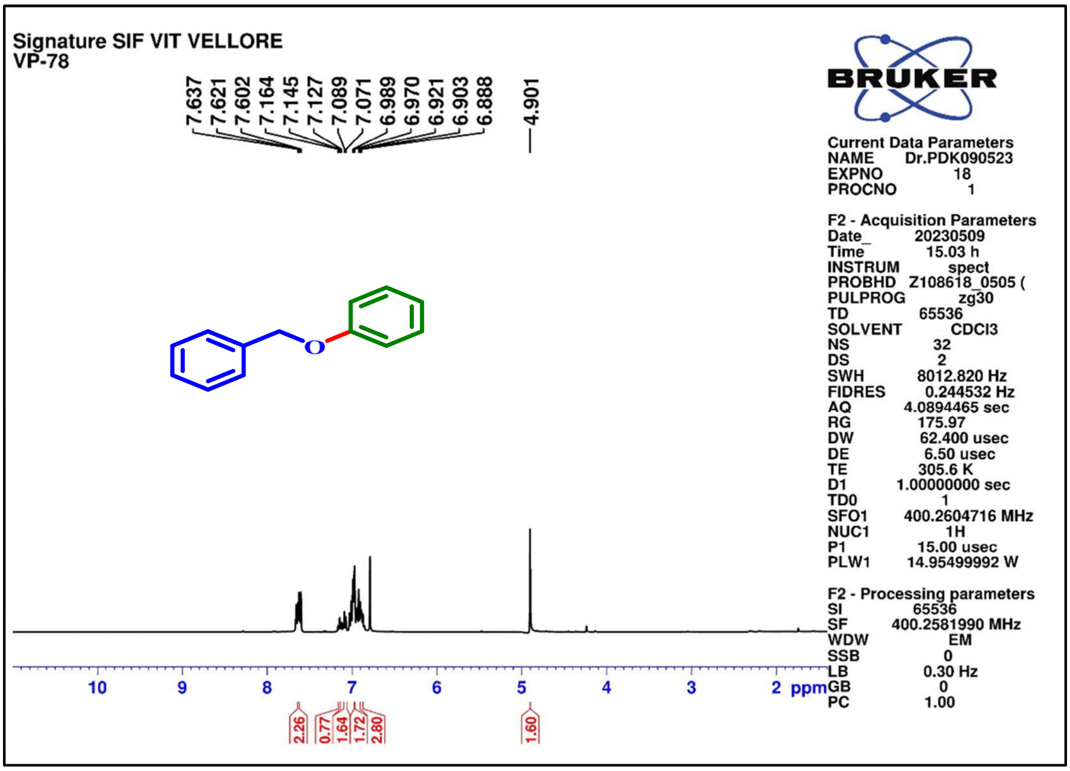


Fig. S56. ^{1}H NMR spectrum of (benzyloxy)benzene

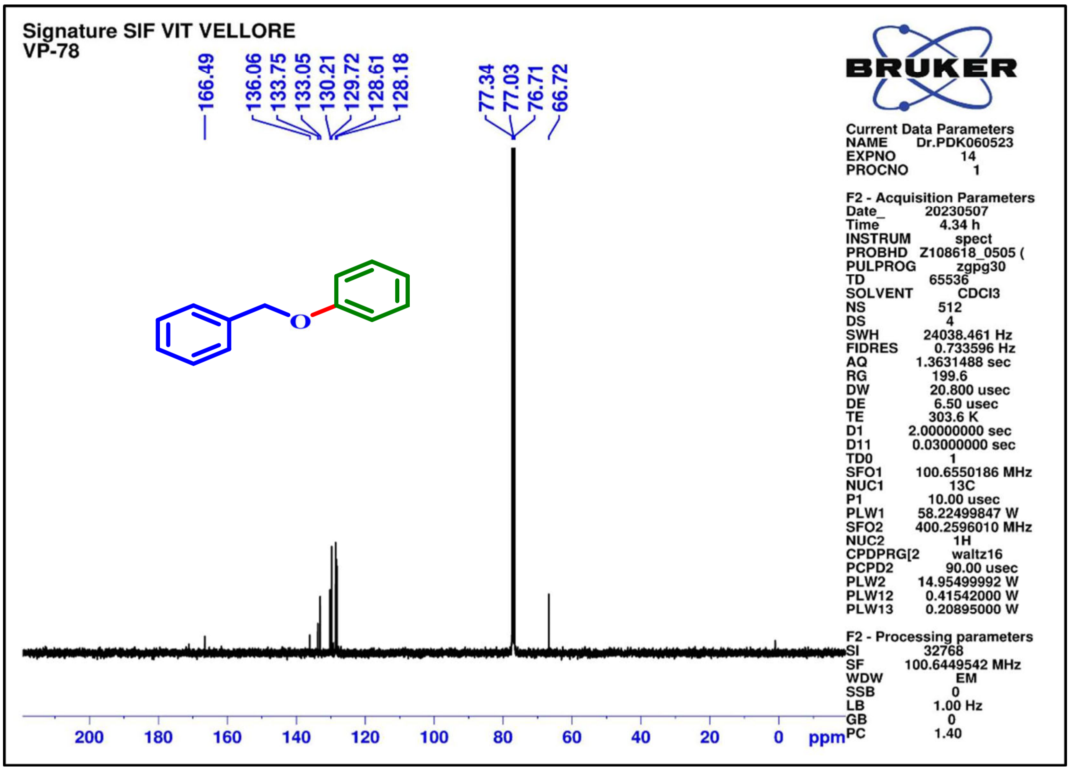


Fig. S57. ^{13}C NMR spectrum of (benzyloxy)benzene

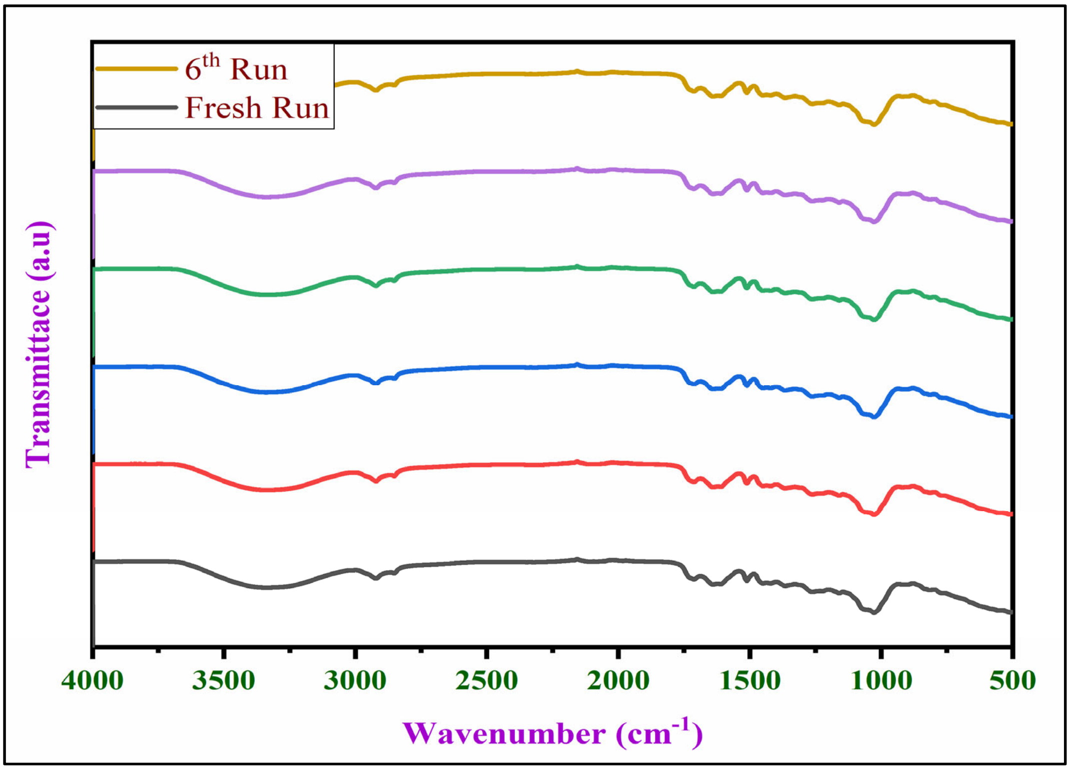
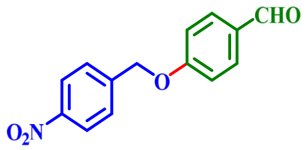
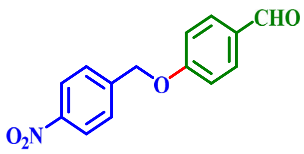
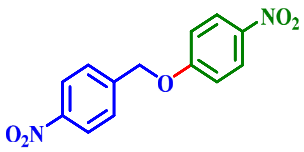
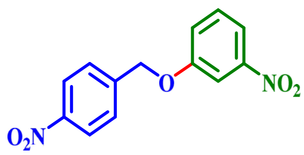
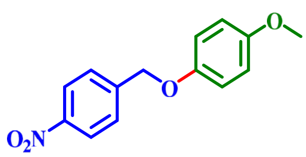
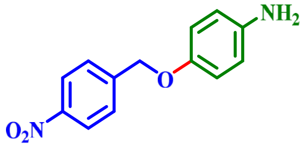
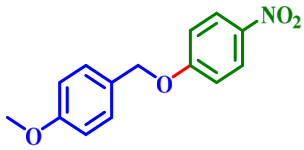
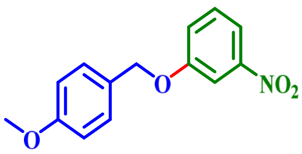
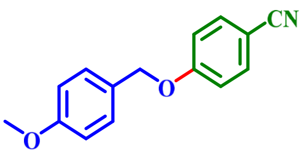
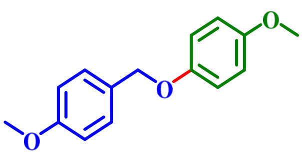
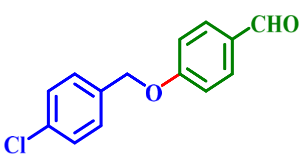
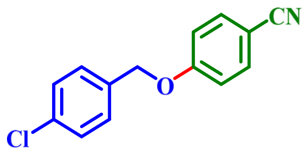
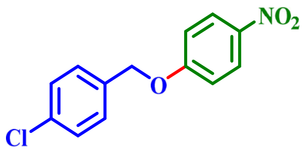
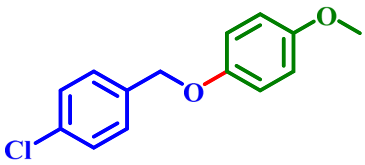
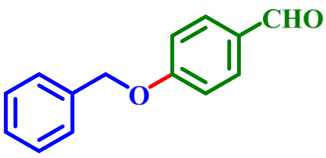
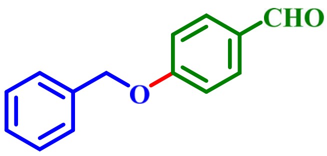
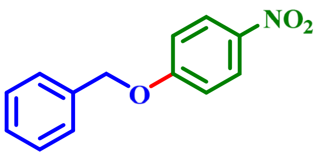
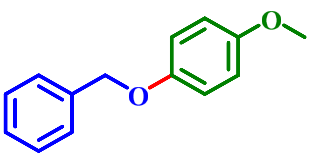


Fig. S58. Recyclability FT-IR Spectrum of PCFPc photocatalyst

Table S3. Spectral data

Sr. No	Code	Product	Spectral data
1	2a	 (Manuscript Fig.3,4, Pg. 11)	400 MHz, $CDCl_3$: δ 9.84 (s, 1H), 8.20 (d, J = 8.80 Hz, 2H), 7.80 (d, J = 8.80 Hz, 2H), 7.55 (d, J = 8.80 Hz, 2H), 7.02 (d, J = 8.80 Hz, 2H), 5.20 (s, 2H). ^{13}C NMR 100 MHz, $CDCl_3$: δ190.70, 162.94, 147.80, 143.29, 132.10, 130.65, 127.68, 123.99, 115.10, 68.84 ppm.
2	2b		400 MHz, $CDCl_3$: δ 9.75 (s, 1H), 8.12 (d, J = 8.40 Hz, 2H), 7.71 (d, J = 8.80 Hz, 2H), 7.46 (d, J = 8.80 Hz, 2H), 6.93 (d, J = 8.40 Hz, 2H), 5.11 (s, 2H). ^{13}C NMR 100 MHz, $CDCl_3$: δ191.20, 163.44, 148.31, 143.80, 132.61, 131.15, 128.18, 124.50, 115.60, 69.35 ppm.
3	2c		400 MHz, CDCl3: δ 8.15 (d, J = 8.68 Hz, 2H), 8.12 (d, J = 9.00 Hz, 2H), 7.47 (d, J = 7.12 Hz, 2H), 7.45 (d, J = 9.68 Hz, 2H), 4.77(s, 2H). 100 ^{13}C NMR MHz, $CDCl_3$: δ 161.21, 148.16, 141.41, 129.61, 127.01, 124.96, 123.76, 64.03 ppm.
4	2d		400 MHz, $CDCl_3$: δ 8.26 (s, 1H), 8.06 (d, J = 8.00 Hz, 2H), 7.74 (d, J = 7.20 Hz, 2H), 7.35 (t, J = 8.00 Hz, 3H), 7.19 (d, J = 8.80 Hz, 2H), 4.51 (s, 2H).
5	2e		400 MHz, $CDCl_3$: δ 8.10 (d, J = 6.80 Hz, 2H), 7.45 (d, J = 7.20 Hz, 2H), 7.21 (d, J = 8.80 Hz, 2H), 6.82 (d, J = 8.40 Hz, 2H), 4.50 (s, 2H), 3.74 (s, 3H). ^{13}C NMR 100 MHz, $CDCl_3$: δ 160.82, 148.80, 147.01, 145.02, 129.06, 126.94, 123.59, 116.48, 63.63, 60.66 ppm.
6	2f		400 MHz, CDCl3: δ 8.03 (d, J = 6.32 Hz, 2H), 7.49 (d, J = 9.12 Hz, 2H), 7.35 (d, J =

			7.16 Hz, 2H), 7.25 (d, J = 6.76 Hz, 2H), 5.25 (s, 2H),4.56(s, 2H). 100 MHz, DMSO-d_6: δ 166.08, 142.99, 136.61, 133.81, 130.56, 128.48, 127.07, 126.91, 63.50 ppm.
7	2g		400 MHz, $CDCl_3$: δ 8.13 (d, J = 8.40 Hz, 2H), 7.45 (d, J = 8.80 Hz, 2H), 7.29 (d, J = 8.80 Hz, 2H), 6.70 (d, J = 9.20 Hz, 2H), 4.75 (s, 2H), 3.70 (s, 3H). ^{13}C NMR 100 MHz, $CDCl_3$: δ 158.69,148.20, 147.30, 132.24, 127.00, 123.74, 115.73, 112.82, 64.01, 55.45 ppm.
8	2h		400 MHz, CDCl3: δ 8.14 (d, J = 8.72 Hz, 2H), 7.45 (d, J = 8.80 Hz, 2H), 7.06 (t, J = 7.96 Hz, 1H), 7.01 (s, 1H), 6.98 (d, J = 6.08 Hz, 1H), 6.74 (d, J = 6.16 Hz, 2H), 4.76 (s, 2H), 3.71 (s, 3H). ^{13}C NMR 100 MHz, $CDCl_3$: δ 160.36, 148.19, 147.30, 130.55, 127.00, 123.78, 122.83, 117.16, 113.07, 64.01, 55.45 ppm.
9	2i		400 MHz, $CDCl_3$: δ 8.10 (d, J = 7.20 Hz, 2H), 7.43 (d, J = 8.00 Hz, 2H), 7.01 (d, J = 8.00 Hz, 2H), 6.55 (d, J = 8.40 Hz, 2H), 4.70 (s, 2H), 3.52 (s, 3H). ^{13}C NMR 100 MHz, $CDCl_3$: δ 169.94, 147.30, 145.28, 143.51, 127.30, 125.25, 121.84, 115.14, 114.71, 61.79, 58.89 ppm.
10	2j		400 MHz, $CDCl_3$: δ 7.35 (d, J = 8.80 Hz, 2H), 7.24 (d, J = 8.40 Hz, 2H), 6.85 (d, J = 8.80 Hz, 2H), 6.76 (d, J = 8.80 Hz, 2H), 4.54 (s, 2H), 3.76 (s, 3H), 3.73 (s, 3H). ^{13}C NMR 100 MHz, $CDCl_3$: δ 158.91 158.57, 146.42, 141.26, 133.30, 128.59, 124.91, 113.78, 64.35, 60.59, 55.17 ppm.
11	2k		400 MHz, CDCl3: δ 9.89 (s, 1H), 8.12 (d, J = 8.64 Hz, 2H), 7.75 (d, J = 8.44 Hz, 2H), 7.46 (d, J = 6.64 Hz, 2H), 7.44 (d, J = 6.68 Hz, 2H), 4.76 (s, 2H). ^{13}C NMR 100 MHz, $CDCl_3$: δ 191.07, 162.84, 148.34, 141.03, 134.66, 130.95, 129.48, 127.00, 123.71, 63.95 ppm.

12	2l		400 MHz, $CDCl_3$: δ 7.94 (d, J = 8.40 Hz, 2H), 7.29 (d, J = 8.00 Hz, 2H), 6.97 (d, J = 8.80 Hz, 2H), 6.62 (d, J = 8.80 Hz, 2H), 4.64 (s, 2H).
13	2m		400 MHz, CDCl3: δ 7.38 (d, J = 6.80 Hz, 2H), 7.34 (d, J = 7.20 Hz, 2H), 7.19 (d, J = 8.80 Hz, 2H), 6.79 (d, J = 8.80 Hz, 2H), 4.70 (s, 2H). ^{13}C NMR 100 MHz, $CDCl_3$: δ 161.10, 145.42, 140.93, 132.03, 128.58, 127.04, 116.87, 110.29, 65.23 ppm.
14	2n		400 MHz, CDCl3: δ 7.23 (d, J = 8.40 Hz, 2H), 7.12 (d, J = 8.80 Hz, 2H), 6.84 (d, J = 8.40 Hz, 2H), 6.74 (d, J = 8.80 Hz, 2H), 4.55 (s, 2H), 3.75 (s, 3H). ^{13}C NMR 100 MHz, $CDCl_3$: δ 157.54, 153.67, 131.23, 127.78, 127.28, 123.05, 115.29, 112.39, 63.03, 53.70 ppm.
15	2o		400 MHz, CDCl3: δ 9.81 (s, 1H), 7.76 (d, J = 8.72 Hz, 2H), 7.35 (t, J = 8.12 Hz, 3H), 7.28 (d, J = 6.76 Hz, 2H), 7.00 (d, J = 8.72 Hz, 2H), 5.07 (s, 2H). ^{13}C NMR 100 MHz, $CDCl_3$: δ 190.83, 163.75, 135.96, 132.03, 130.14, 128.76, 128.36, 127.51, 115.17, 70.29 ppm.
16	2p		400 MHz, CDCl3: δ 9.73 (s, 1H), 7.68 (d, J = 8.80 Hz, 2H), 7.26 (t, J = 8.40 Hz, 3H), 7.20 (d, J = 6.80 Hz, 2H), 6.92 (d, J = 8.80 Hz, 2H), 5.00 (s, 2H).
17	2q		400 MHz, CDCl3: δ 7.85 (d, J = 6.40 Hz, 2H), 7.50 (d, J = 7.60 Hz, 2H), 7.45 (t, J = 7.20 Hz, 3H), 7.22 (d, J = -6.40 Hz, 2H), 4.77 (s, 2H).
18	2r		400 MHz, CDCl3: δ 7.63 (t, J = 6.64 Hz, 3H), 7.57 (d, J = 6.76 Hz, 2H), 7.37 (d, J = 8.80 Hz, 2H), 6.85 (d, J = 8.72 Hz, 2H), 4.90 (s, 2H), 3.63 (s, 3H). ^{13}C NMR 100 MHz, $CDCl_3$: δ 161.23, 144.99, 141.01, 129.15, 128.58, 127.06, 123.22, 116.49, 65.06, 60.63 ppm.

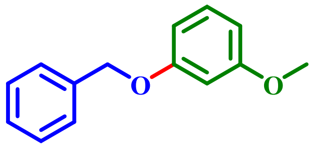
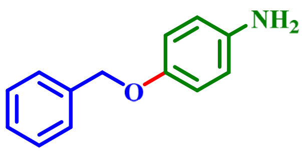
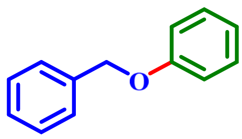
19	2s		400 MHz, CDCl3: δ 7.39 (d, J = 10.68 Hz, 2H), 7.34 (t, J = 8.60 Hz, 2H), 7.19 (t, J = 7.80 Hz, 2H), 7.13 (s, 1H), 6.89 (d, J = 8.04 Hz, 2H), 4.68 (s, 2H), 3.81 (s, 3H). ^{13}C NMR 100 MHz, $CDCl_3$: δ 164.77, 158.72, 139.34, 128.94, 126.84, 125.36, 122.15, 115.55, 111.44, 63.32, 53.74 ppm.
20	2t		400 MHz, CDCl3: δ 7.29 (d, J = 8.40 Hz, 2H), 7.22 (t, J = 8.80 Hz, 3H), 7.01 (d, J = 8.40 Hz, 2H), 6.51 (d, J = 8.40 Hz, 2H), 5.28 (s, 2H), 4.59 (s, 2H). ^{13}C NMR 100 MHz, $CDCl_3$: δ 161.68, 145.17, 141.18, 136.10, 129.20, 127.16, 123.25, 116.79, 64.77 ppm.
21	2u		400 MHz, CDCl3: δ 7.62 (t, J = 6.40 Hz, 2H), 7.15 (t, J = 7.60 Hz, 1H), 7.08 (d, J = 7.20 Hz, 2H), 6.96 (t, J = 7.60 Hz, 3H), 6.90 (d, J = 6.00 Hz, 2H), 4.90 (s, 2H). ^{13}C NMR 100 MHz, $CDCl_3$: δ 166.49, 136.06, 133.75, 133.05, 130.21, 129.72, 128.61, 128.18, 66.72 ppm.

Fig. S59. Leaching test of PCFPc photocatalyst

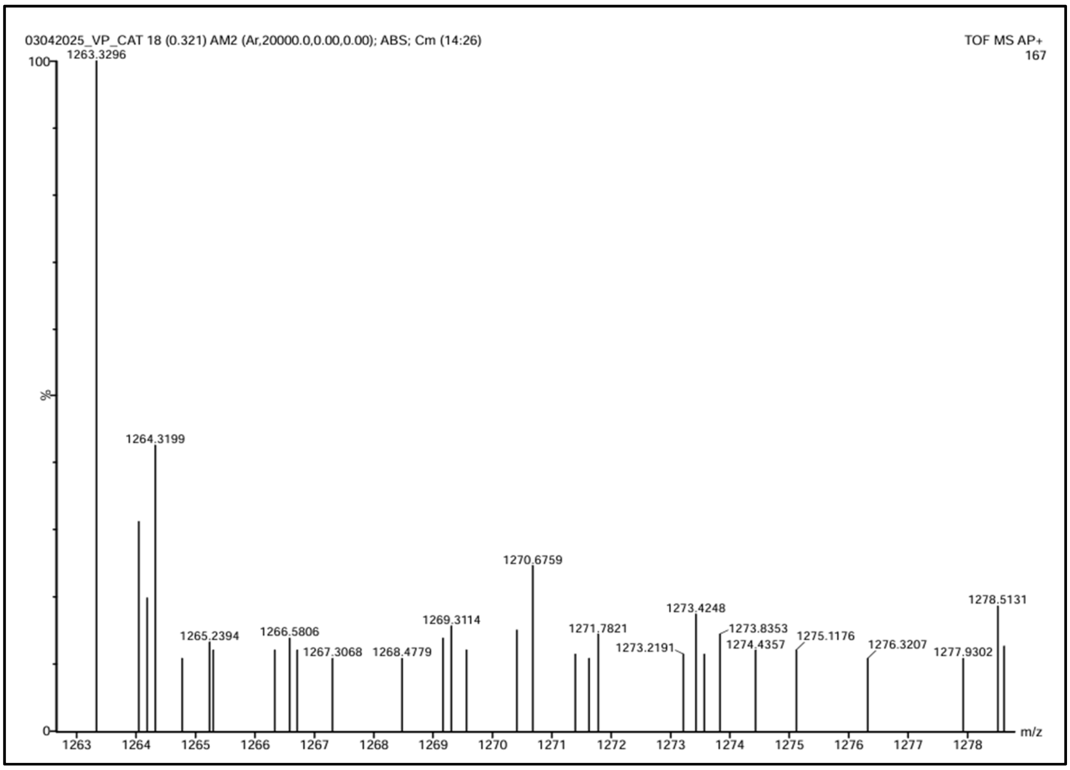


Fig. S60. HR-MS Spectrum of of PCFPc photocatalyst

References:

[1] V. S. Patil, P. R. Bhagat, *Catal Letters* **2024**, DOI 10.1007/s10562-024-04613-1.

[2] V. S. Patil, B. C. Mataghare, R. G. Maske, P. R. Yadav, V. D. Channe, K. R. Balinge, V. B. Khajone, D. S. Patle, P. R. Bhagat, *Energy Convers Manag* **2024**, *319*, DOI 10.1016/j.enconman.2024.118939.