Supporting Documents

Unveiling the Photocatalytic Activity of Carbon Dots/g-C_3N_4 Nanocomposite for the O-Arylation of 2-Chloroquinoline-3-carbaldehydes

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Text S1. Materials details

All of the analytical-grade chemicals were procured from Sigma-Aldrich, India, and Alpha-Aldrich and used as such. Avra Synthesis Pvt. Ltd. in India supplied the ethanol and other solvents. All reagents used were of analytical grade (AR) and used without further purification, and deionized water was made in our lab.

Text S2. Characterization details

All samples' X-ray diffraction patterns were obtained using the Bruker D8 Advance X-ray diffraction technique with CuKα radiation (λ = 0.154 nm) in the range of 2 theta from 10 to 90° at a scan speed of 2° min^{-1}. The surface chemical composition was confirmed using X-ray photoelectron spectra (XPS) (TPHI 5000 Versa Probe III) with an Al K X-ray source. With the aid of KBr pellets, the FT-IR spectra were determined on a Shimazu spectrophotometer. For each sample, 48 scans were logged with a resolution of 2 cm^{-1} in the 4000-400 cm^{-1} range. The compositional and morphological examination of the synthesized samples was investigated using transmission electron microscopy (Tecnai G2-20 twin field emission microscope). Quantachrome analyzer was used to assess the materials' specific surface areas, and a zeta potential (HORIBA SZ-100) was used to measure the surface charge and stability of the built-up materials. In the Zeta potential analysis condition, the electrode was filled with synthesized materials dispersed in distilled water, and the parameters were adjusted to 3.4 V electrode voltage, 25 °C temperature, a 10 min data capture period, and a pH of 7. HR–MS was conducted by Ultimate 3000 UHPLC–Q Exactive (Thermo Scientific, US) to determine the mass of the compound. The Jasco V-670 spectrometer and Shimadzu (RF-700) spectrometer systems were used to record UV Vis-DRS and photoluminescence spectra.

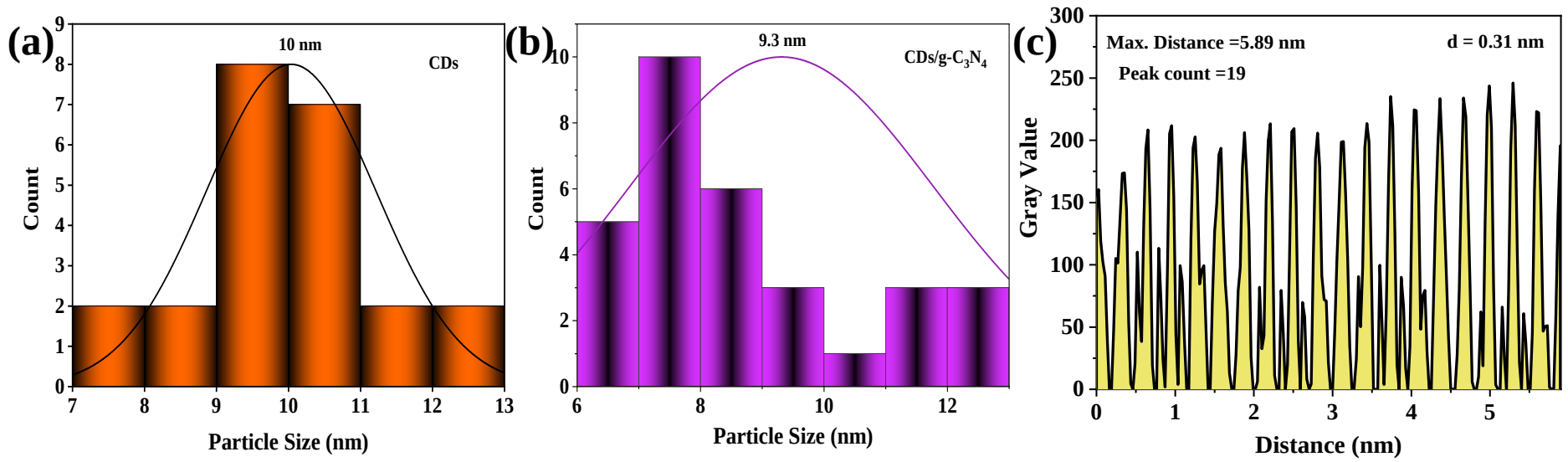
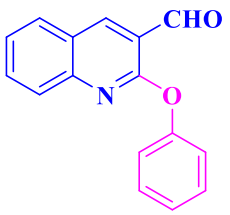


Figure S1. Particle size histogram of a) CDs, b) 3CDCN, and c) HRTEM d-spacing value of 3CDCN calculation



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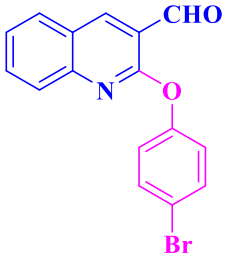
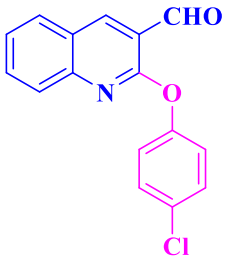
Exact Mass: 249.08
3.1



$C_{16}H_{10}BrNO_2$
Exact Mass: 326.99
3.2



$C_{16}H_{10}ClNO_2$
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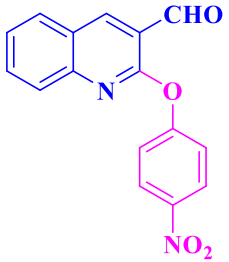
3.3



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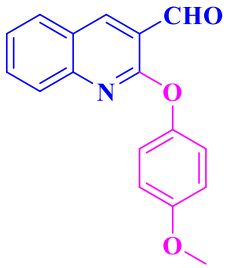
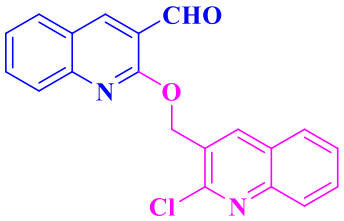


$C_{17}H_{13}NO_3$
Exact Mass: 279.09
3.5



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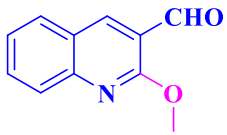
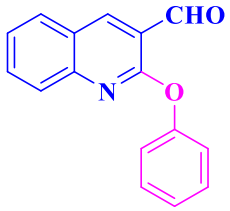
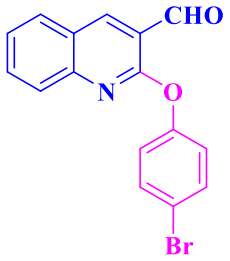
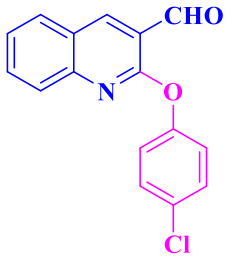
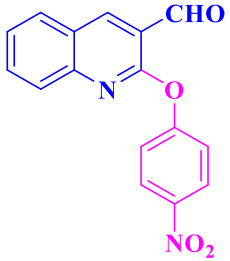
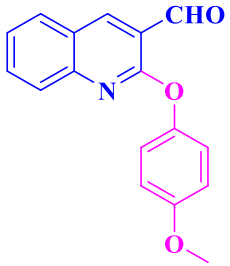
Exact Mass: 348.07
3.6

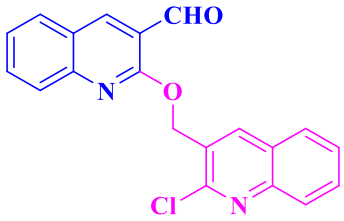
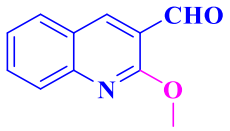


$C_{11}H_9NO_2$
Exact Mass: 187.06
3.7

Characterization data of organic compounds:

S.No.	Structure of the compound	Name of the compound & Molecular formula	Appearance & Melting point (°C)	FT-IR, ν/cm^{-1}	^{1}H-NMR (400 MHz, $CDCl_3$, Me_4Si) (ppm):	^{13}C-NMR (100 MHz, $CDCl_3$, Me_4Si) (ppm):	HRMS $[M+H]^+$
3.1.		2-phenoxyquinoline-3-carbaldehyde & $C_{16}H_{11}NO_2$	Colourless crystals & 126 °C	2959, 1688, 1257, 893, 754, 682	δ 10.60 (s, 1H), 8.68 (s, 1H), 7.84 (t, 1H), 7.69 (t, 1H), 7.65 (d, 1H), 7.43 (m, 3H), 7.26 (d, 2H), 7.22 (d, 1H)	δ 187.96, 159.49, 152.06, 147.61, 139.53, 131.69, 128.61, 128.51, 126.85, 124.77, 124.19, 124.15, 120.78, 119.21	250.0872
3.2.		2-(4-bromophenoxy)quinoline-3-carbaldehyde & $C_{16}H_{10}BrNO_2$	White solid & 148 °C	2959, 1689, 1206, 1011, 900, 806	δ 10.56 (s, 1H), 8.68 (s, 1H), 7.85 (d, 1H), 7.69 (d, 1H), 7.66 (t, 1H), 7.52 (d, 2H), 7.44 (m, 1H), 7.15 (d, 2H)	δ 188.60, 160.01, 152.02, 148.39, 140.81, 132.89, 132.51, 129.65, 127.75, 125.99, 125.22, 123.72, 120.02, 118.10	327.9975

3.3.		2-(4-chlorophenoxy)quinoline-3-carbaldehyde & $C_{16}H_{10}ClNO_2$	White solid & 165 °C	3054, 2862, 1685, 1212, 1079, 691	δ 10.57 (s, 1H), 8.68 (s, 1H), 7.85 (d, 1H), 7.69 (d, 2H), 7.44 (t, 1H), 7.39 (d, 2H), 7.22 (d, 1H), 7.20 (d, 1H)	δ 187.67, 159.13, 150.44, 147.42, 139.79, 131.87, 129.48, 128.65, 128.55, 126.76, 124.96, 124.21, 122.27, 119.03	284.0478
3.4.		2-(4-nitrophenoxy)quinoline-3-carbaldehyde & $C_{16}H_{10}N_2O_4$	White solid & 134 °C	3126, 2854, 1695, 1509, 846, 752	δ 10.56 (s, 1H), 8.74 (s, 1H), 8.31 (d, 2H), 7.90 (d, 1H), 7.71 (d, 1H), 7.70 (d, 1H), 7.50 (m, 1H), 7.45 (d, 2H)	δ 188.70, 140.81, 132.90, 130.50, 129.67, 129.57, 127.78, 125.98, 123.29	295.0727
3.5.		2-(4-methoxyphenoxy)quinoline-3-carbaldehyde & $C_{17}H_{13}NO_3$	White solid & 120 °C	2953, 1692, 1500, 1200, 758, 556	δ 10.59 (s, 1H), 8.66 (s, 1H), 7.83 (d, 1H), 7.60 (d, 1H), 7.64 (d, 1H), 7.40 (t, 1H), 7.18 (d, 2H), 6.93 (d, 2H), 3.80 (s, 3H)	δ 189.11, 160.85, 140.48, 132.66, 129.63, 127.84, 125.66, 125.08, 122.74, 120.15, 114.56, 55.66	280.0978

3.6.		2-((2-chloroquinolin-3-yl)methoxy)quinoline-3-carbaldehyde & $C_{20}H_{13}ClN_2O_2$	White solid & 180 °C	1600, 1328, 1018, 753, 492	δ 10.53 (s, 1H), 8.60 (s, 1H), 8.00 (d, 1H), 8.35 (s, 1H) 7.86 (d, 1H), 7.81 (d, 1H), 7.80 (d, 1H), 7.73 (d, 1H), 7.67 (d, 1H), 7.53 (t, 1H), 7.43 (t, 1H), 5.85 (s, 2H)	δ 187.77, 158.90, 147.67, 146.22, 139.79, 136.81, 131.85, 129.62, 128.74, 127.71, 127.33, 126.64, 126.43, 126.32, 126.10, 124.49, 123.68, 118.94, 63.81, 28.68	349.0744
3.7.		2-methoxyquinoline-3-carbaldehyde &$C_{11}H_9NO_2$	White solid & 109 °C	3350, 2870, 1594, 1337, 1003, 759, 471	δ 10.40 (s, 1H), 8.52 (s, 1H), 7.82 (t, 2H), 7.69 (td, 1H), 7.38 (t, 1H), 4.12 (s, 3H)	δ 189.35, 161.26, 148.96, 140.06, 132.59, 129.75, 127.28, 125.06, 124.41, 120.09, 53.88	187.0712

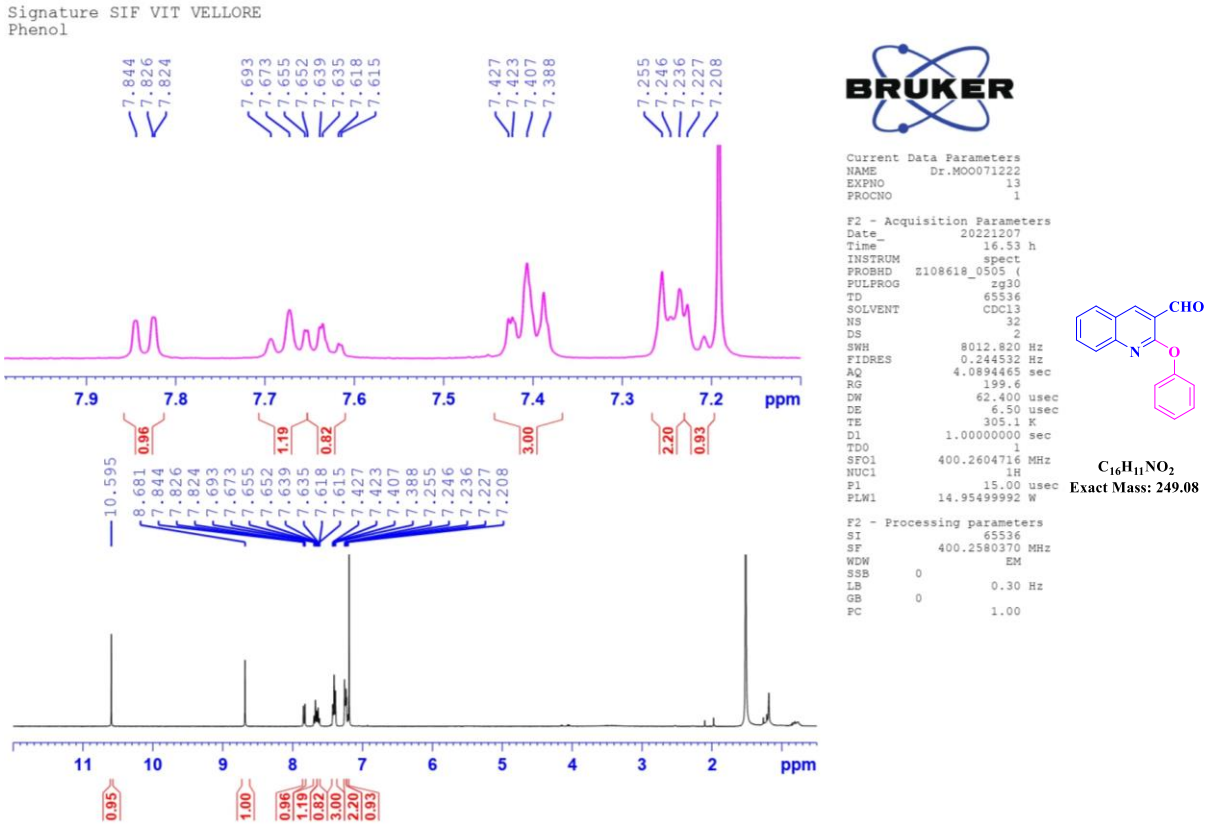
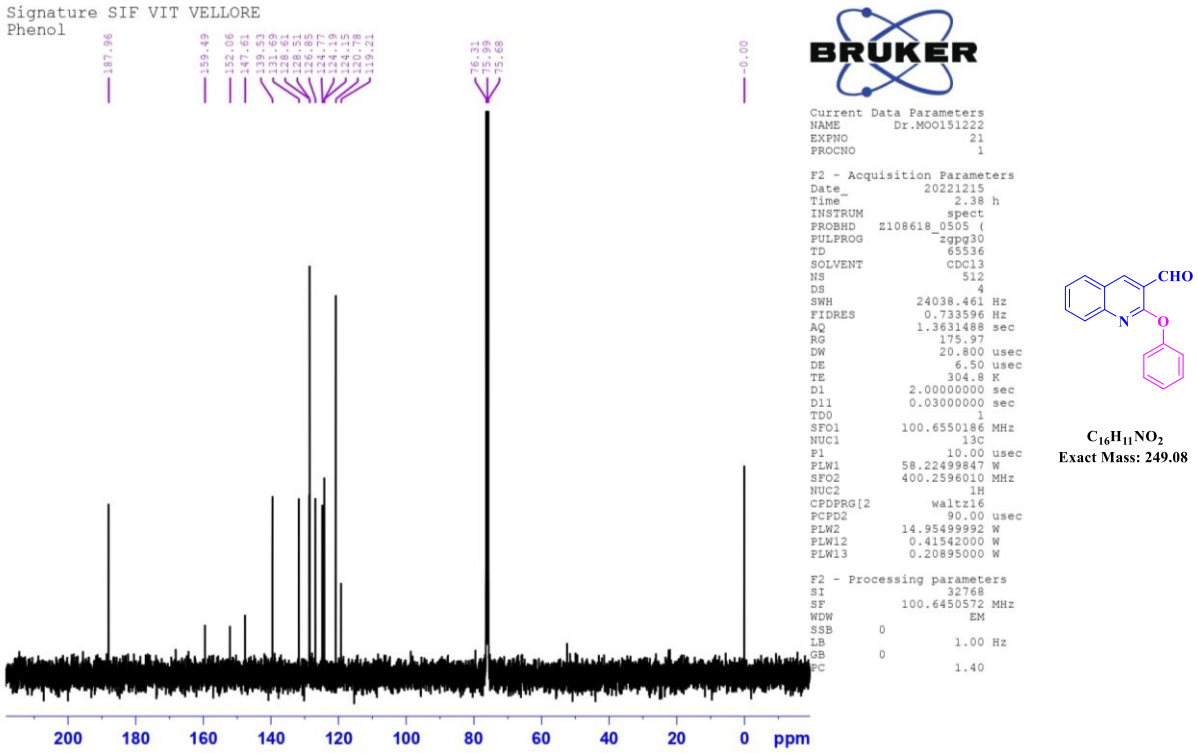


Figure S2. ^{1}H NMR spectrum of 2-phenoxyquinoline-3-carbaldehyde **(3.1)**



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$C_{16}H_{11}NO_2$
Exact Mass: 249.08

Figure S3. ^{13}C NMR spectrum of 2-phenoxyquinoline-3-carbaldehyde **(3.1)**

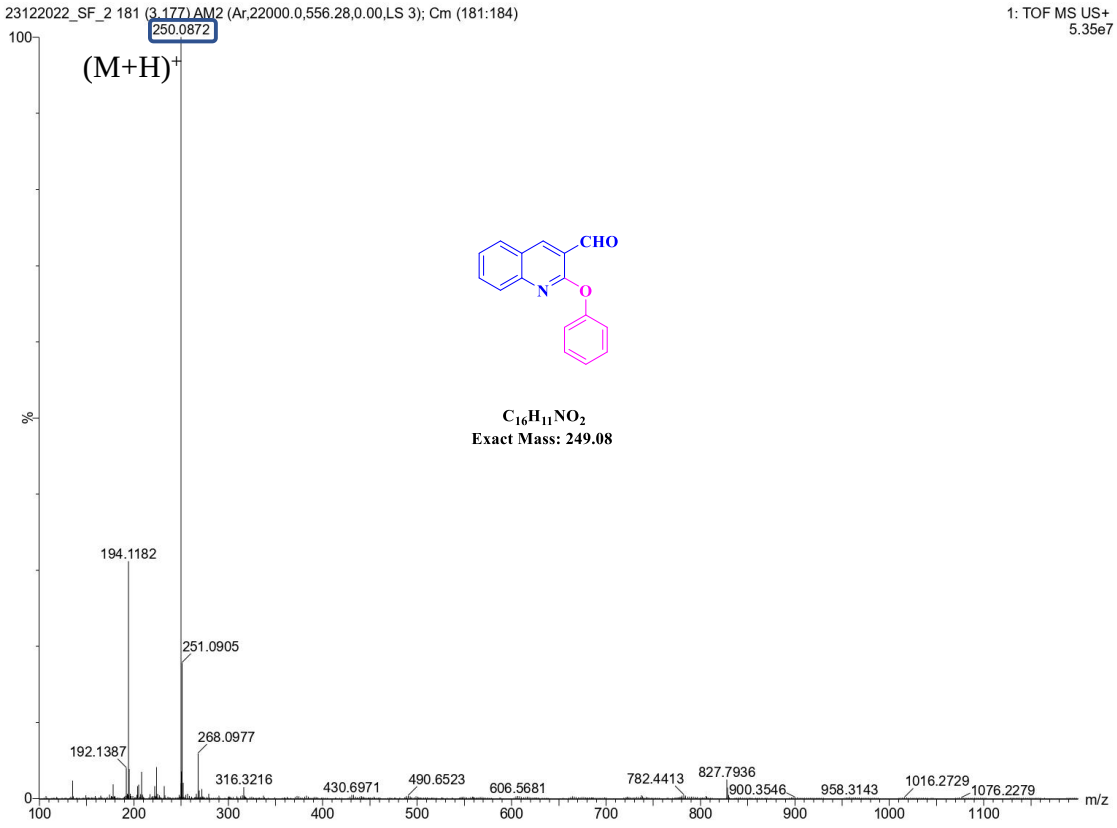

Figure S4. HRMS spectrum of 2-phenoxyquinoline-3-carbaldehyde **(3.1)**

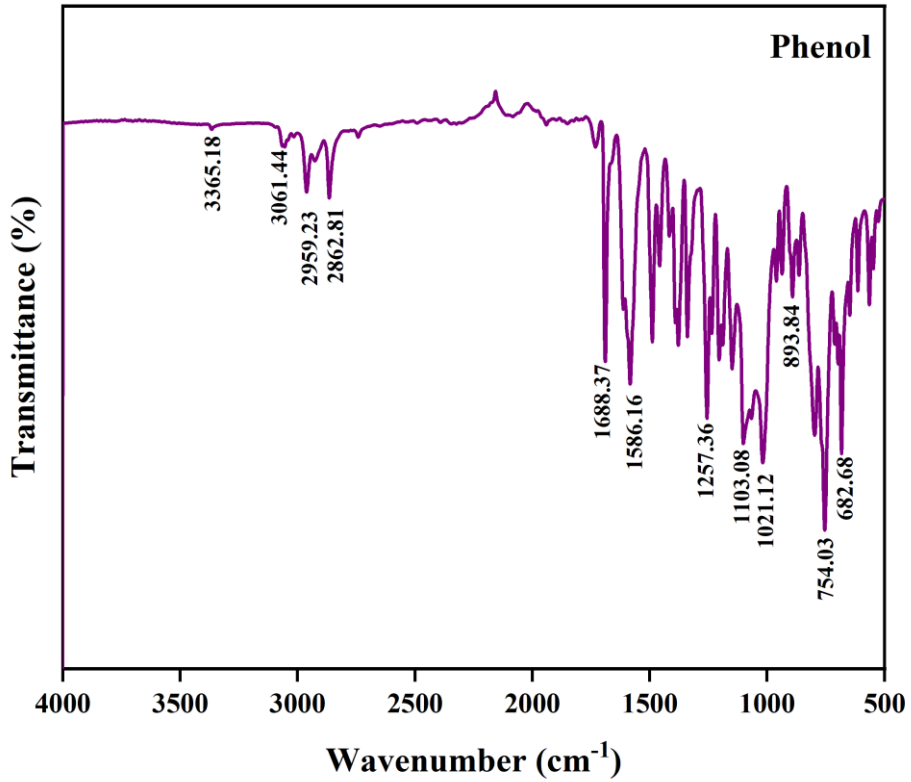

Figure S5. FTIR spectrum of 2-phenoxyquinoline-3-carbaldehyde **(3.1)**

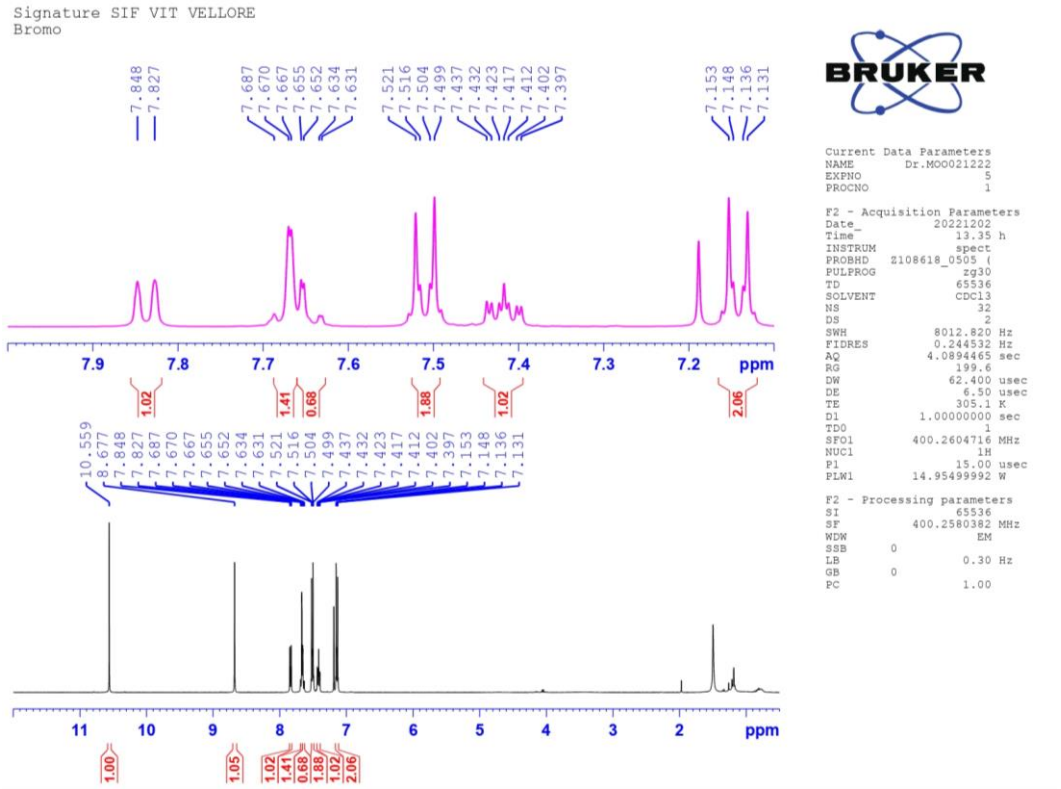

Figure S6. [1]H NMR spectrum of 2-(4-bromophenoxy)quinoline-3-carbaldehyde **(3.2)**

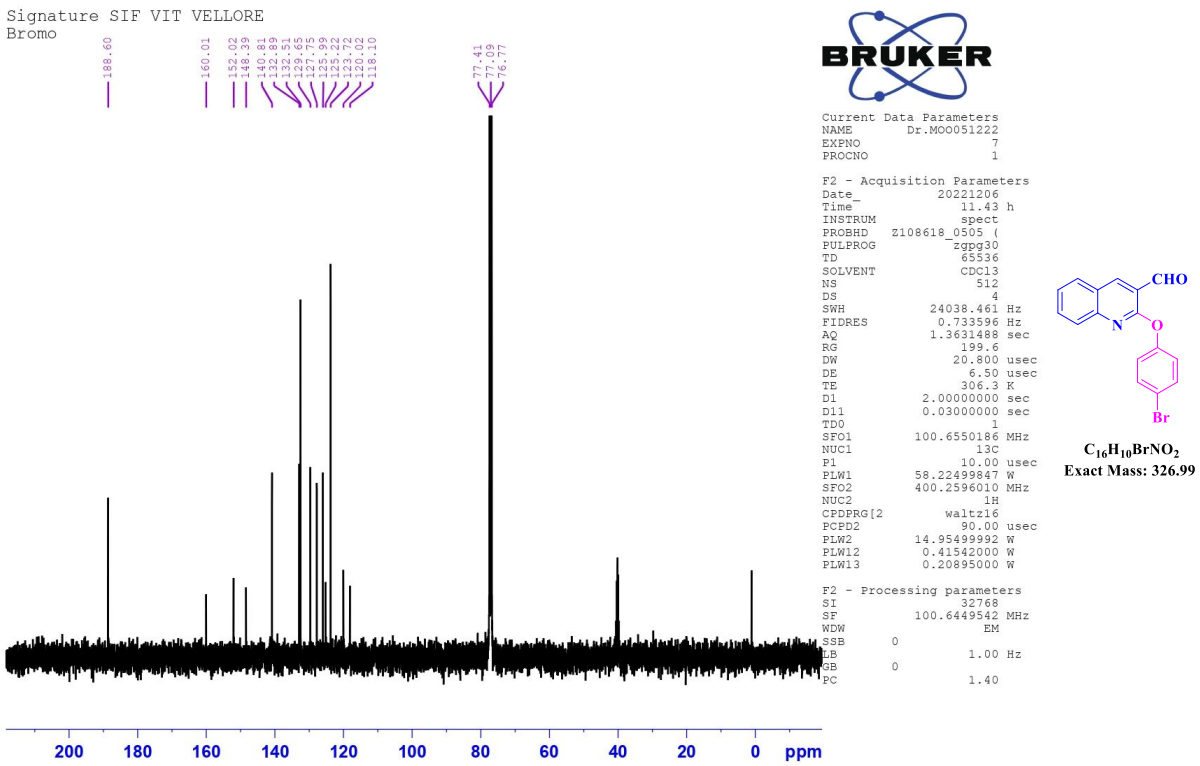

Figure S7. ^{13}C NMR spectrum of 2-(4-bromophenoxy)quinoline-3-carbaldehyde **(3.2)**

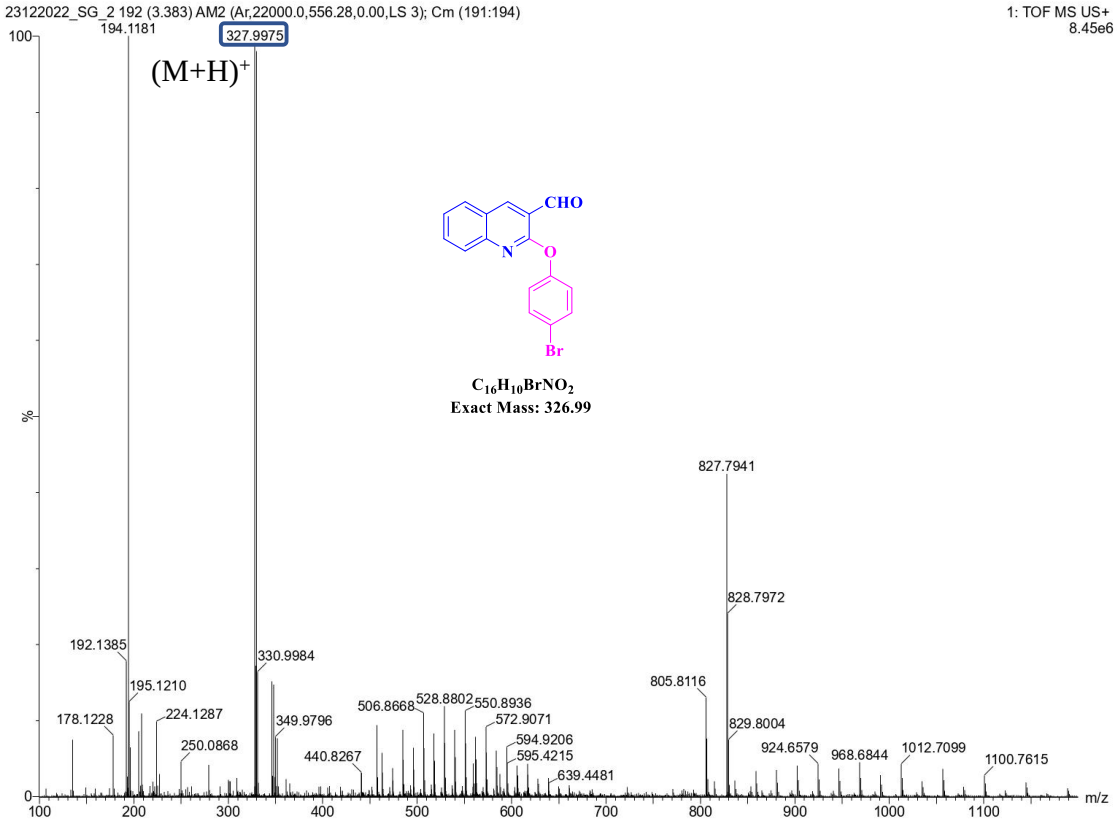

Figure S8. HRMS spectrum of 2-(4-bromophenoxy)quinoline-3-carbaldehyde **(3.2)**

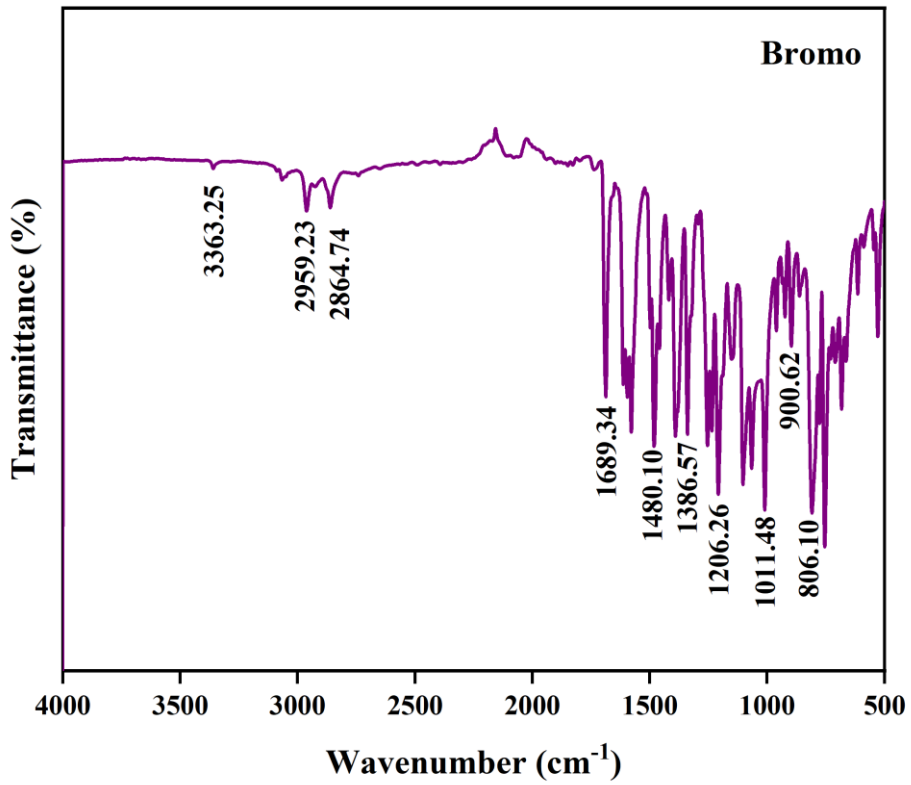

Figure S9. FTIR spectrum of 2-(4-bromophenoxy)quinoline-3-carbaldehyde **(3.2)**

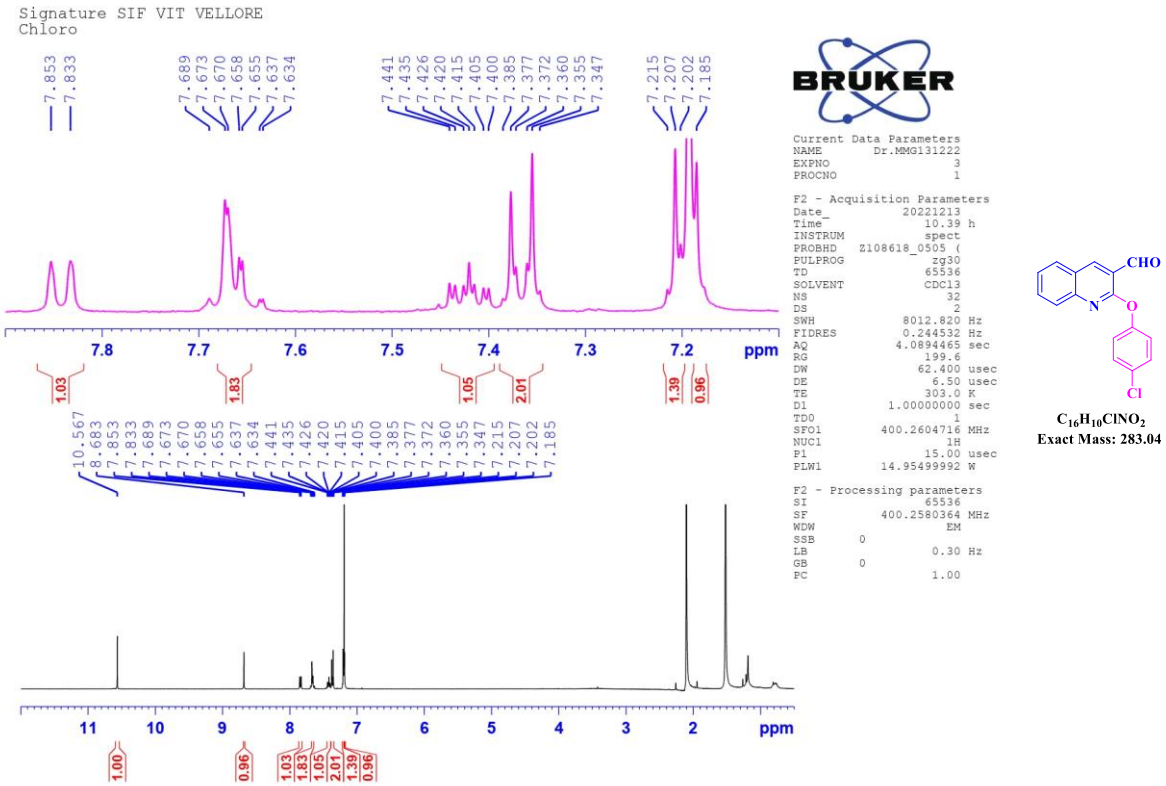

Figure S10. ^{1}H NMR spectrum of 2-(4-chlorophenoxy)quinoline-3-carbaldehyde **(3.3)**

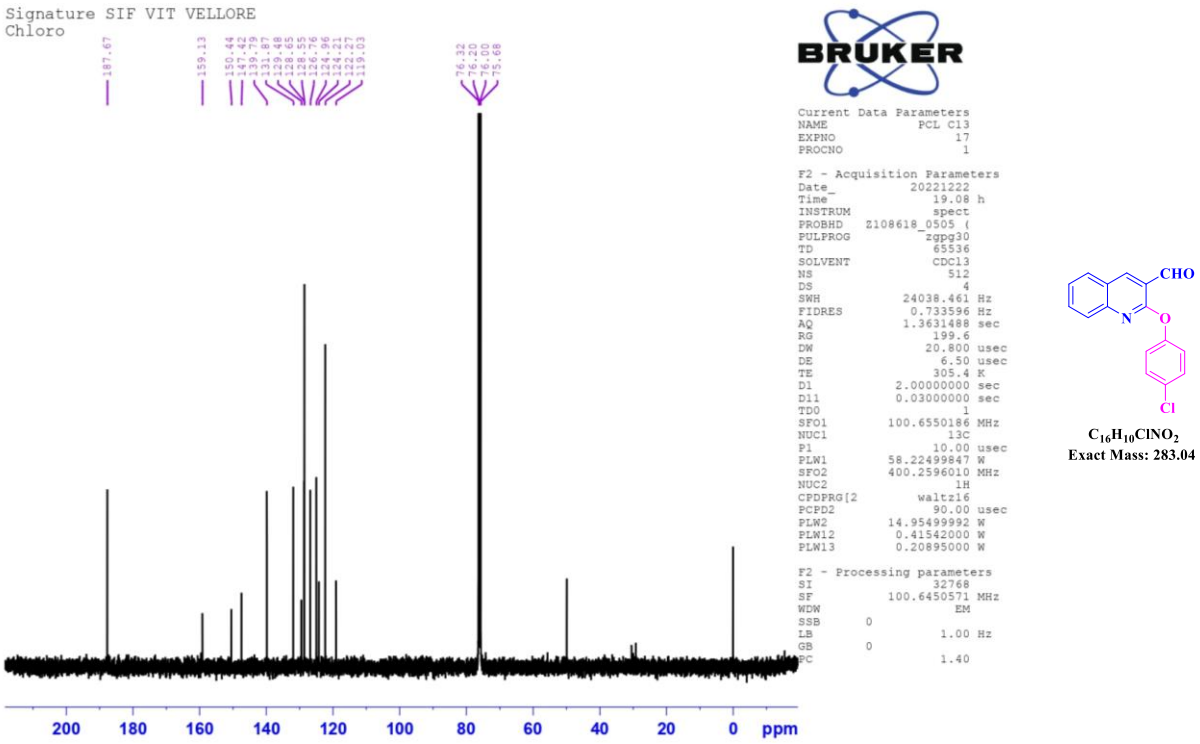

Figure S11. ^{13}C NMR spectrum of 2-(4-chlorophenoxy)quinoline-3-carbaldehyde **(3.3)**

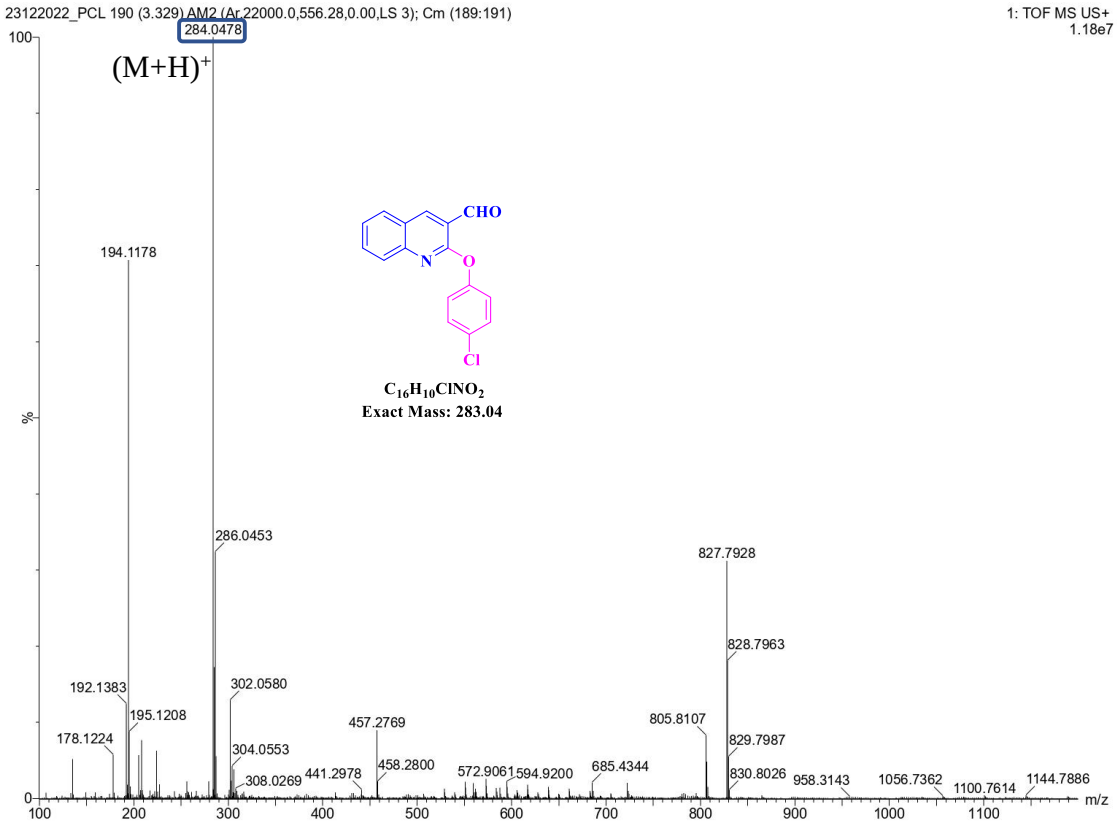

Figure S12. HRMS spectrum of 2-(4-chlorophenoxy)quinoline-3-carbaldehyde **(3.3)**

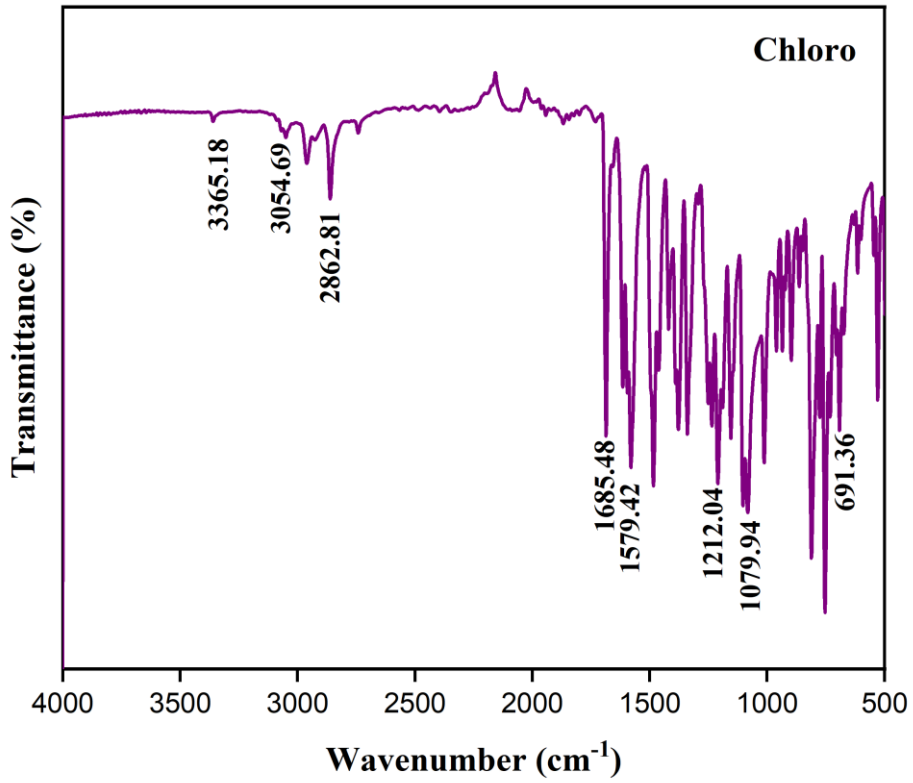

Figure S13. FTIR spectrum of 2-(4-chlorophenoxy)quinoline-3-carbaldehyde **(3.3)**

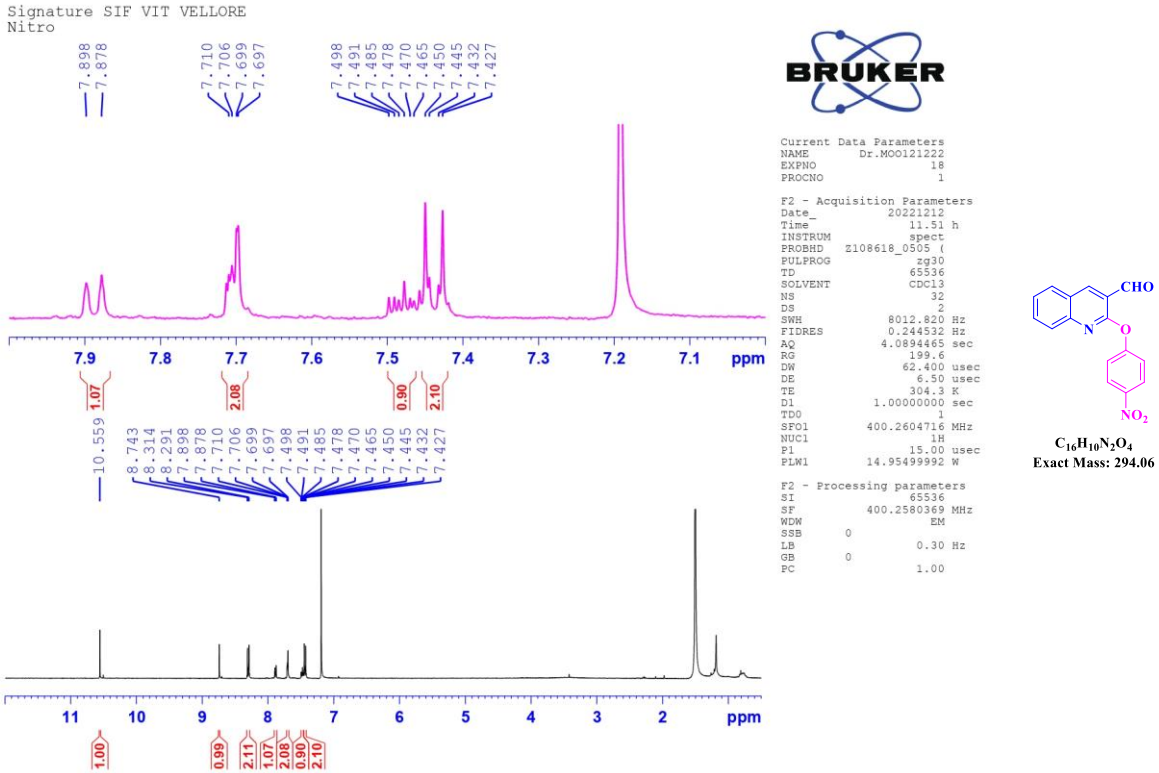

Figure S14. ^{1}H NMR spectrum of 2-(4-nitrophenoxy)quinoline-3-carbaldehyde **(3.4)**

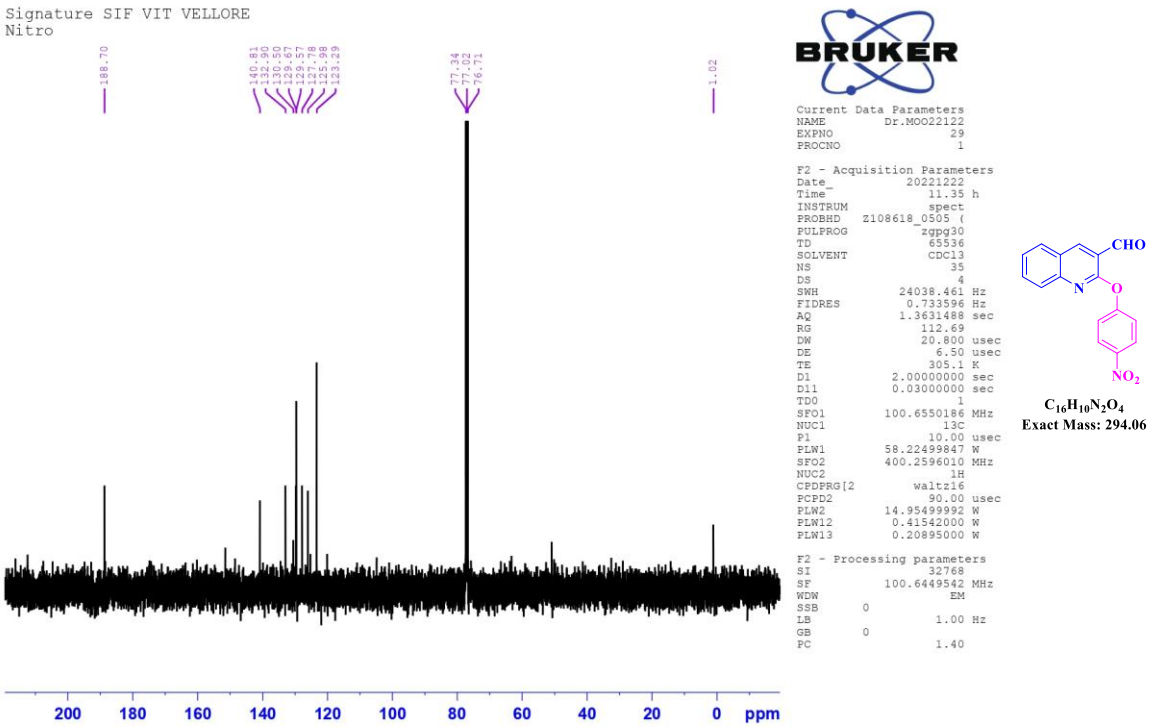

Figure S15. ^{13}C NMR spectrum of 2-(4-nitrophenoxy)quinoline-3-carbaldehyde **(3.4)**

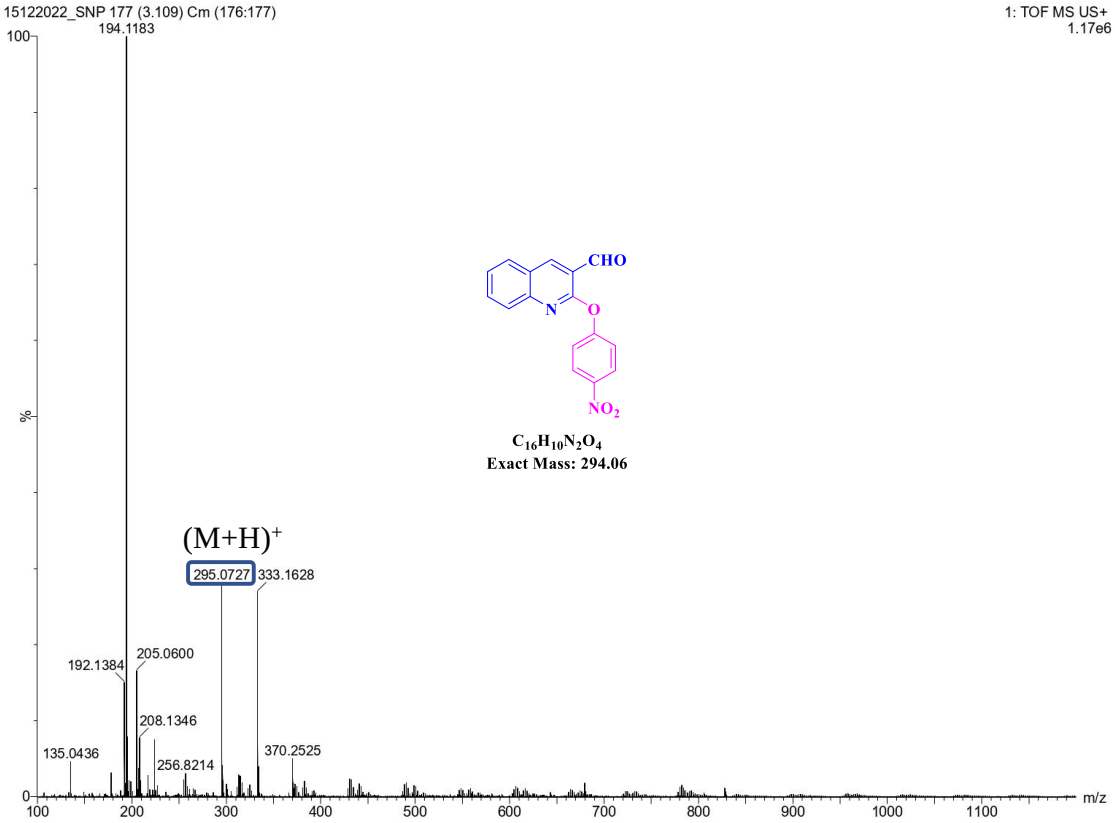

Figure S16. HRMS spectrum of 2-(4-nitrophenoxy)quinoline-3-carbaldehyde **(3.4)**

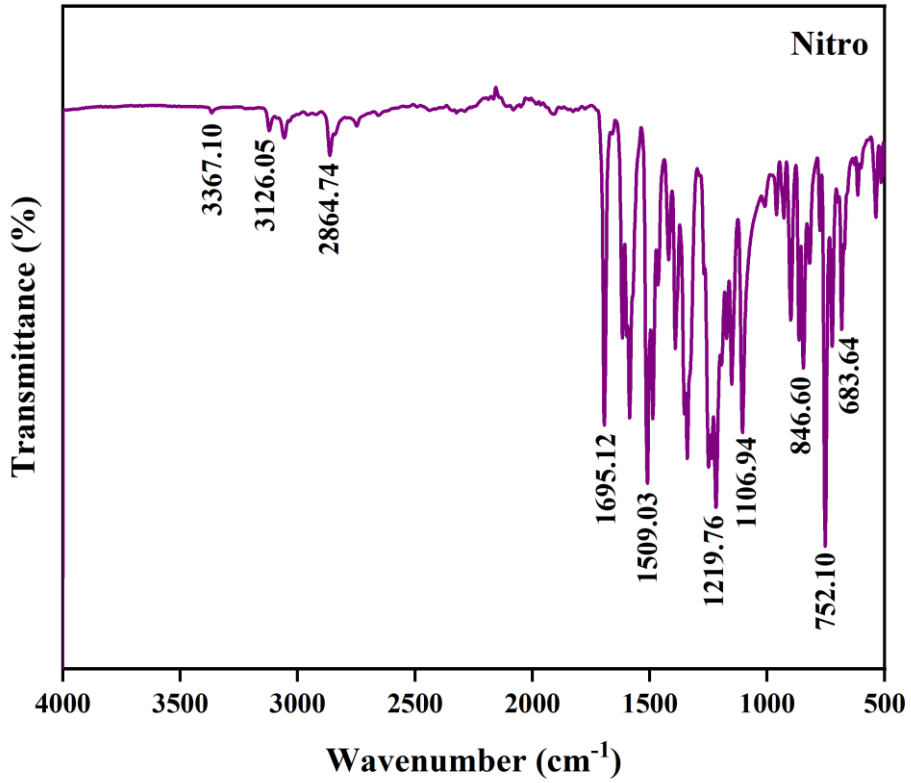

Figure S17. FTIR spectrum of 2-(4-nitrophenoxy)quinoline-3-carbaldehyde **(3.4)**

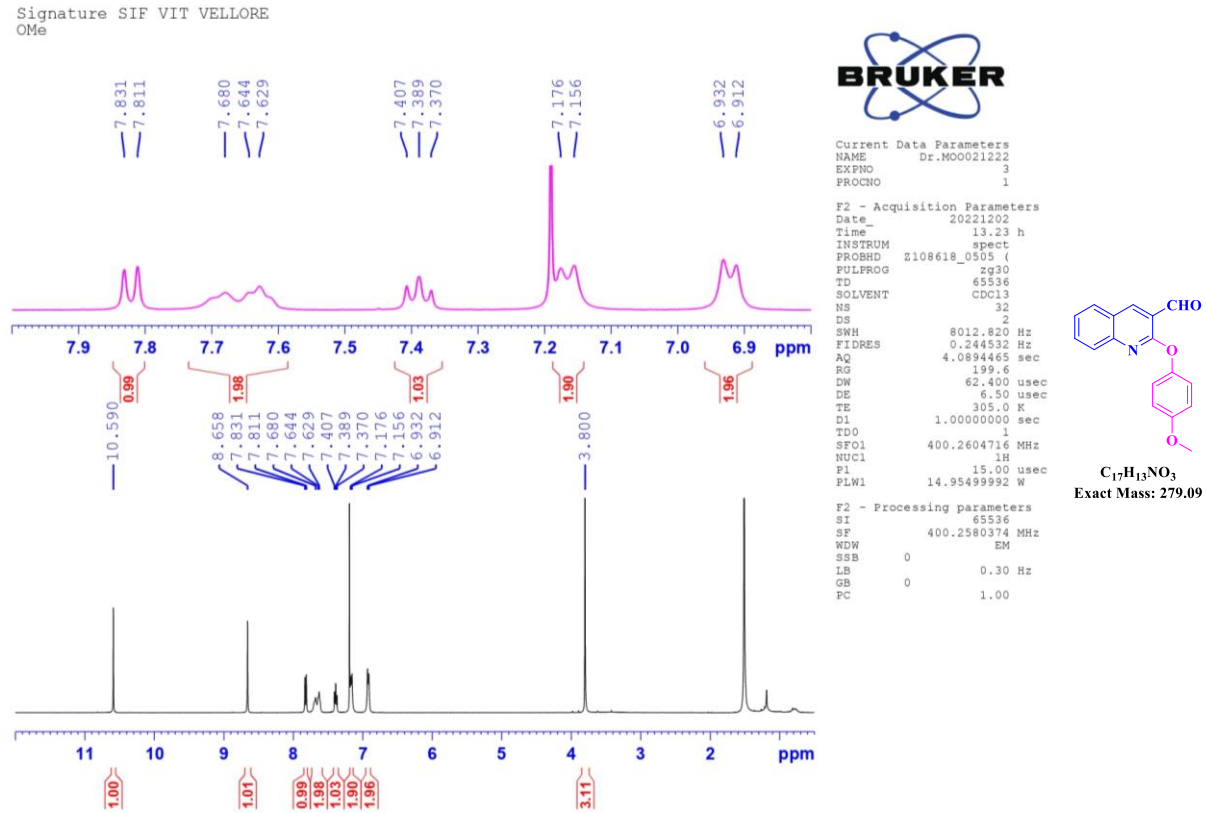

Figure S18. ^{1}H NMR spectrum of 2-(4-methoxyphenoxy)quinoline-3-carbaldehyde **(3.5)**

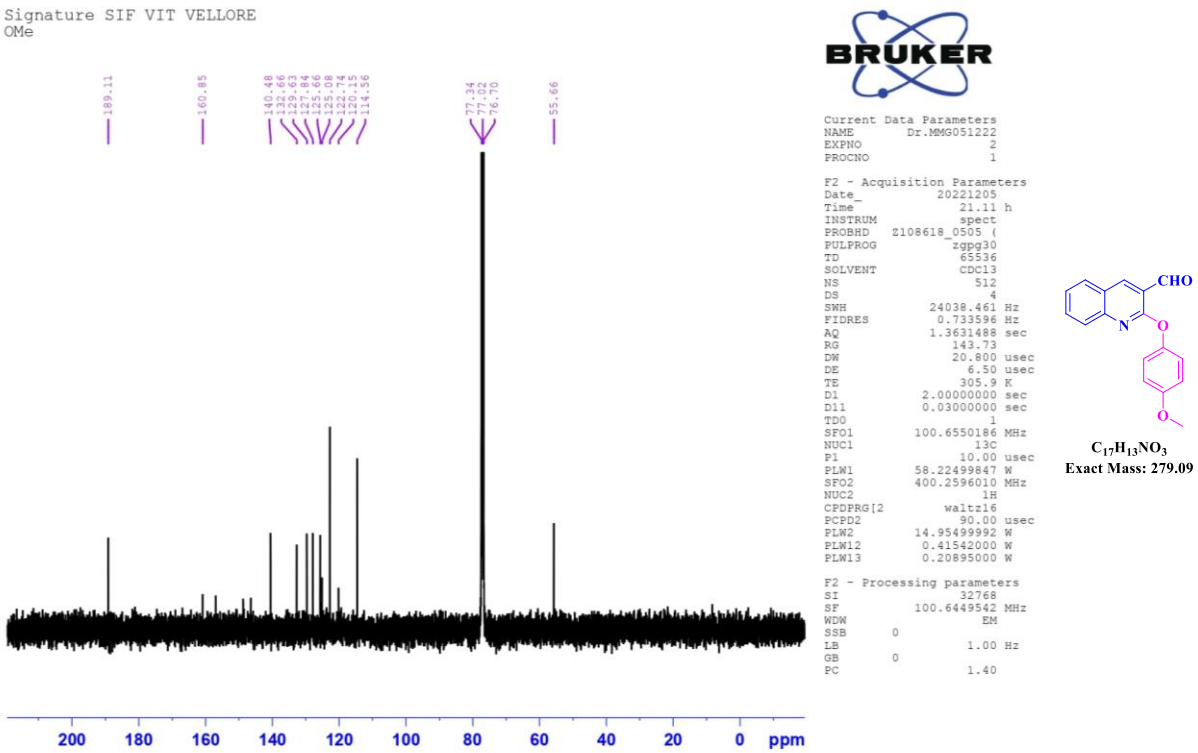

Figure S19. ^{13}C NMR spectrum of 2-(4-methoxyphenoxy)quinoline-3-carbaldehyde **(3.5)**

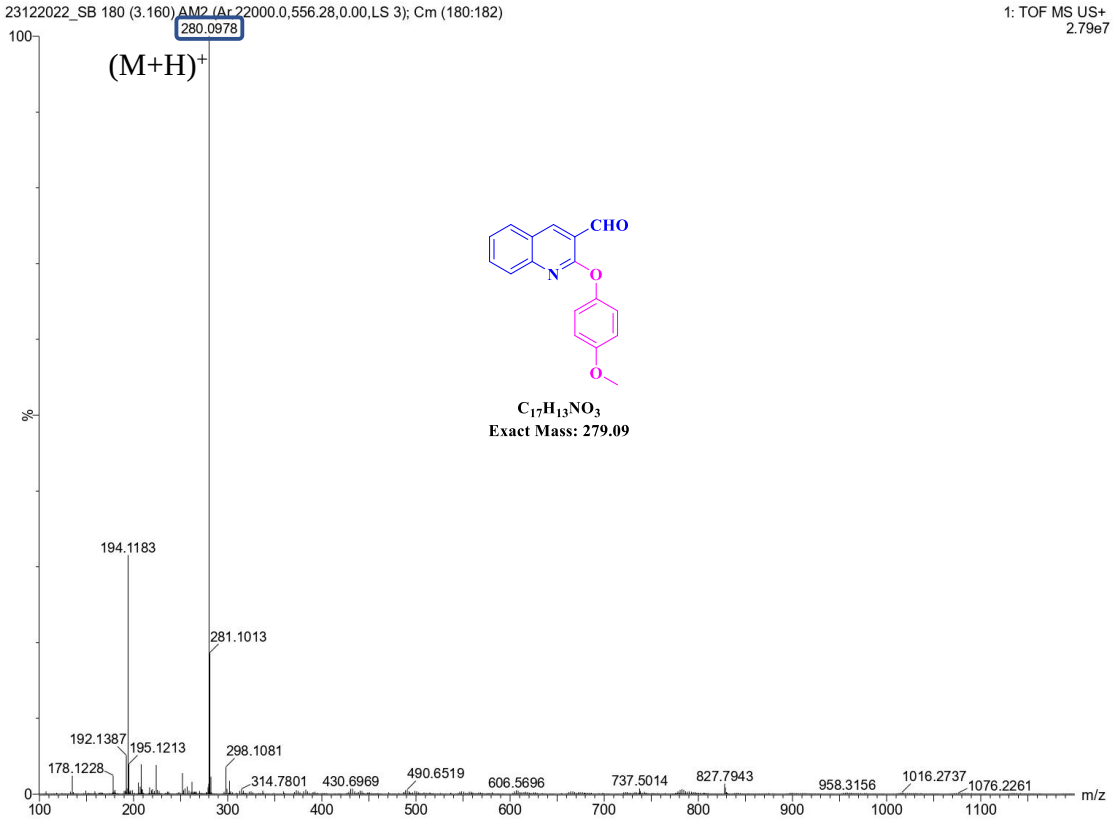

Figure S20. HRMS spectrum of 2-(4-methoxyphenoxy)quinoline-3-carbaldehyde **(3.5)**

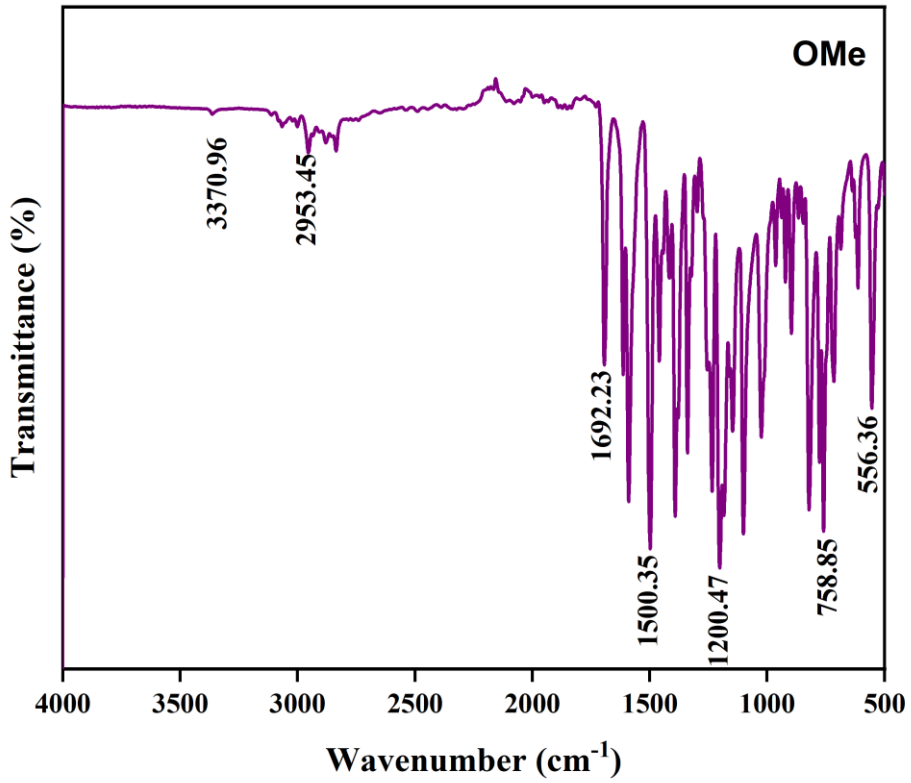

Figure S21. FTIR spectrum of 2-(4-methoxyphenoxy)quinoline-3-carbaldehyde **(3.5)**

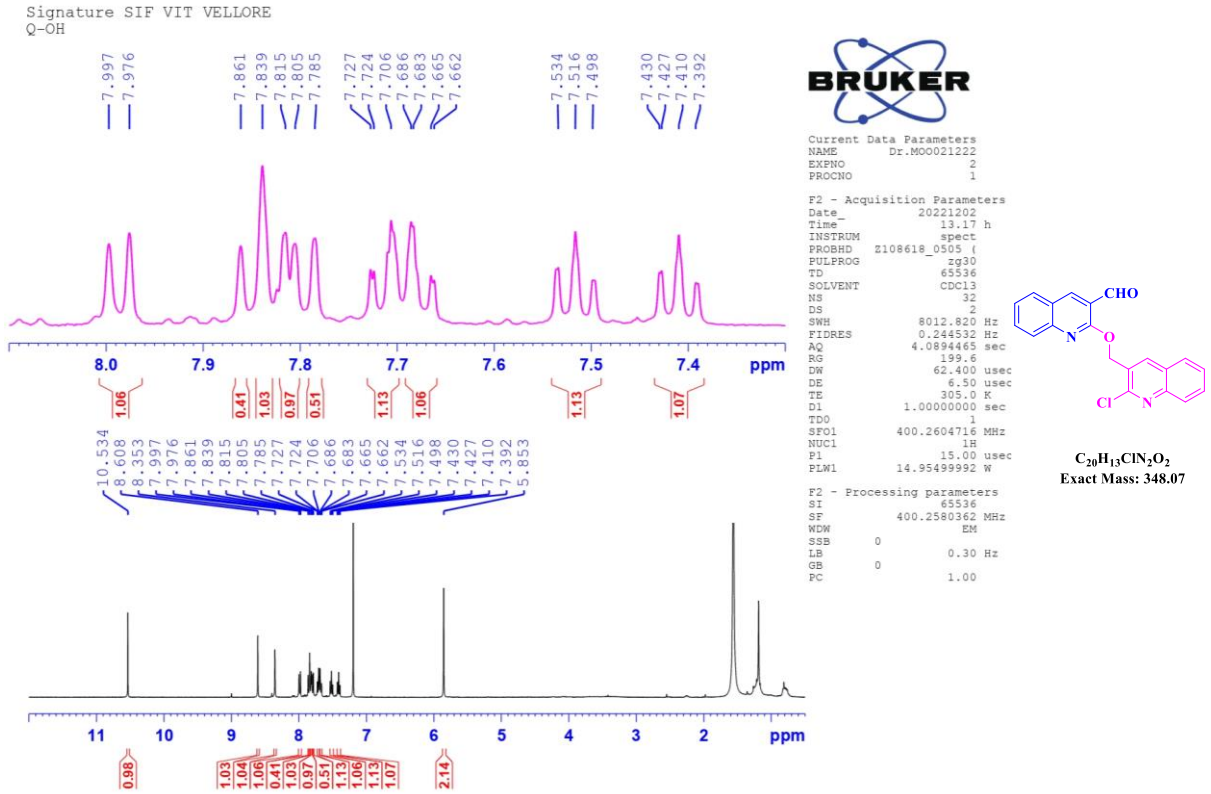

Figure S22. ^{1}H NMR spectrum of 2-((2-chloroquinolin-3-yl)methoxy)quinoline-3-carbaldehyde **(3.6)**

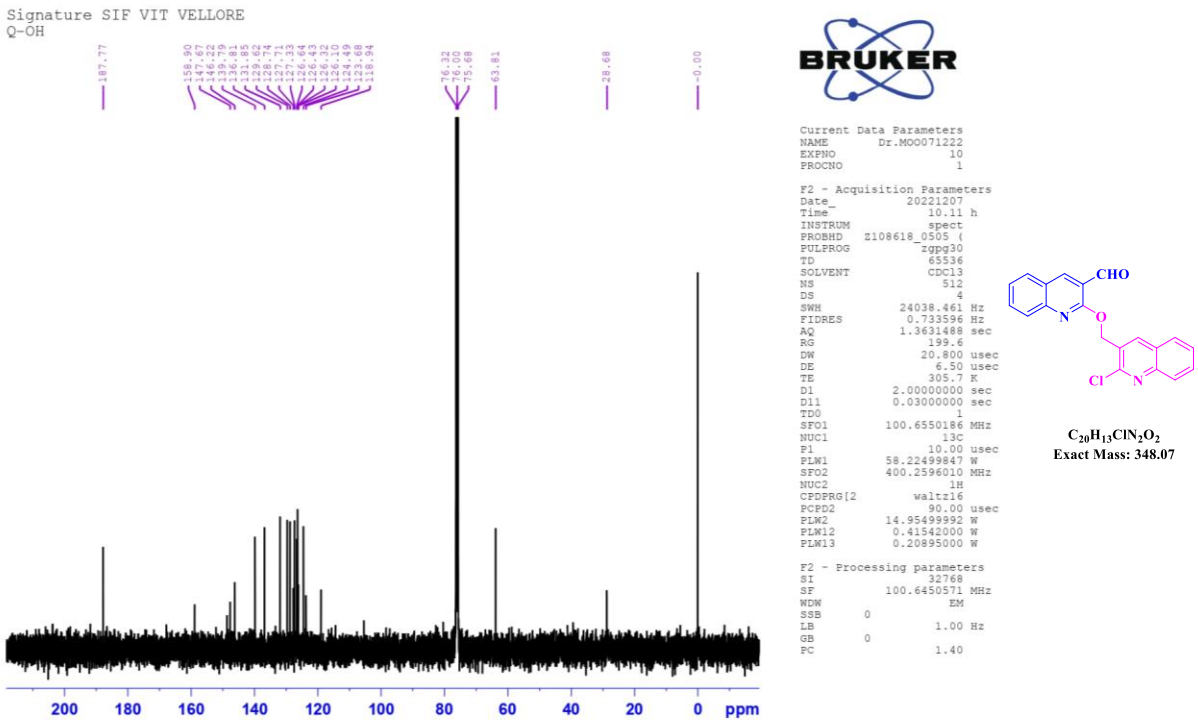

Figure S23. NMR spectrum of 2-((2-chloroquinolin-3-yl)methoxy)quinoline-3-carbaldehyde **(3.6)**

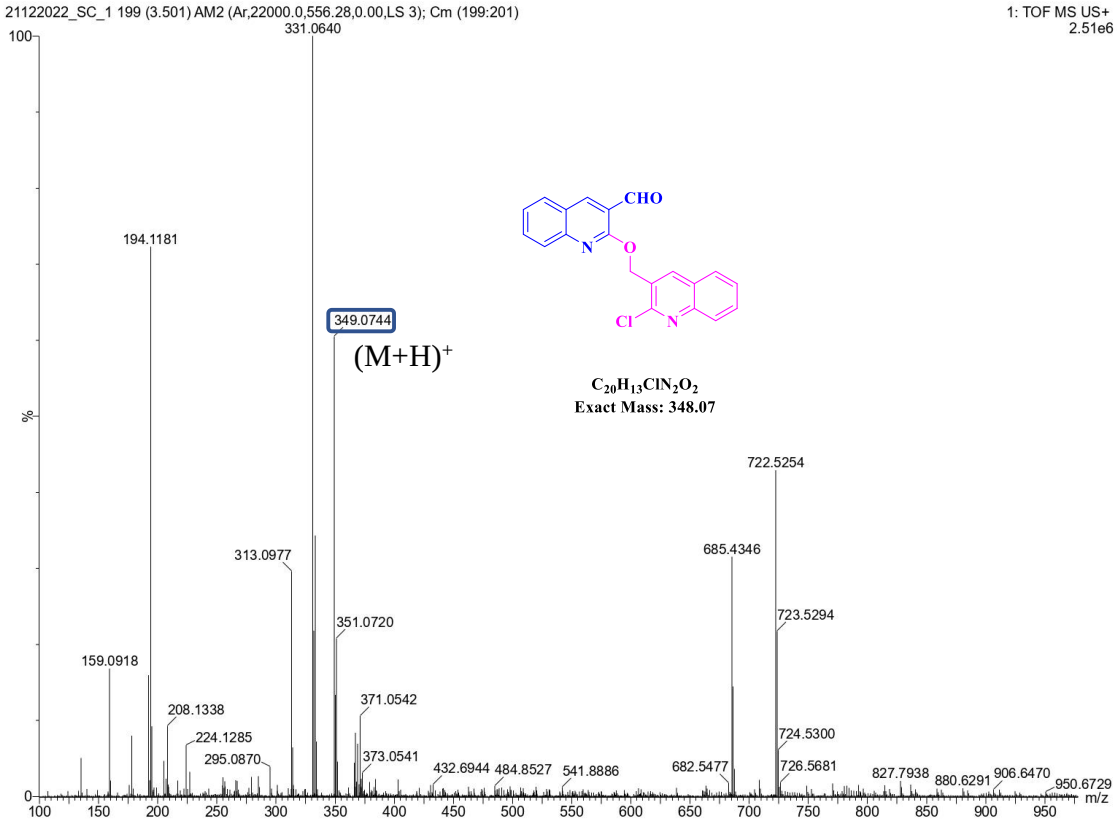

Figure S24. HRMS spectrum of 2-((2-chloroquinolin-3-yl)methoxy)quinoline-3-carbaldehyde **(3.6)**

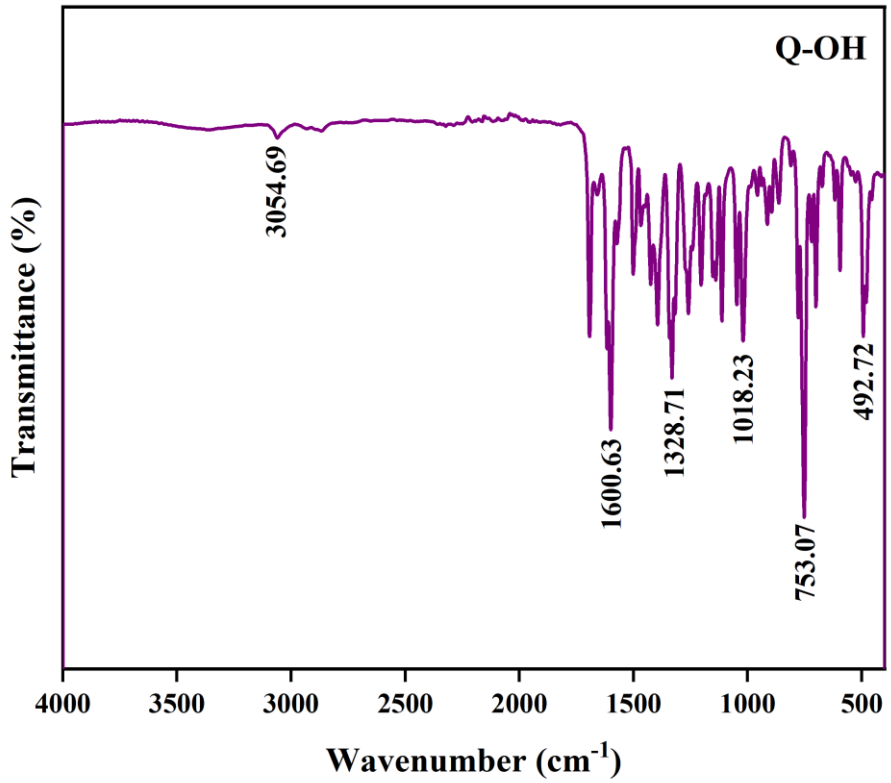

Figure S25. FTIR spectrum of 2-((2-chloroquinolin-3-yl)methoxy)quinoline-3-carbaldehyde **(3.6)**

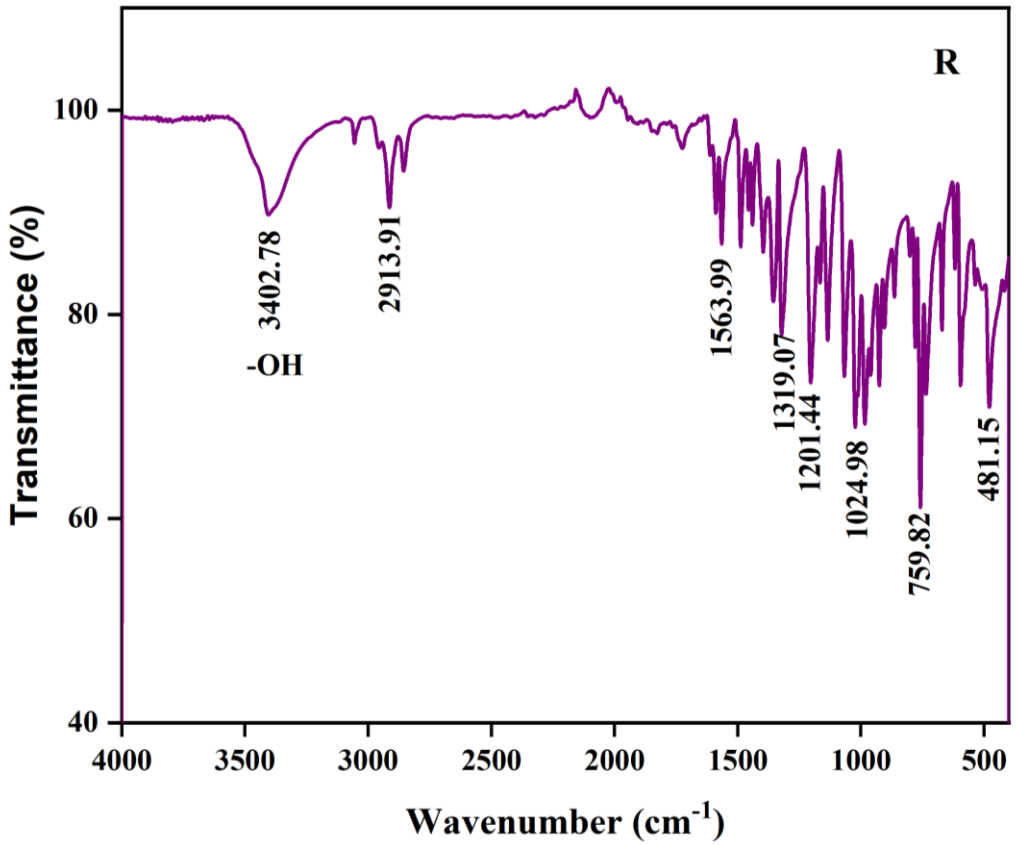

Figure S26. FTIR spectrum of (2-chloroquinolin-3-yl)methanol

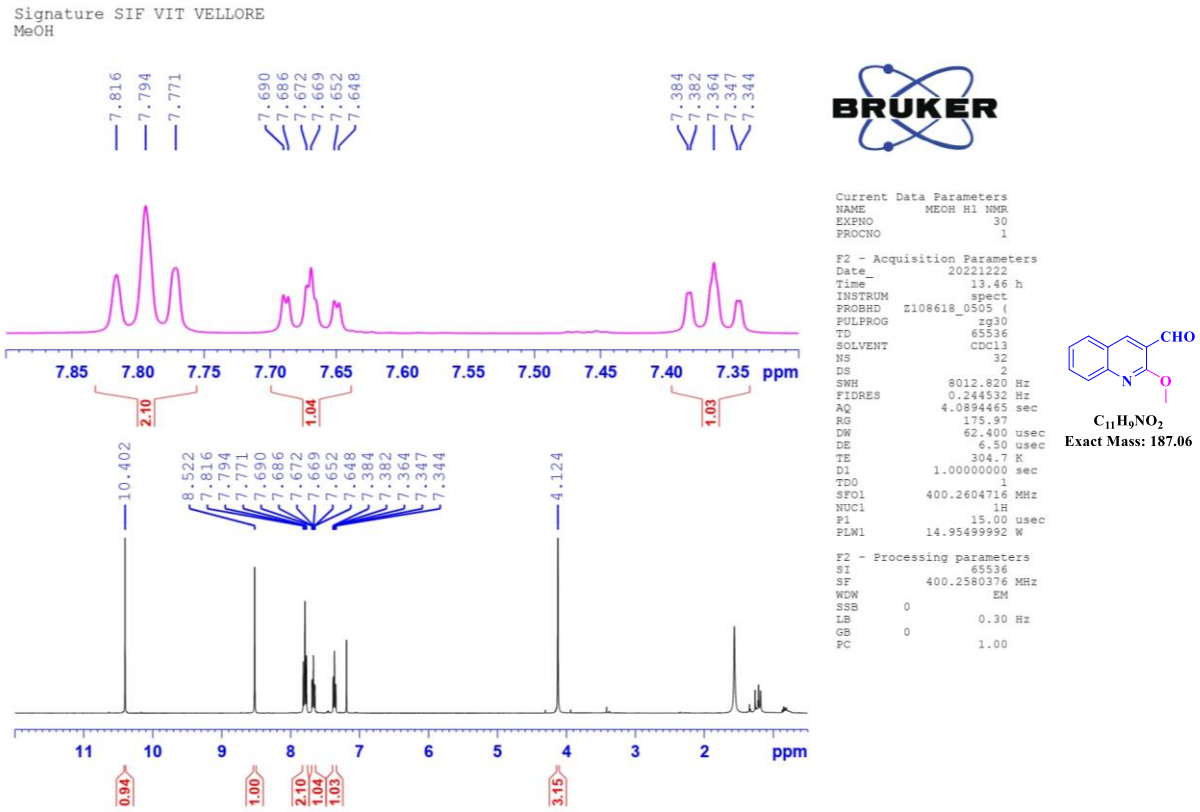

Figure S27. ^{1}H NMR spectrum of 2-methoxyquinoline-3-carbaldehyde **(3.7)**

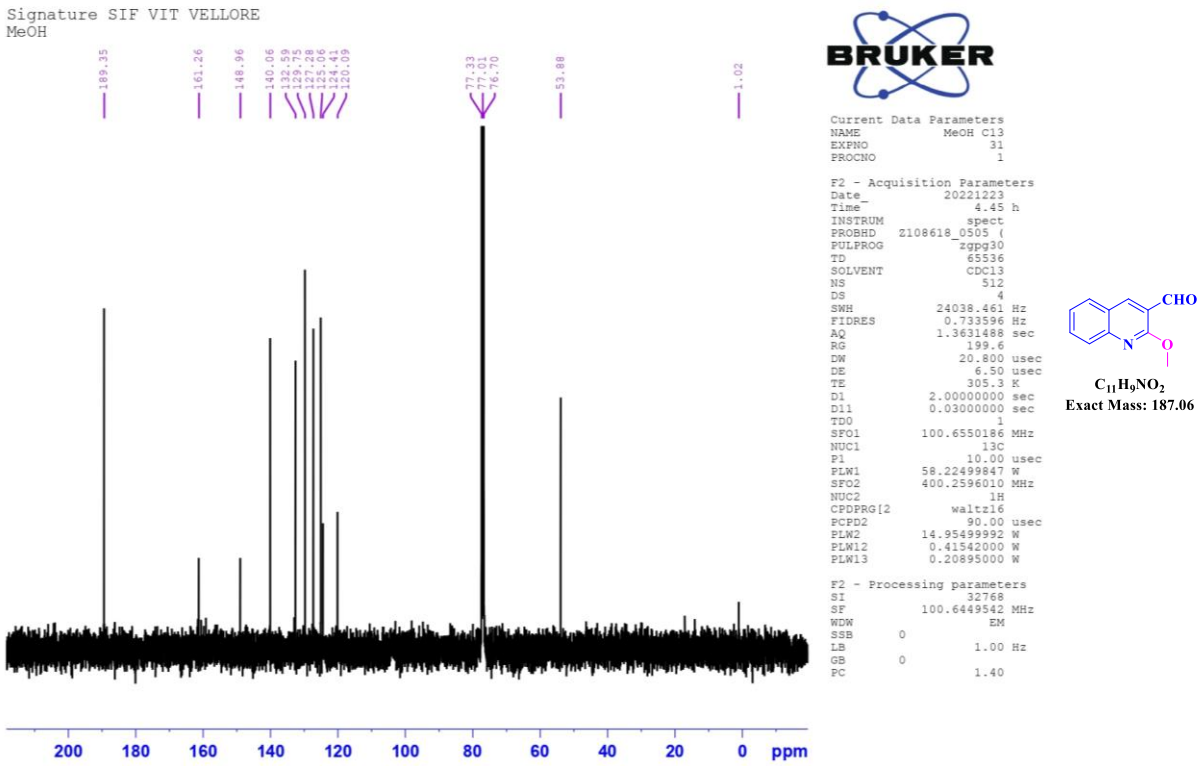

Figure S28. ^{13}C NMR spectrum of 2-methoxyquinoline-3-carbaldehyde **(3.7)**

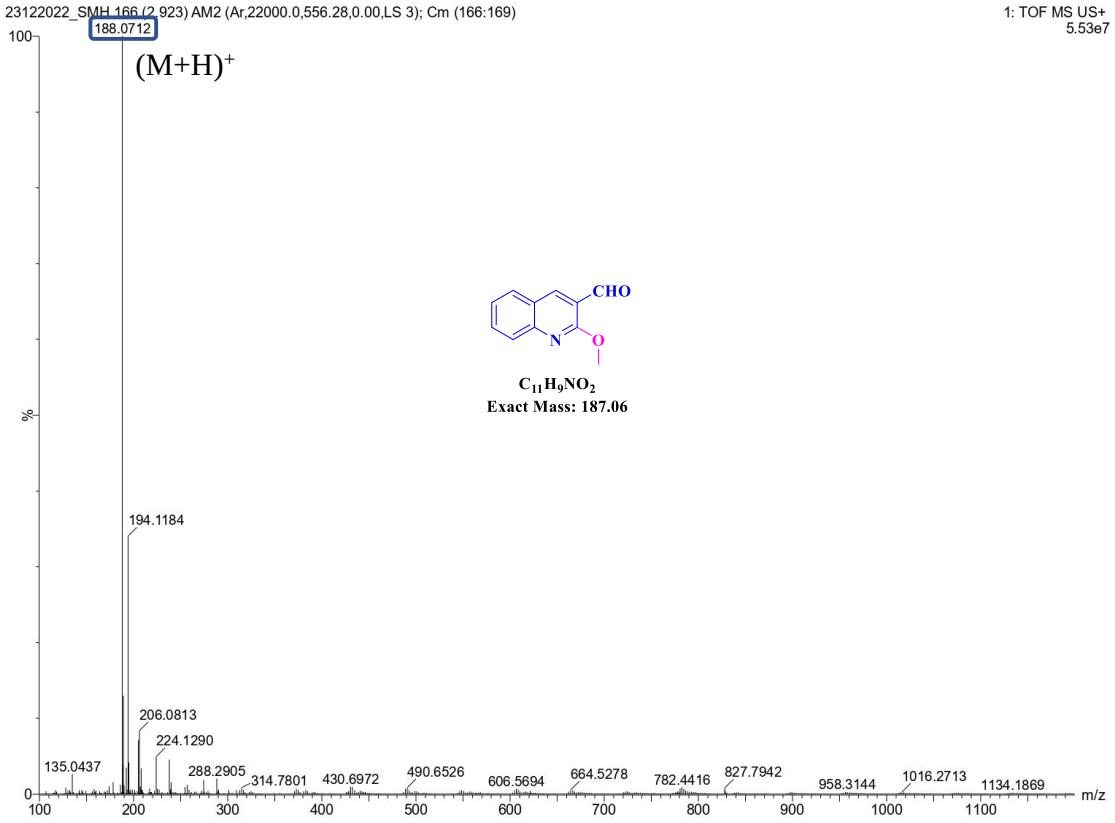

Figure S29. HRMS spectrum of 2-methoxyquinoline-3-carbaldehyde **(3.7)**

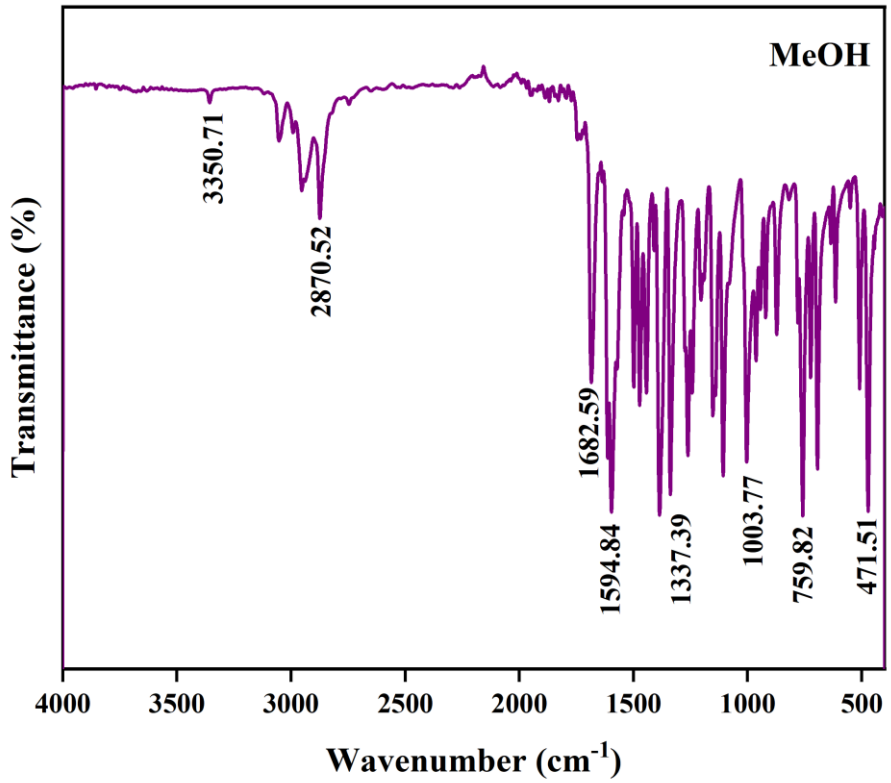

Figure S30. FTIR spectrum of 2-methoxyquinoline-3-carbaldehyde **(3.7)**