coatings

Supplementary Materials: Photocatalytic oxidation of amoxicillin in CPC reactor over 3D printed TiO_2/CNT – PETG static mixers

Kristina Miklec [1], Ivana Grčić [1*], Lucija Radetić [1], Ivan Karlo Cingesar [2] and Domagoj Vrsaljko [2]

[1] University of Zagreb, Faculty of Geotechnical Engineering, Hallerova aleja 7, HR-42000 Varaždin, Croatia
[2] University of Zagreb, Faculty of Chemical Engineering and Technology, Marulićev trg 19, HR-10000 Zagreb, Croatia
* Correspondence: ivana.grcic@gfv.unizg.hr

1. Experimental setup

Figure S1. Experimental system – CPC reactor in Laboratory for Environmental Engineering (Faculty of Geotechnical Engineering, University of Zagreb).

Figure S2. Q-TOF LC/MS (Faculty of Geotechnical Engineering, University of Zagreb).

2. FTIR analysis of static mixers and used materials

FTIR spectra are shown in Figure S1.Peak between wavelength 3000 cm^{-1} and 2850 cm^{-1} are characteristic for stretching vibrations of C – H bond in CH_2 groups. Peak on 1713 cm^{-1} is related to stretching vibrations of C = O bond in carbonyl groups. All peaks

between 1600 cm^{-1} and 1450 cm^{-1} are connected with stretching vibrations of C – C bond in benzene ring. Strong peak occurs on 1240 cm^{-1} which indicated presence of ester groups. 1093 cm^{-1} and 1016 cm^{-1} peaks are related to the in-plane vibrations of the C – H bonds [21]. Furthermore, C – H out-of-plane deformation of two carbonyl substituents on the aromatic ring on 723 cm^{-1} are visible in FTIR spectra [22]. All the peaks are visible in all of the characterized samples.

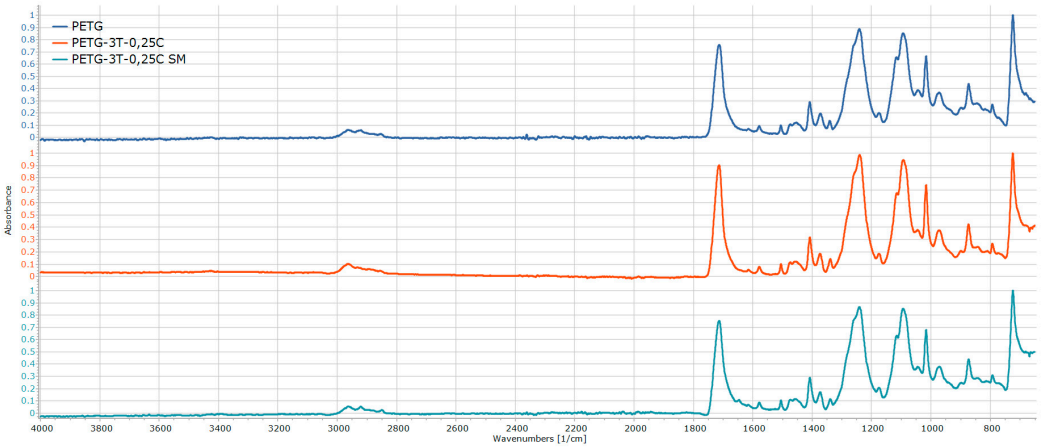

Figure S3. FTIR spectra of a PETG, PETG-3T-0,25C and PETG-3T-0,25C SM.

3. Surface investigation

Water contact angles were measured to define the surface hydrophilicity.

Figure S4. Visualization of water drop on static mixers with fillers: (from left to right) 3TiO_2-0CNT @PETG, 3TiO_2-0.25CNT @PETG, 3TiO2-0.5CNT @PETG.

Measured water contact angle for pure PETG static mixer (referent) was (63.8 ± 0.5)°. Similar results were obtained for static mixers with only TiO_2 added as fillers, while water contact angles for mixers with CNT were higher. E.g. measured angle for 3TiO_2-0.25CNT @PETG was (91.1 ± 3.5)°.

4. Chromatograms and mass spectra

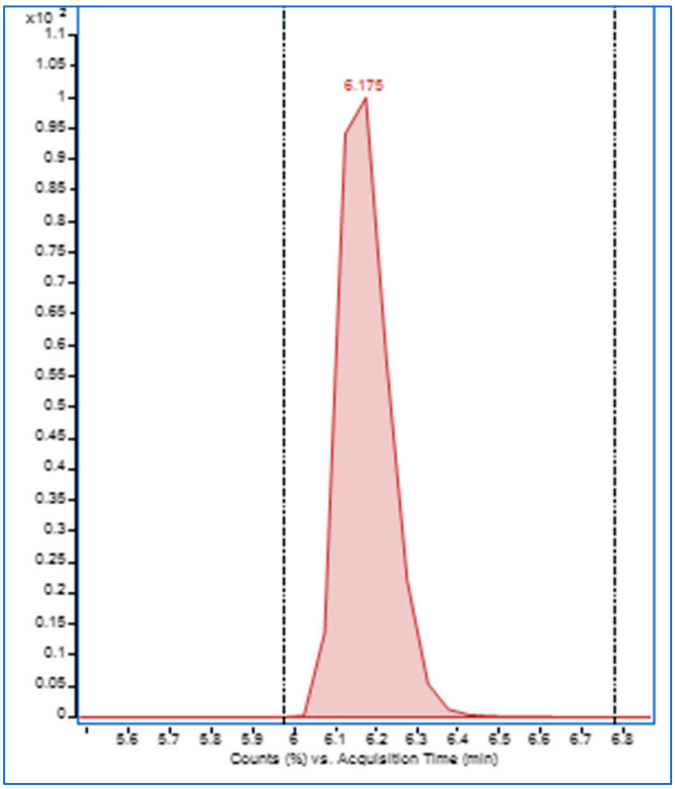

Figure S5. Chromatogram results - amoxicillin.

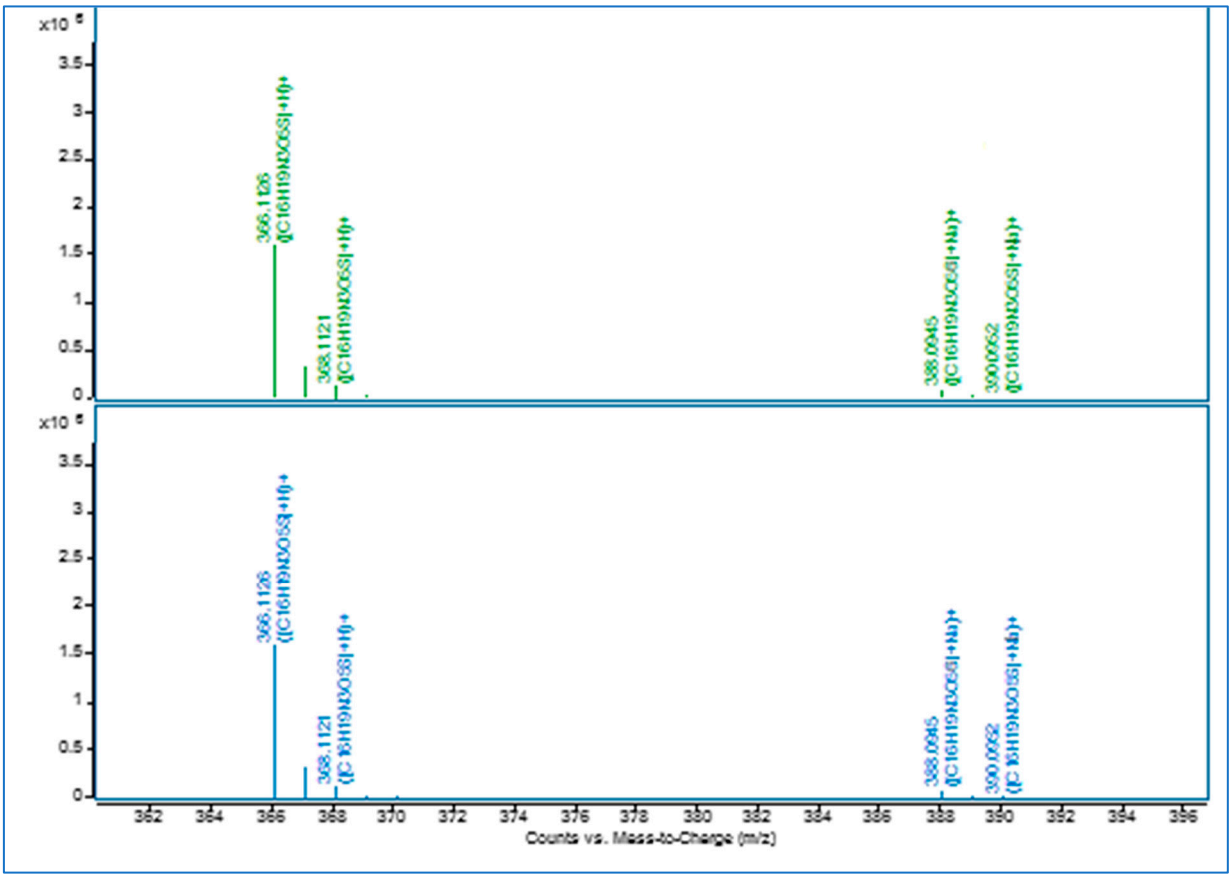

Figure S6. MS spectrum results - amoxicillin.

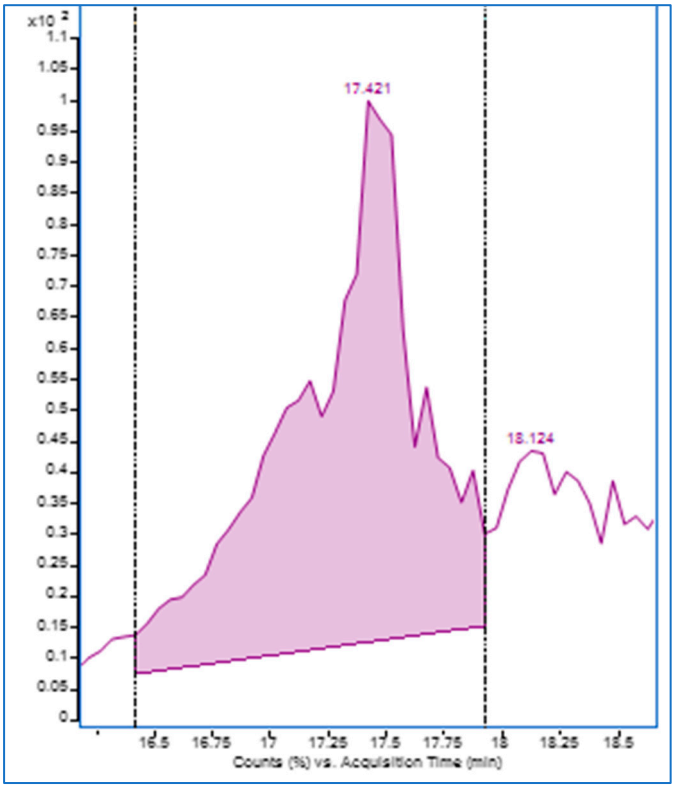

Figure S7. Cromatogram results - Photocatalysis product #1.

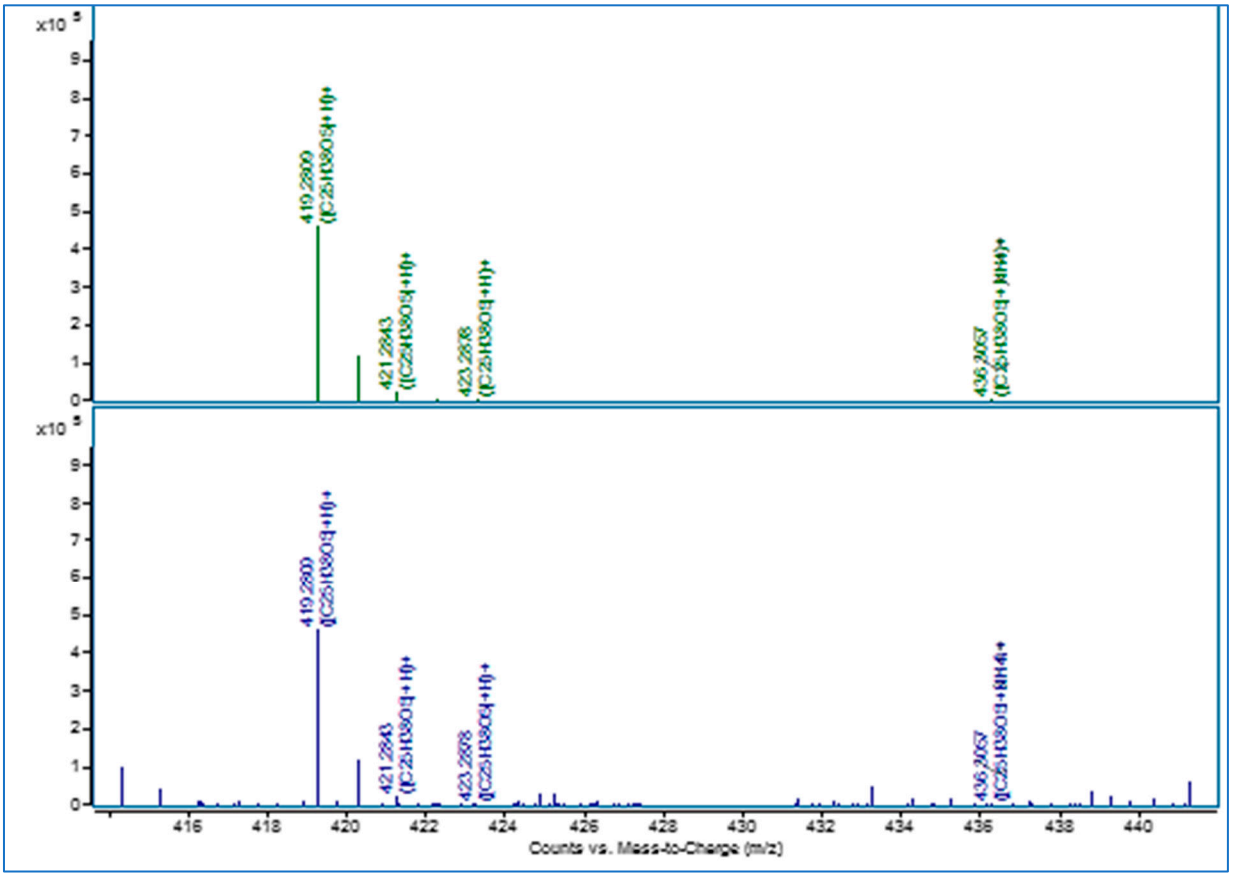

Figure S8. MS spectrum results - Photocatalysis product #1.

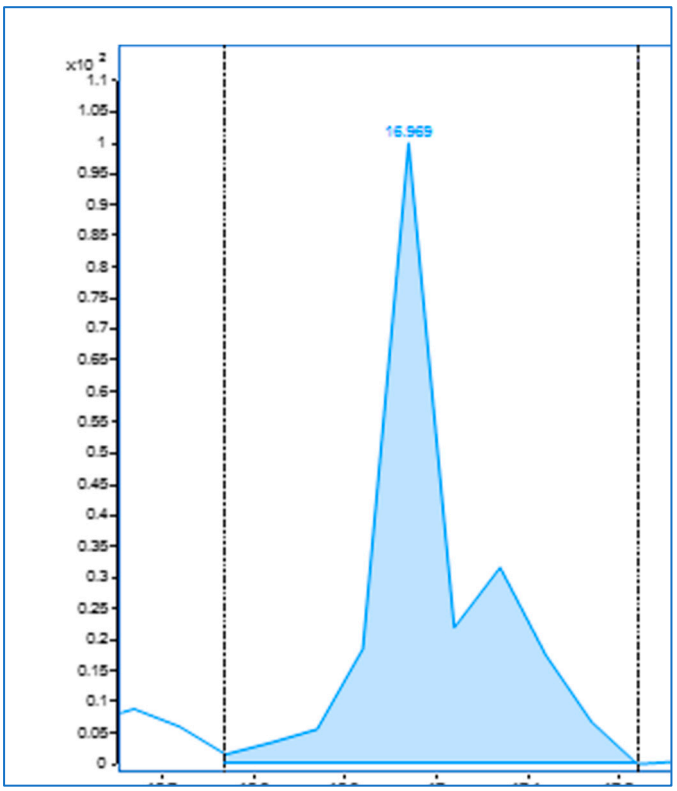

Figure S9. Cromatogram results - 2-Amino-2-(4-hydroxyphenyl)-N-{(Z)-[3-(4-hydroxyphenyl)-2-oxo-2,3,6,7-tetrahydro1H-1,4-diaze-pin-5-yl]methylidene}-acetamide.

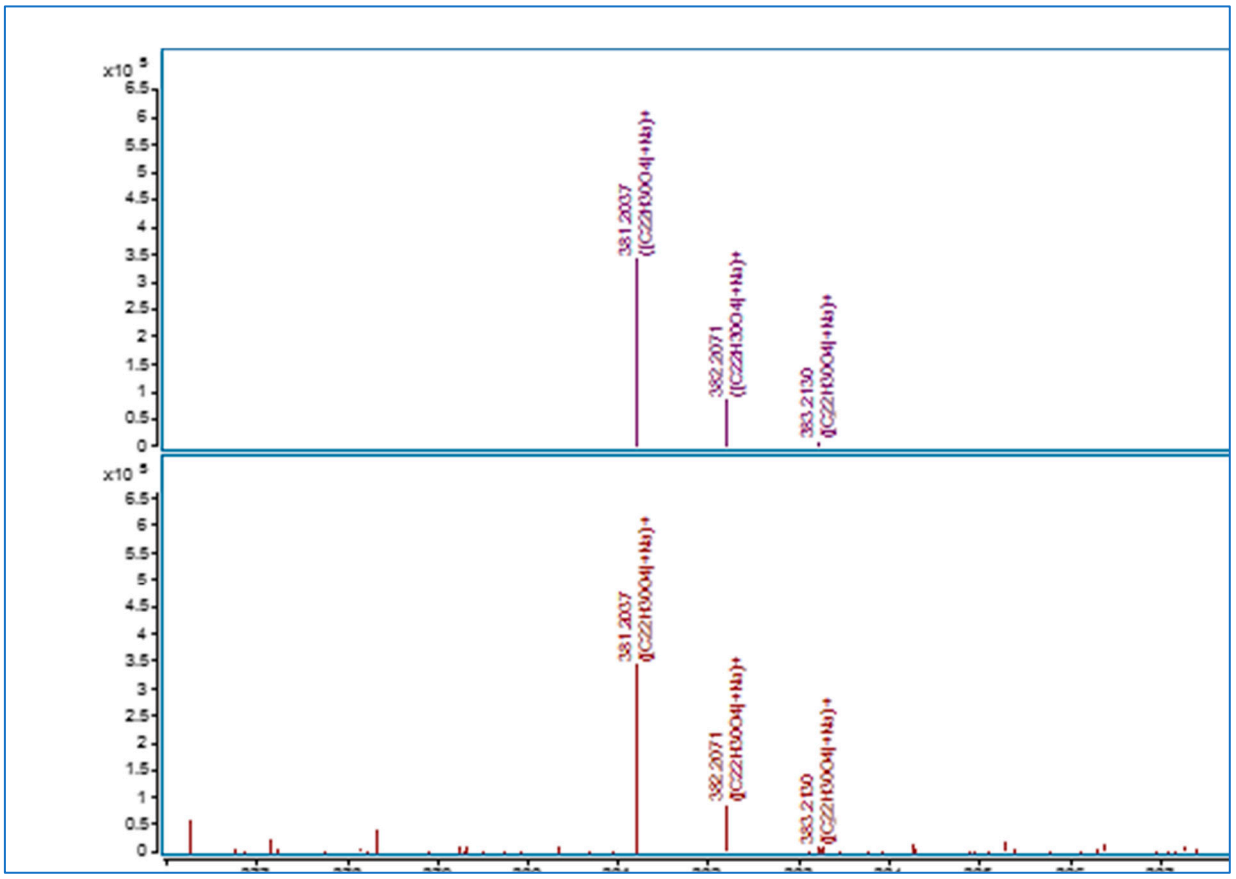

Figure S10. MS spectrum results - 2-Amino-2-(4-hydroxyphenyl)-N-{(Z)-[3-(4-hydroxyphenyl)-2-oxo-2,3,6,7-tetrahydro1H-1,4-diaze-pin-5-yl]methylidene}-acetamide.

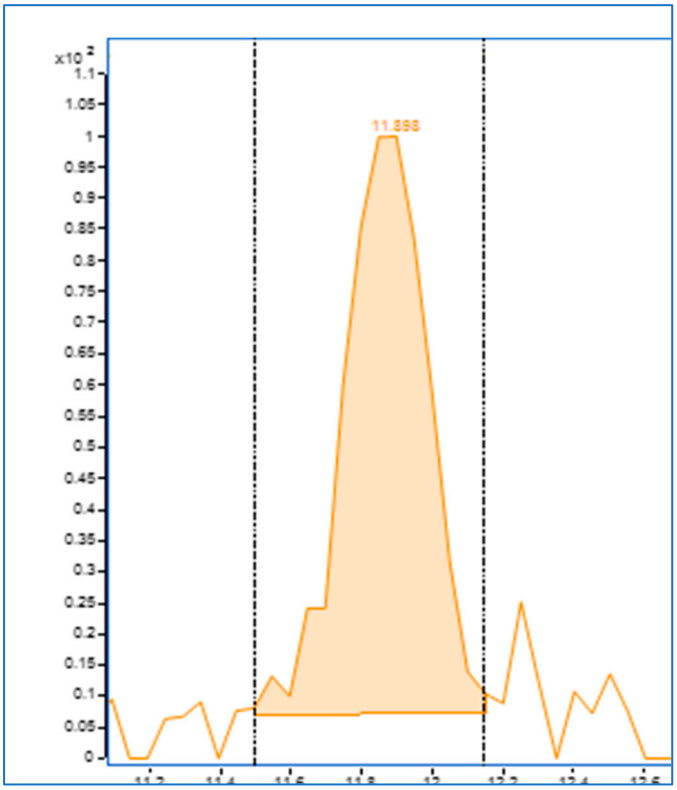

Figure S11. Cromatogram results - Dehydrocarboxylated amoxicillin penilloic acid.

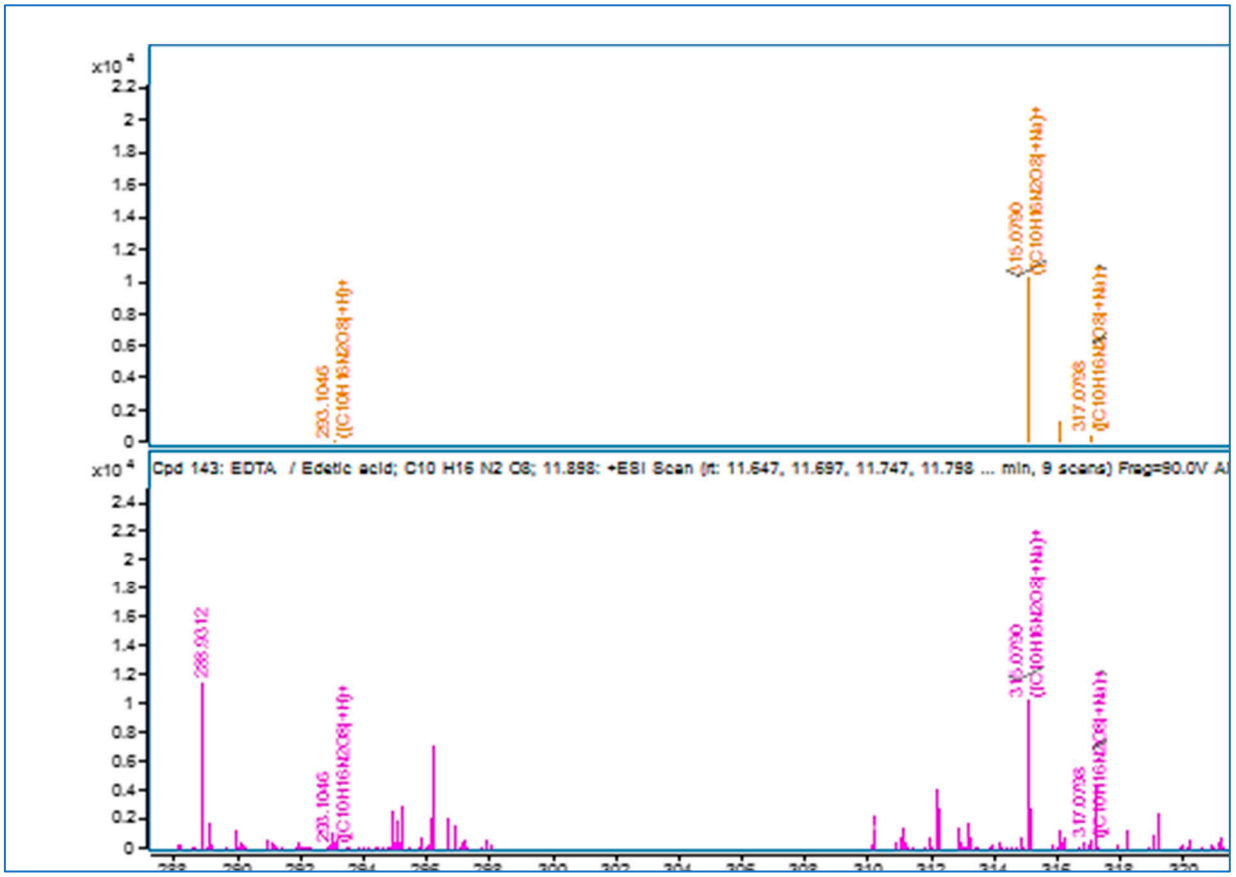

Figure S12. MS spectrum results - Dehydrocarboxylated amoxicillin penilloic acid.

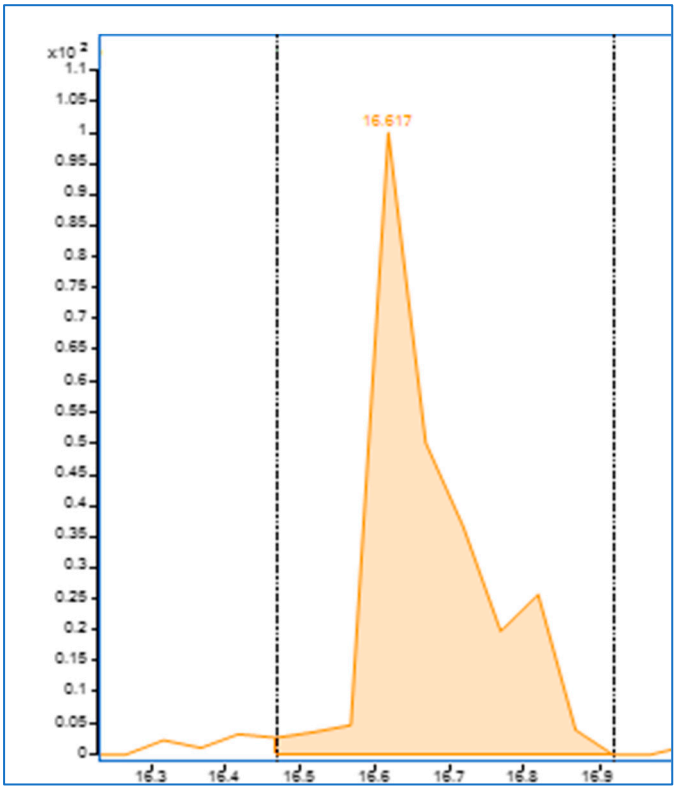

Figure S13. Cromatogram results - Amoxicillin penicilloic acid.

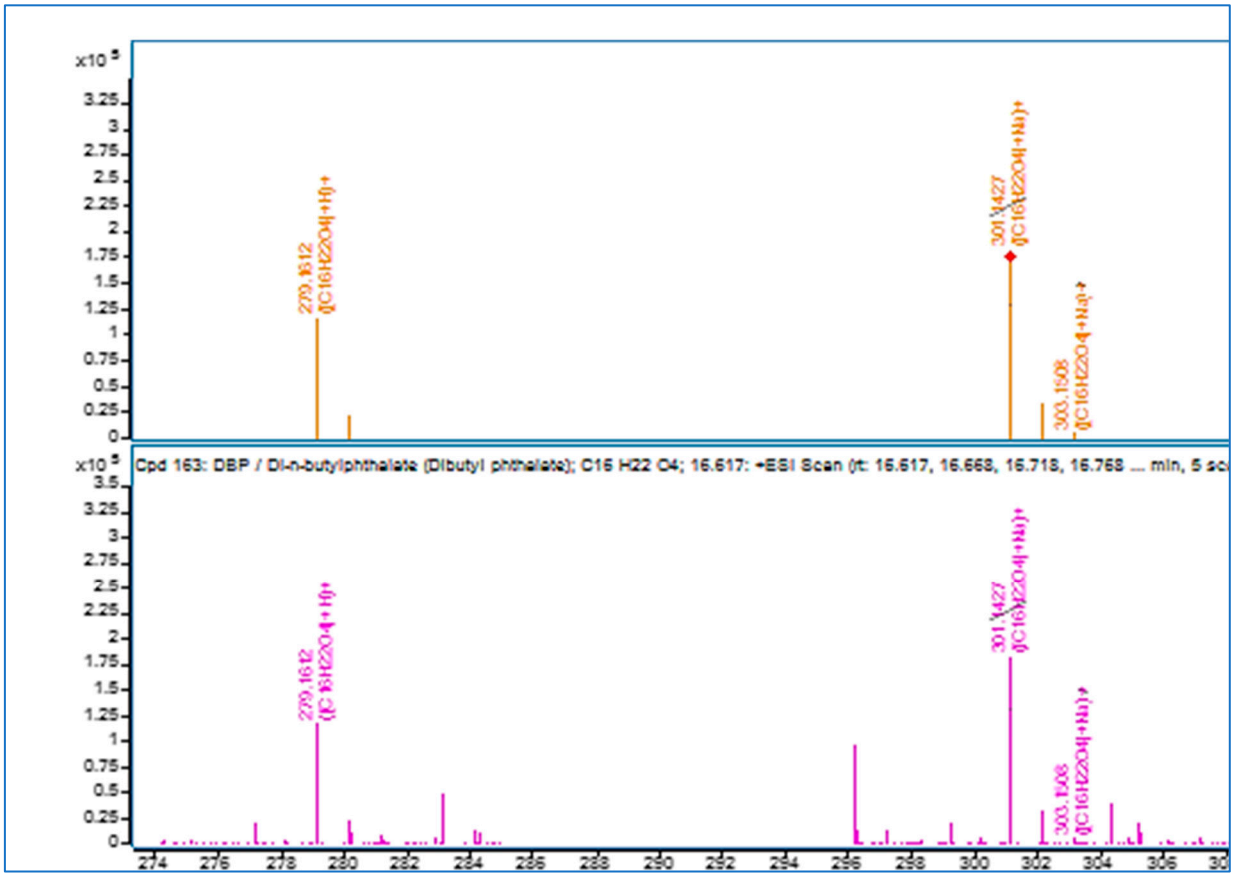

Figure S14. MS spectrum results - Amoxicillin penicilloic acid.

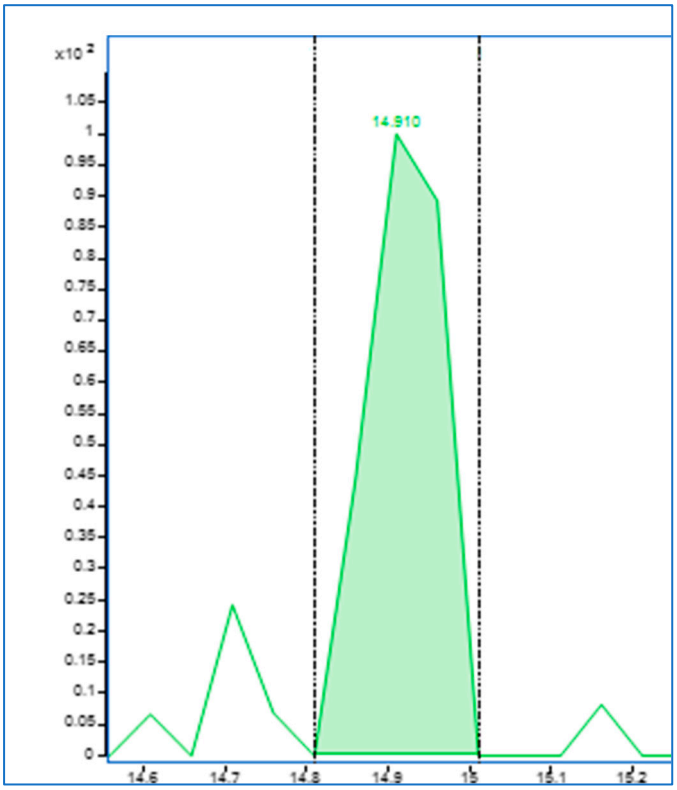

Figure S15. Chromatogram results - Photocatalysis product #2.

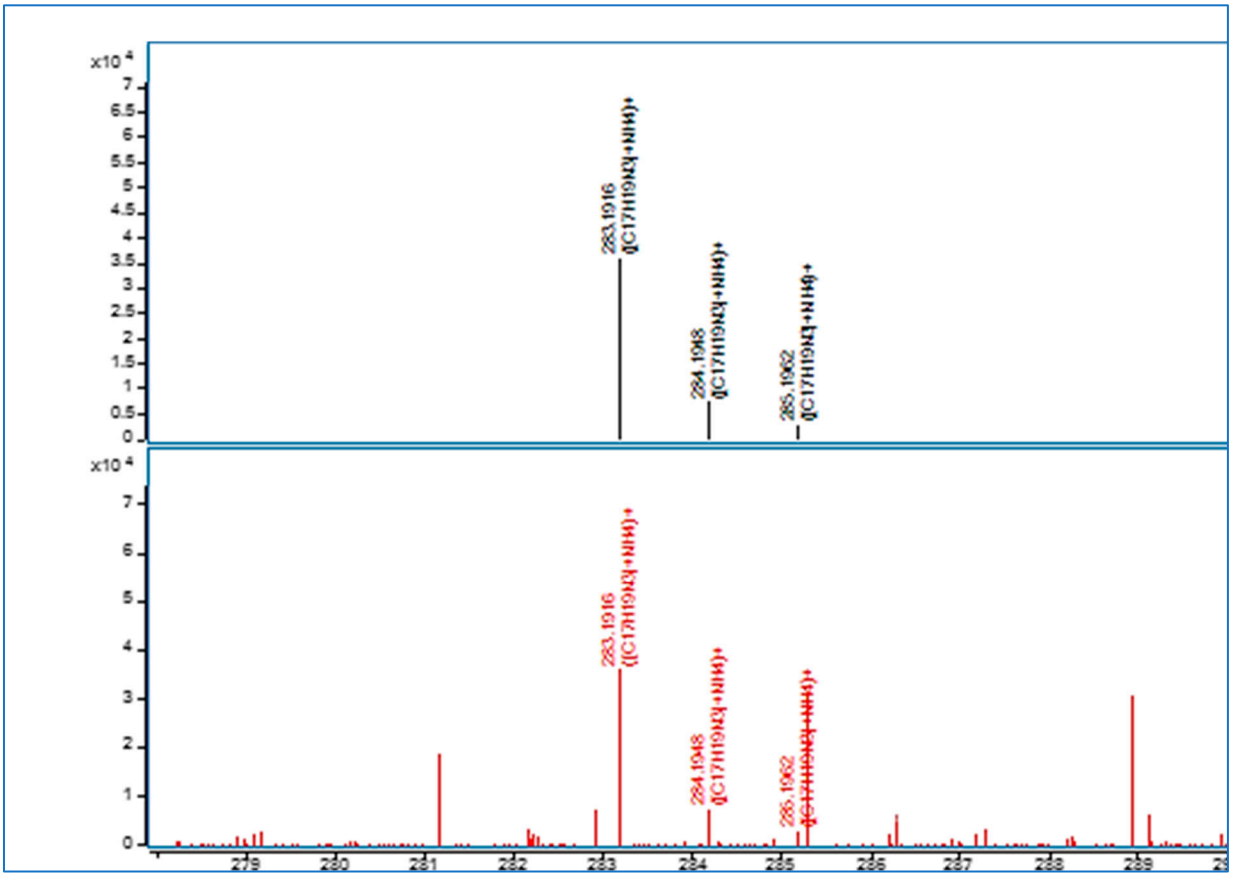

Figure S16. MS spectrum results - Photocatalysis product #2.

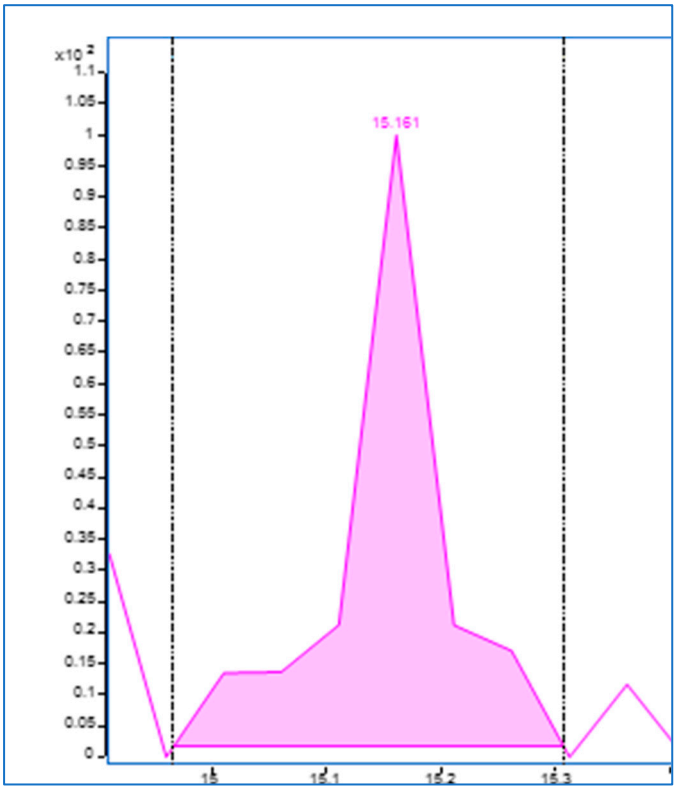

Figure S17. Chromatogram results - Photocatalysis product #3.

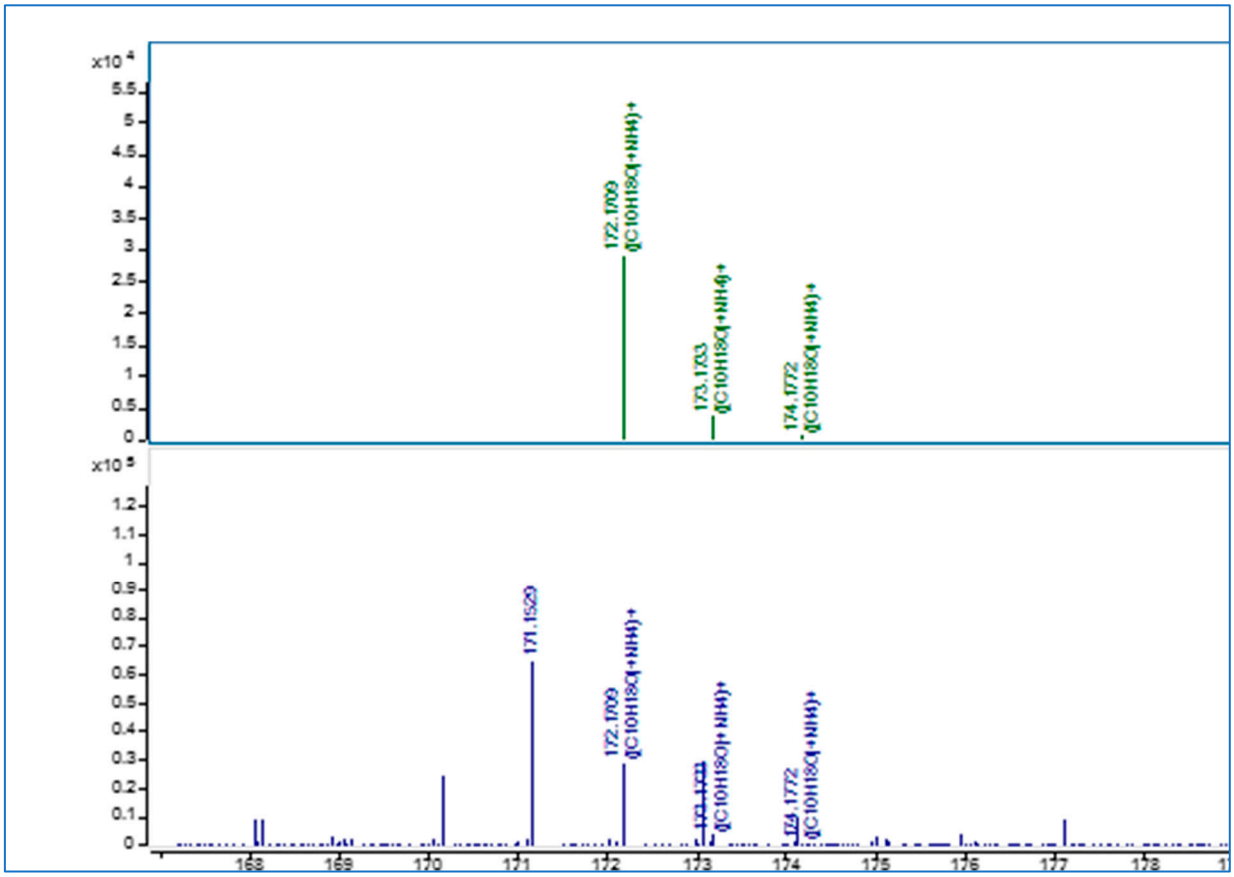

Figure S18. MS spectrum results - Photocatalysis product #3.

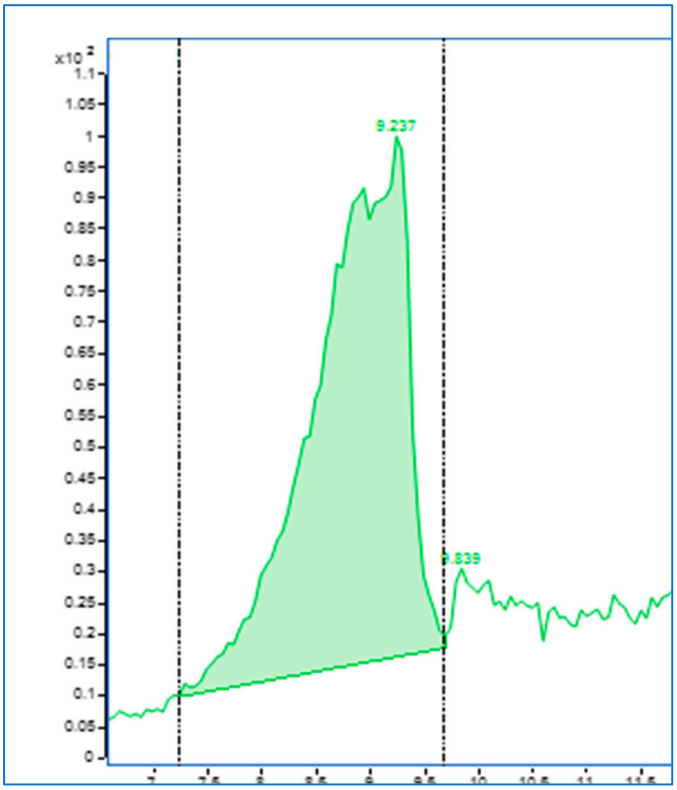

Figure S19. Chromatogram results - Photocatalysis product #4.

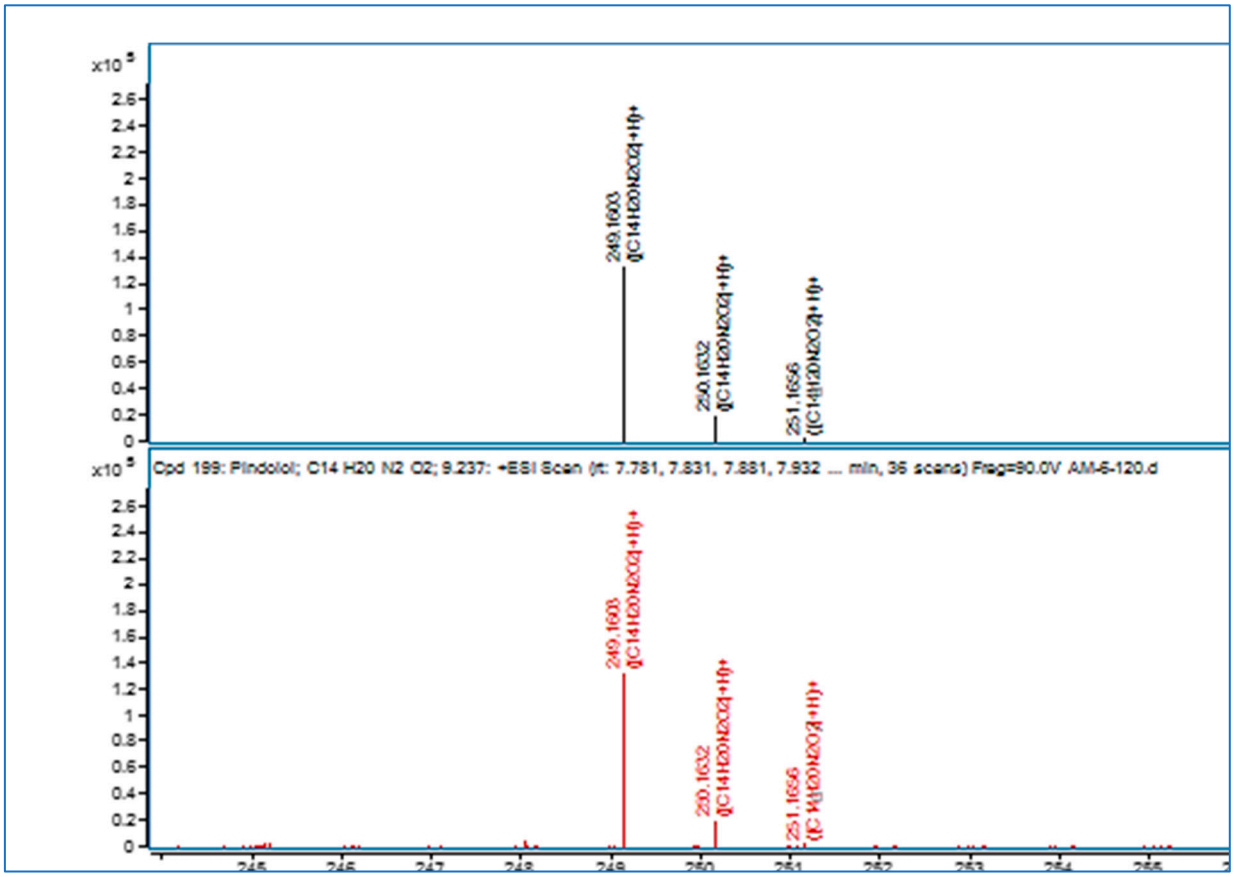

Figure S20. MS spectrum results - Photocatalysis product #4.

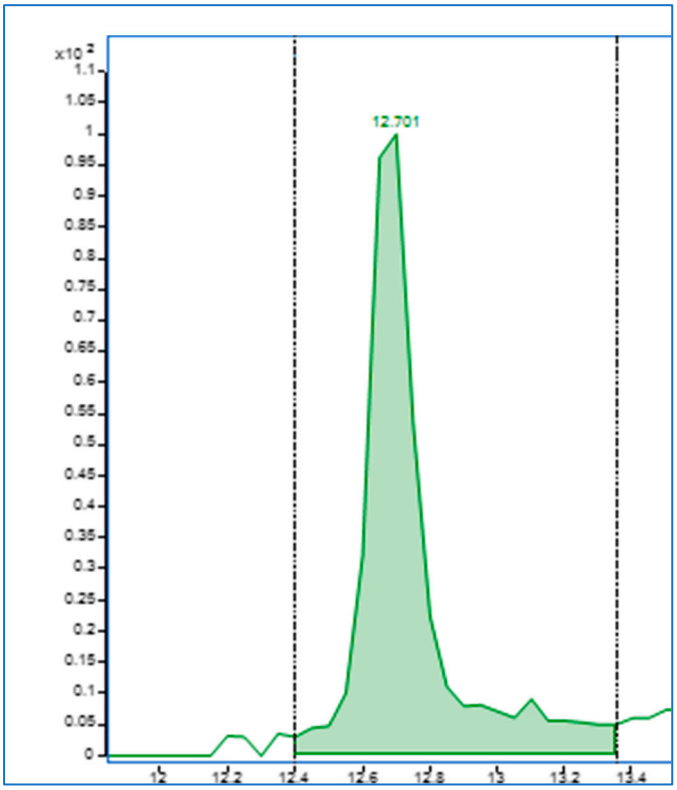

Figure S21. Chromatogram results - Photocatalysis product 5.

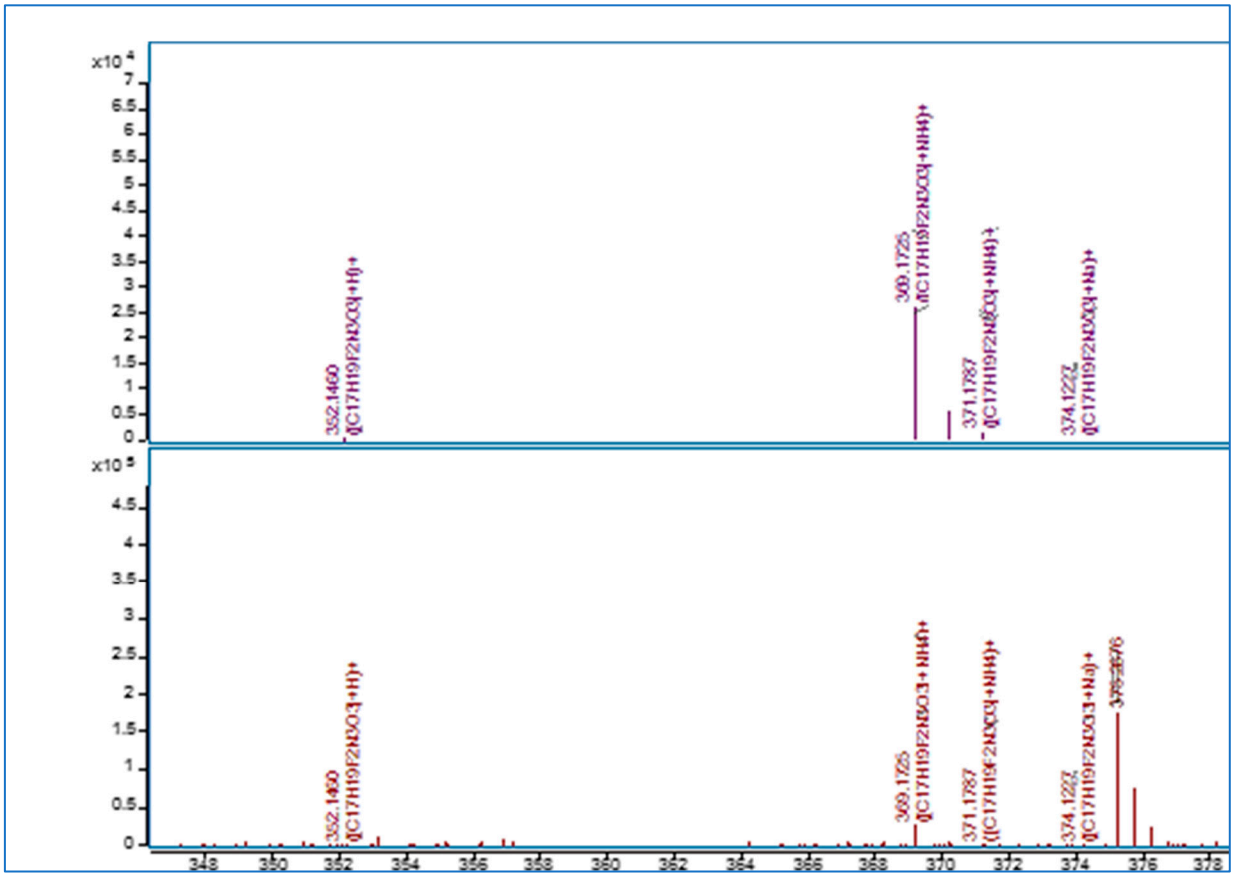

Figure S22. MS spectrum results - Photocatalysis product #5.

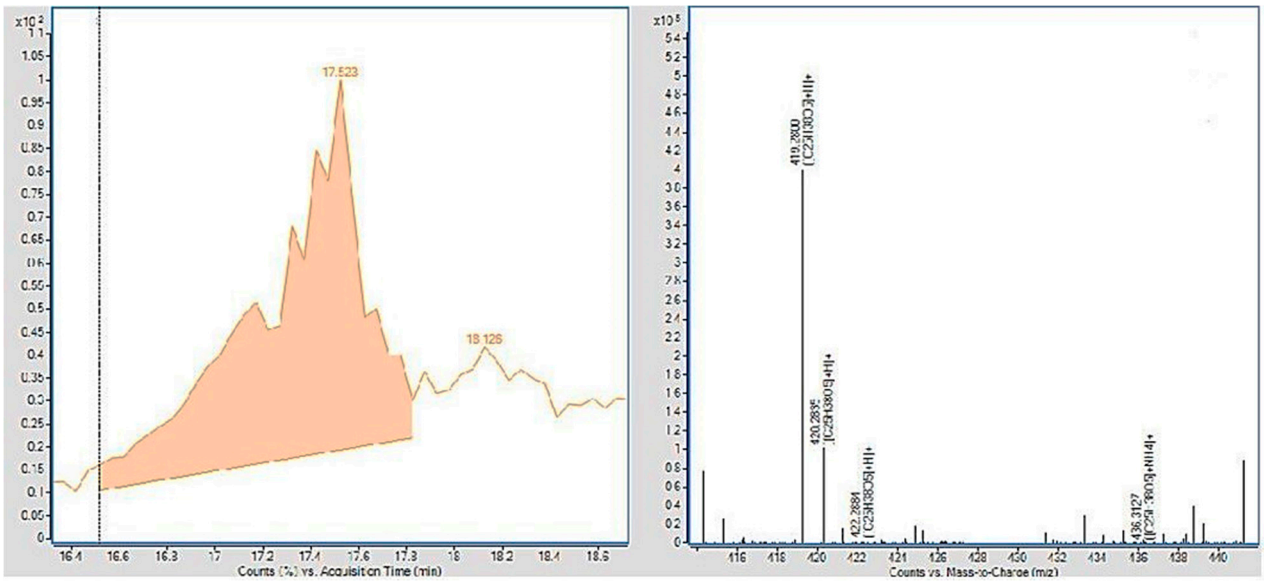

Figure S23. Chromatogram and MS spectrum results of a photolysis product #1.

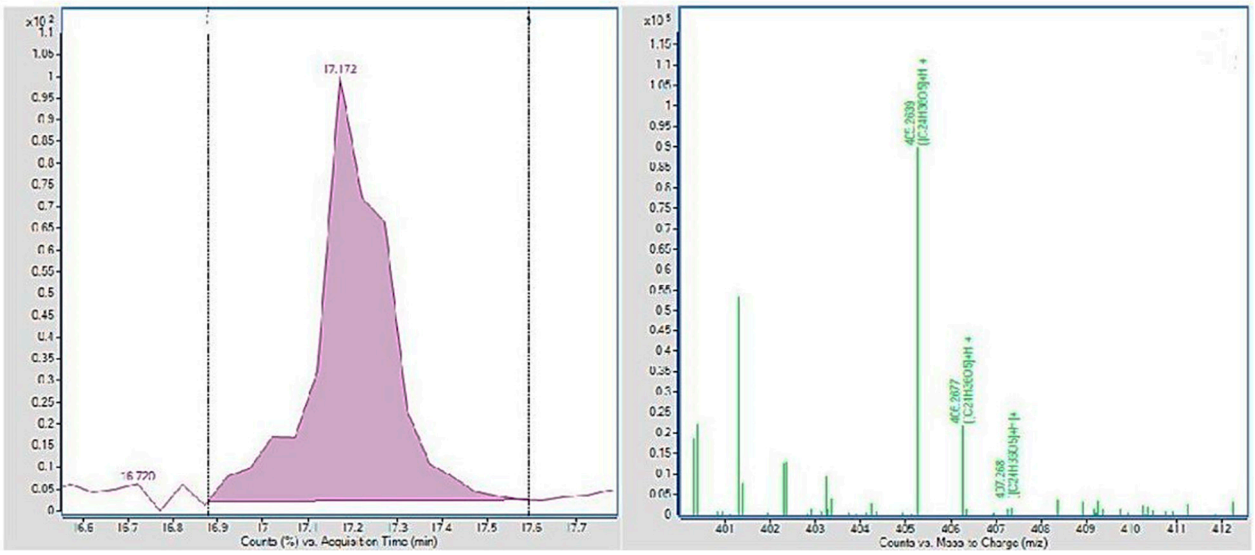

Figure S24. Chromatogram and MS spectrum results of a photolysis product #2.

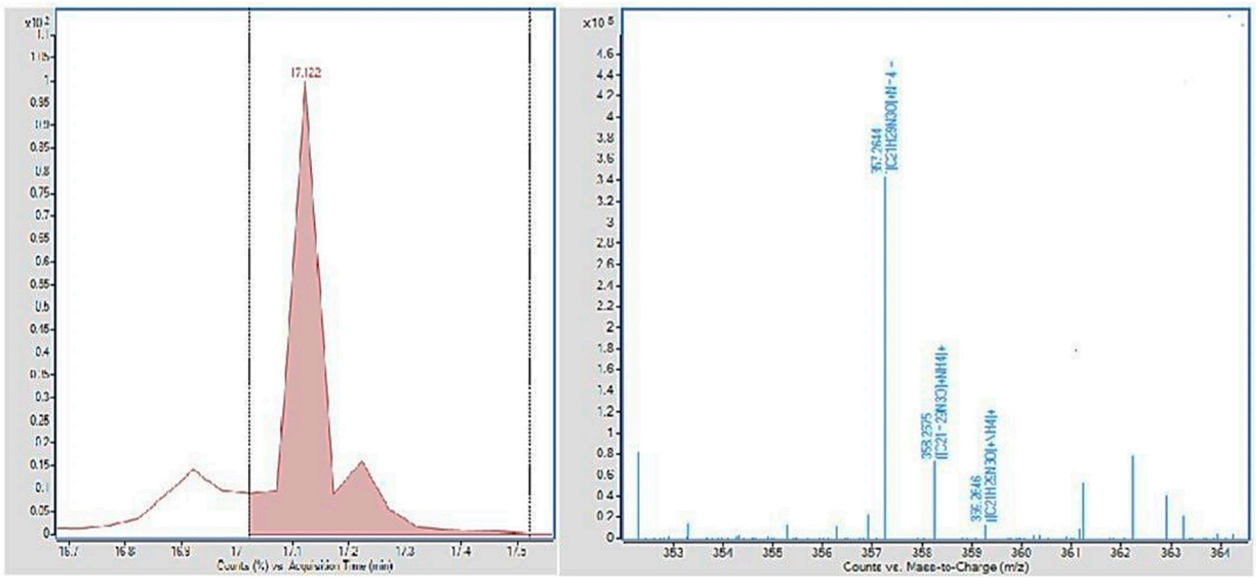

Figure S25. Chromatogram and MS spectrum results of a photolysis product #3.

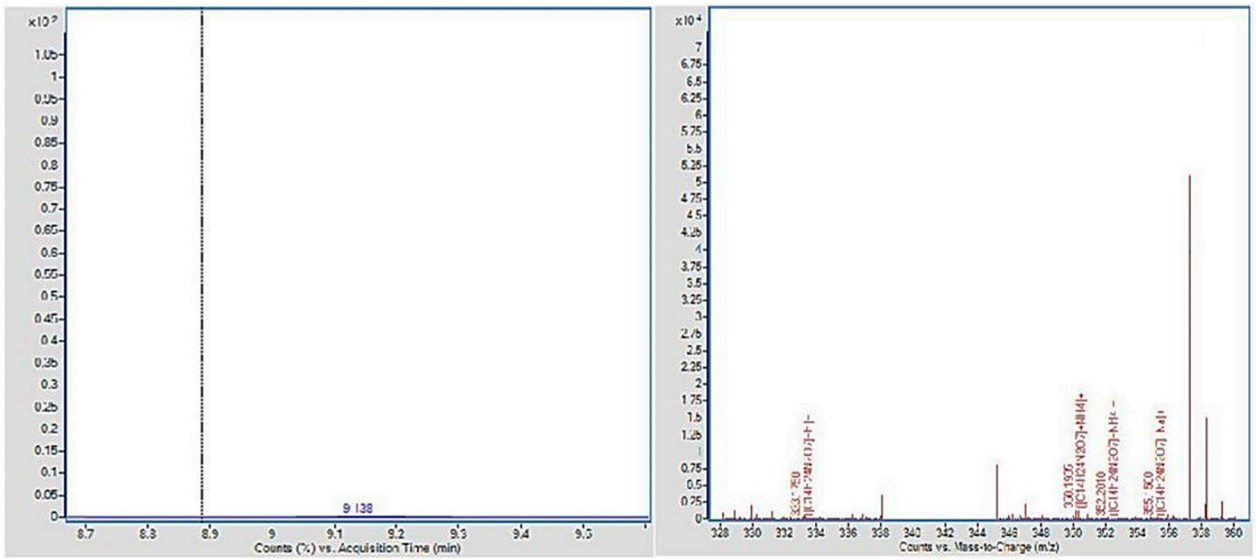

Figure S26. Chromatogram and MS spectrum results of a photolysis product #4.

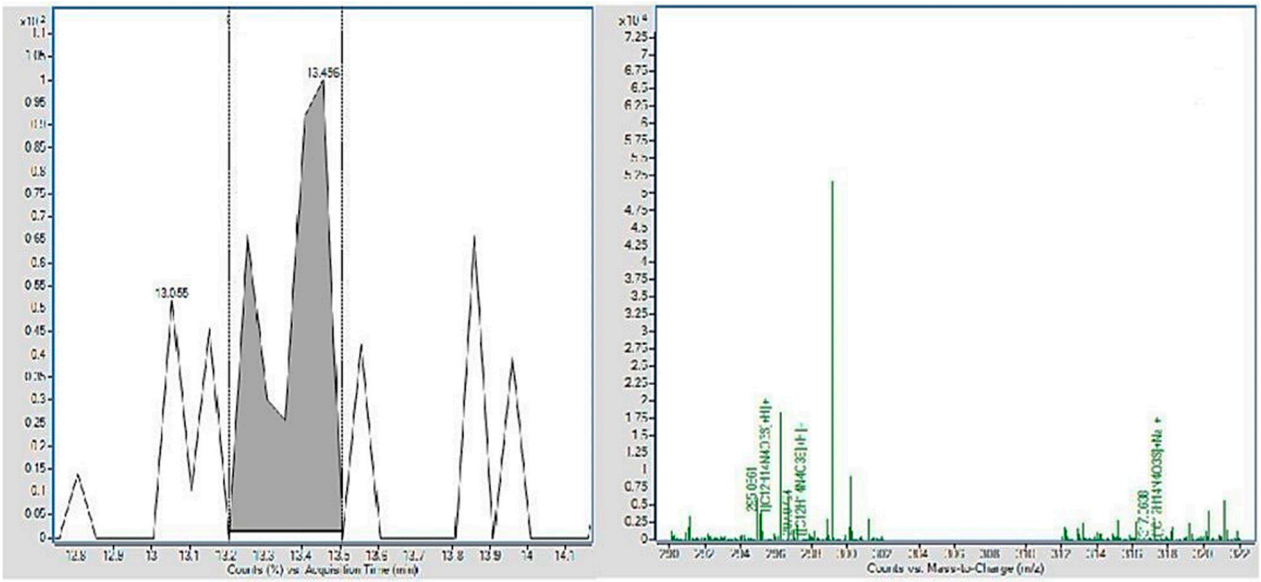

Figure S27. Chromatogram and MS spectrum results of a photolysis product #5.

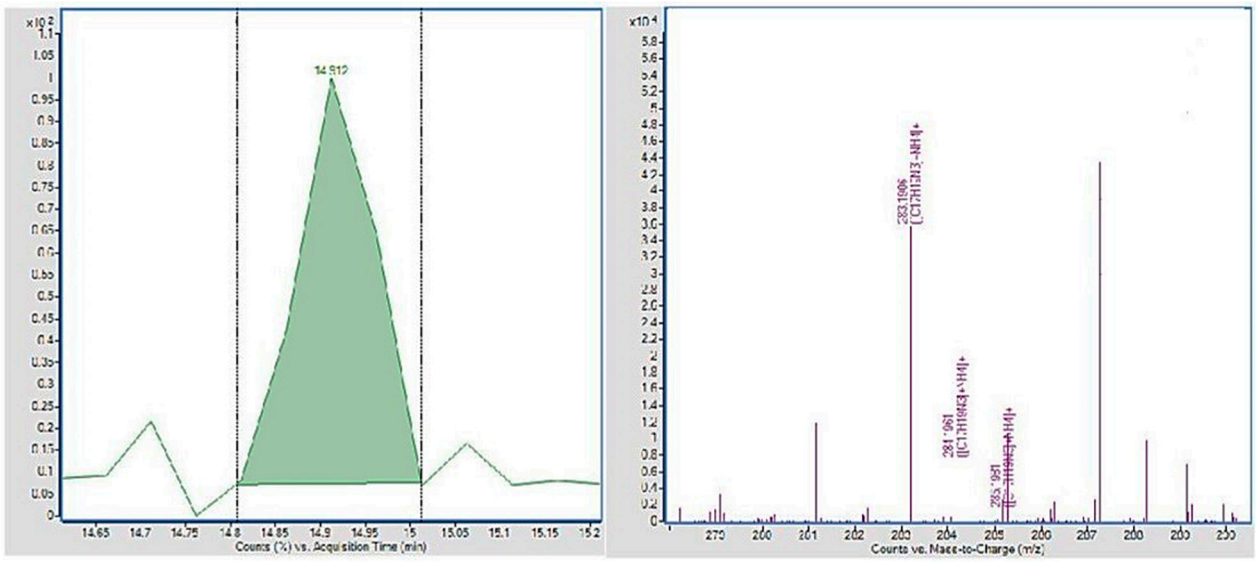

Figure S28. Chromatogram and MS spectrum results of a photolysis product #6.

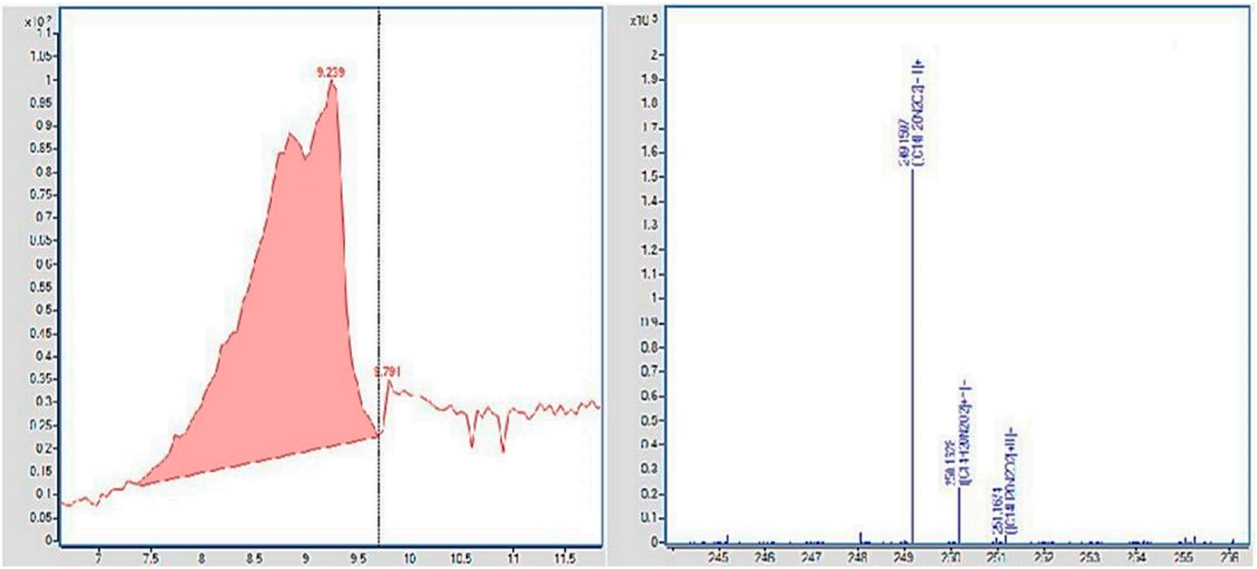

Figure S29. Chromatogram and MS spectrum results of a photolysis product #7.

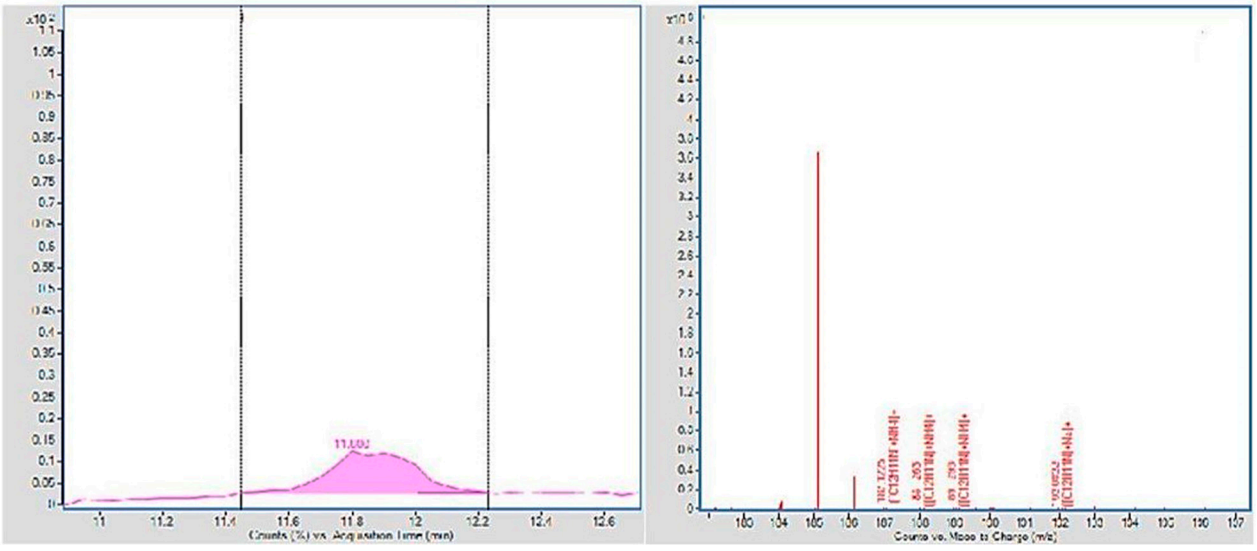

Figure S30. Chromatogram and MS spectrum results of a photolysis product #8.