

The reactivity of polyethylene microplastics in water under low oxygen conditions using radiation chemistry

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Supplemental Material

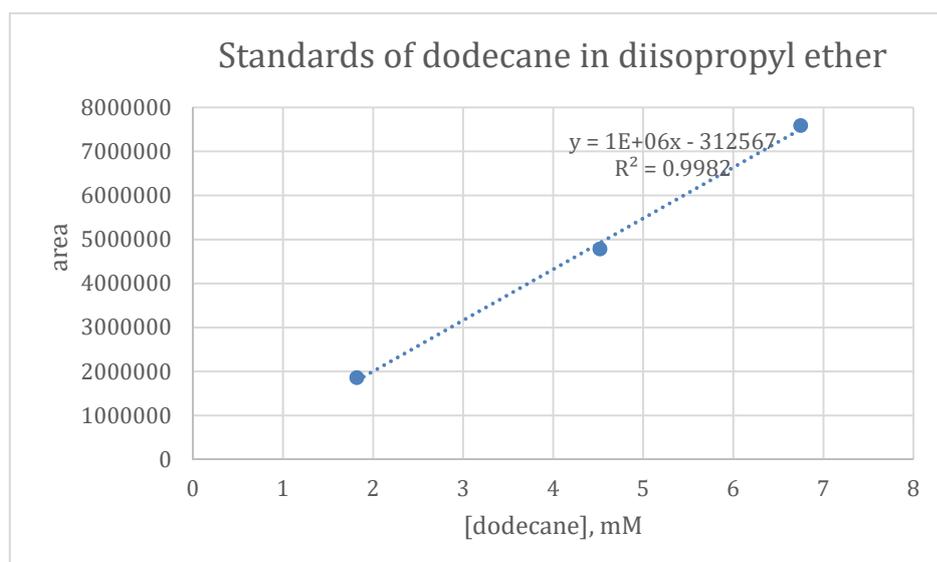


Figure S1. Standard graph of dodecane [mM] in diisopropyl ether.

Additional chromatograms of extracted compounds (SPME) of irradiated PE

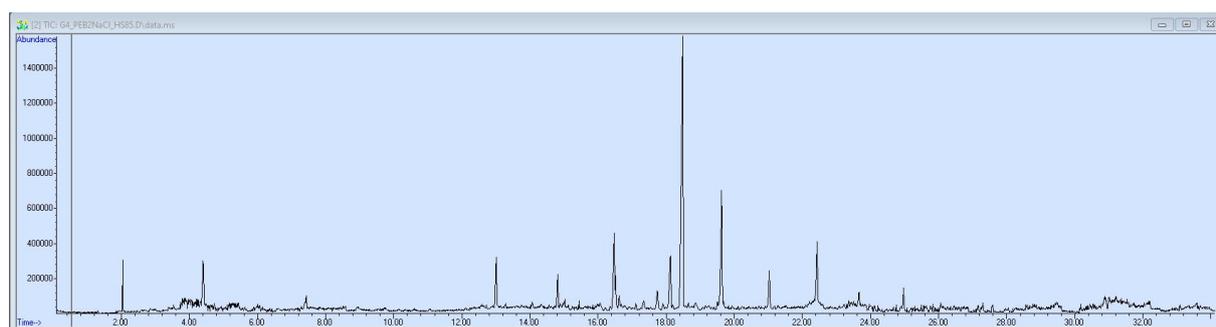


Figure S2. PE (as received) in salt water (0.5M), irradiation dose of ~0.5 MGy.

Table S1. Identified Peaks from Figure S2, using purchased standards.

Retention time, min	Compound
13.013	<i>n</i> -dodecane
14.819	<i>n</i> -tridecane
18.108	<i>n</i> -hexadecane

19.618	2-dodecanone
21.050	<i>n</i> -nonadecane

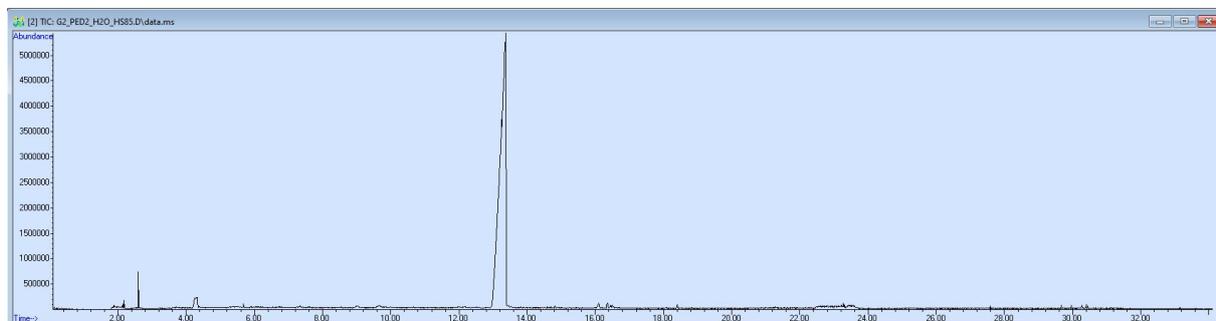


Figure S3. PE (as received) in water, irradiation dose of ~1.5 MGy. Largest peak is *n*-dodecane.

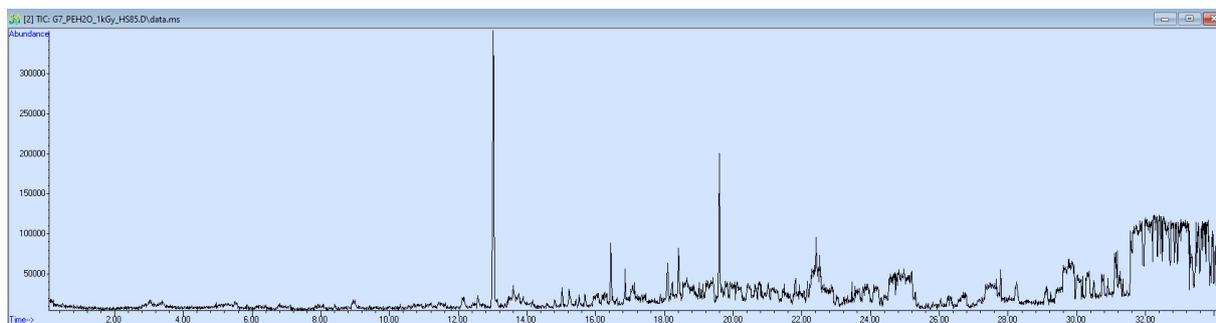


Figure S4. PE (heat-treated) in Lake Michigan water, irradiation dose of ~0.5 MGy. Largest peak is *n*-dodecane.

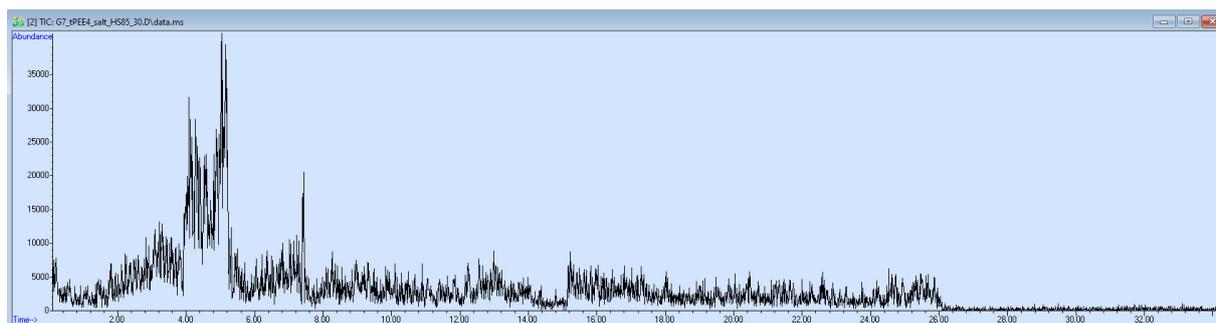


Figure S5. PE (heat-treated) in salt water, irradiation dose of ~2.0 MGy. No detectable compounds.

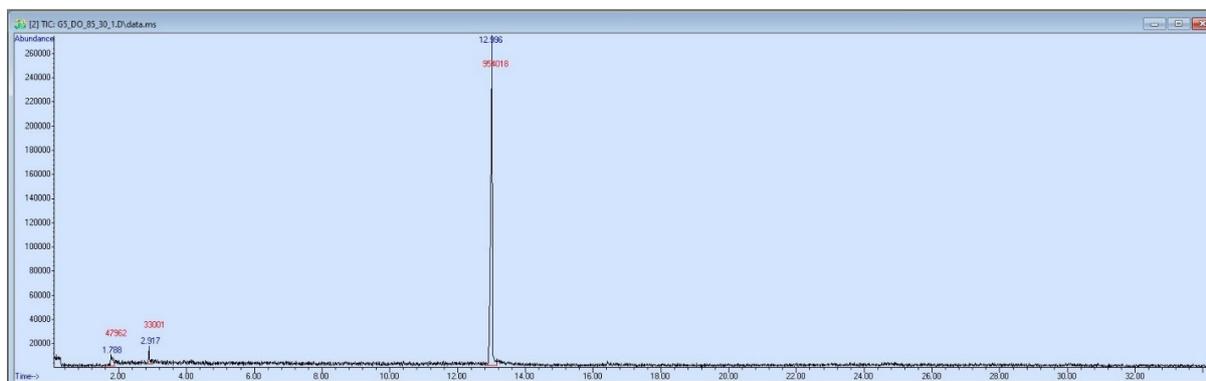


Figure S6. Chromatogram of *n*-dodecane (3.8 mg/L, maximum solubility) in water without PE present. Compiled data are shown in Figure 3. The integrated area is 954,018.

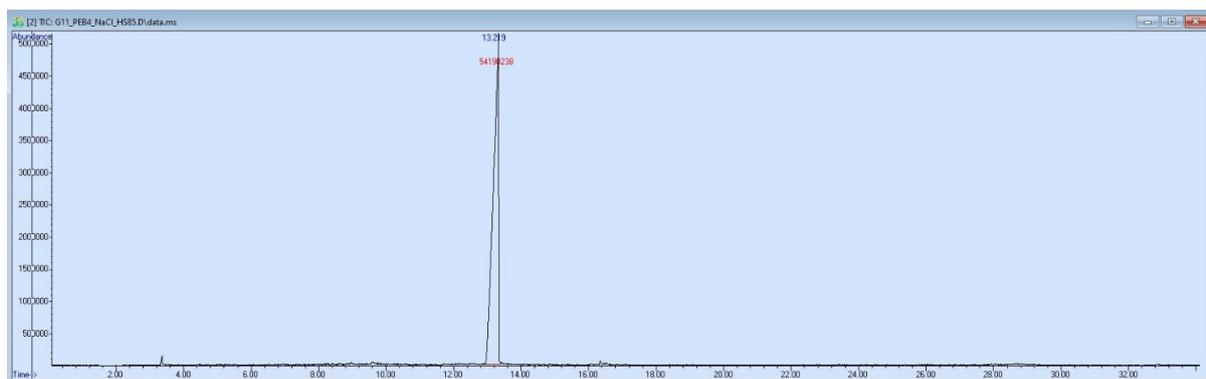


Figure S7. Chromatogram of *n*-dodecane in a saltwater mixture containing “as received” PE irradiated for ~0.5 MGy. Compiled data are shown in Figure 3. The integrated area is 54,198,238.

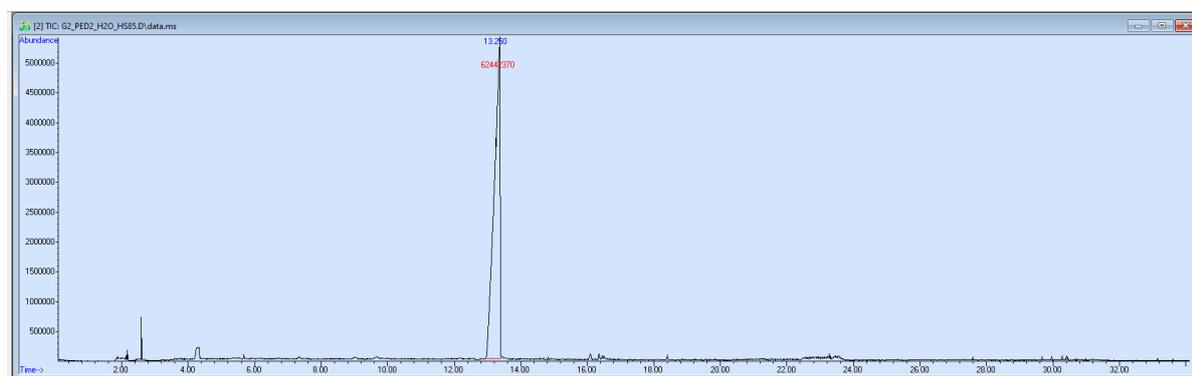


Figure S8. Chromatogram of *n*-dodecane in a water mixture containing “as received” PE irradiated for ~2.0 MGy. Compiled data are shown in Figure 3. The integrated area is 62,448,370.

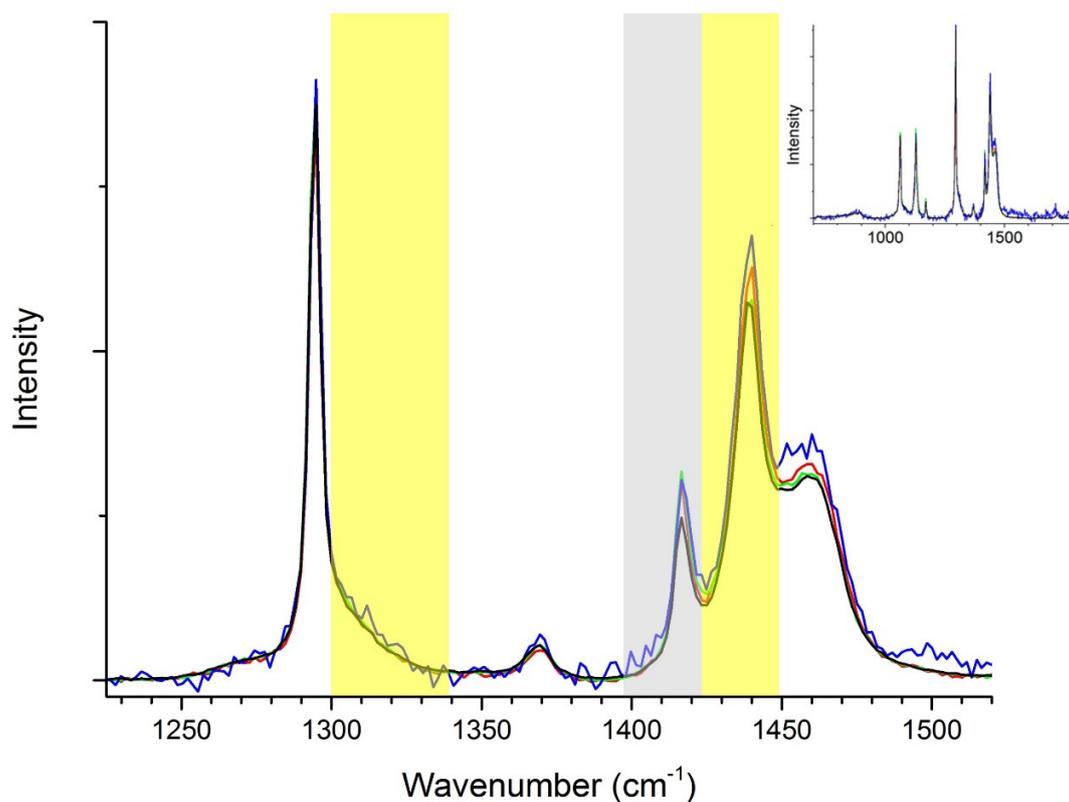


Figure S9. Baseline subtracted high resolution Raman spectra showing the CH₂ twisting, and CH₂ bending bands of gamma irradiated PE in fresh water (**red trace**), salt water (**green trace**), and Lake Michigan water (**blue trace**) showing minimal changes in comparison to the stock PE (**black trace**). Raman bands indicative of crystalline phase PE are highlighted in grey and bands indicating amorphous phase PE are highlighted in yellow.