

## Supporting information

Assessing biodegradation of roadway particles  
via complementary mass spectrometry and NMR analyses.

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**Table S1.** Emerson medium composition (for 1L of deionized water)

Composition	Concentration
K <sub>2</sub> HPO <sub>4</sub>	1 g.L <sup>-1</sup>
MgSO <sub>4</sub>	0.5 g.L <sup>-1</sup>
Soluble starch	15 g.L <sup>-1</sup>
Yeast Extract	2.5 g.L <sup>-1</sup>
Agar	20 g.L <sup>-1</sup>

**Table S2.** Mineral salt medium composition (for 1L ultrapure water)

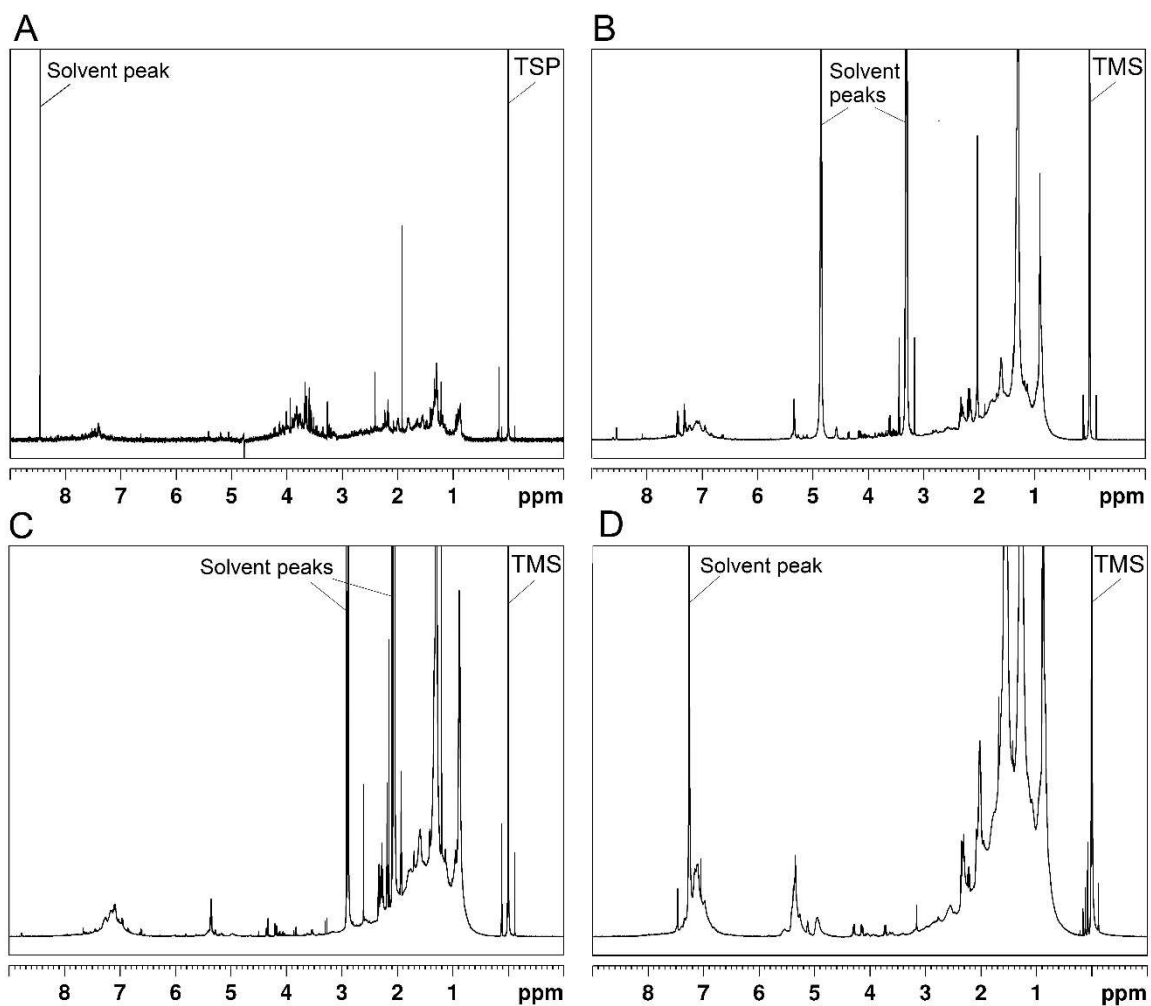
Composition	Concentration
Na <sub>2</sub> HPO <sub>4</sub> .12H <sub>2</sub> O	3.8 g.L <sup>-1</sup>
KH <sub>2</sub> PO <sub>4</sub>	1.8 g.L <sup>-1</sup>
MgSO <sub>4</sub> .7H <sub>2</sub> O	20 mg.L <sup>-1</sup>
Fe(NH <sub>4</sub> ) <sub>2</sub> (SO <sub>4</sub> ) <sub>2</sub> .6H <sub>2</sub> O	30 mg.L <sup>-1</sup>
CaCl <sub>2</sub> .2H <sub>2</sub> O	10 mg.L <sup>-1</sup>
NaCl	0.5g L <sup>-1</sup>
NH <sub>4</sub> Cl	0.3 g.L <sup>-1</sup>
MnSO <sub>4</sub> .H <sub>2</sub> O	18.5 mg.L <sup>-1</sup>
H <sub>3</sub> BO <sub>3</sub>	20 mg.L <sup>-1</sup>
ZnSO <sub>4</sub> .7H <sub>2</sub> O	2.5 mg.L <sup>-1</sup>
Na <sub>2</sub> MoO <sub>4</sub> .2H <sub>2</sub> O	2.5 mg.L <sup>-1</sup>
CoSO <sub>4</sub>	8 µg.L <sup>-1</sup>
CuSO <sub>4</sub> .5H <sub>2</sub> O	8 µg.L <sup>-1</sup>



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21 **Fig. S1.** Nozzles used for collection of RP

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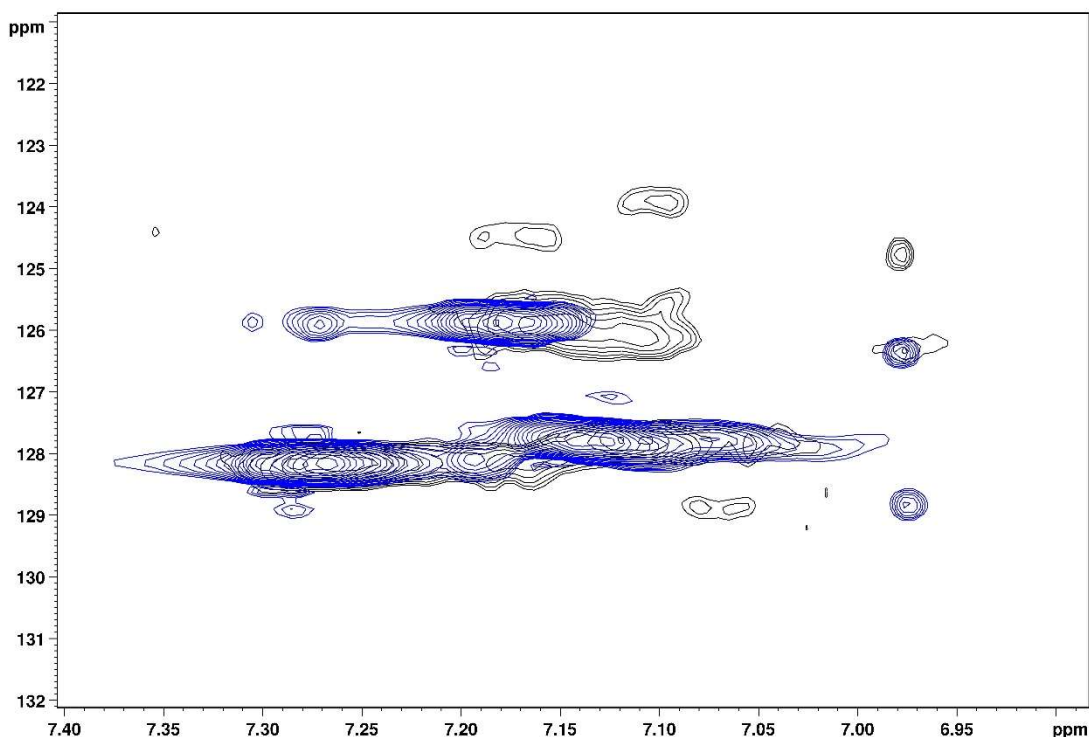
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25 **Fig. S2.**  $^1\text{H}$  NMR spectra of RP extracts obtained after 21 days of contact under agitation. (A)  
 26 water extract ( $\text{D}_2\text{O}$ ); (B) methanol extract (methanol- $\text{d}_4$ ); (C) acetone extract (acetone- $\text{d}_6$ ); (D)  
 27 chloroform extract ( $\text{CDCl}_3$ )

28 **3.1.1. Analysis of the leachate profiles and SBR by NMR spectroscopy**

29 Multi-dimensional analysis were performed to validate peak assignment.  $^1\text{H}$  NMR analysis of  
30 the oil entering the target tire formulation showed a signal at  $\delta_{\text{H}}$  5.2–5.5 ppm that can be  
31 assigned to the =CH ethylenic protons of the unsaturated fatty acids, revealing an overlapping  
32 region with the signal of SBR 1,4-butadiene moieties (Region B, Fig. 2). The other signals of  
33 the RP extract at  $\delta_{\text{H}} \sim 4.8\text{--}5.05$  ppm and  $5.5\text{--}5.7$  ppm (Fig. 2; Regions C and A, respectively)  
34 could be assigned to =CH<sub>2</sub> and =CH ethylenic protons of 1,2-butadiene moieties of SBR,  
35 respectively, and the signal in region D ( $\delta_{\text{H}} \sim 4.1\text{--}4.3$  ppm) to protons of oil unsaturated fatty  
36 acids.

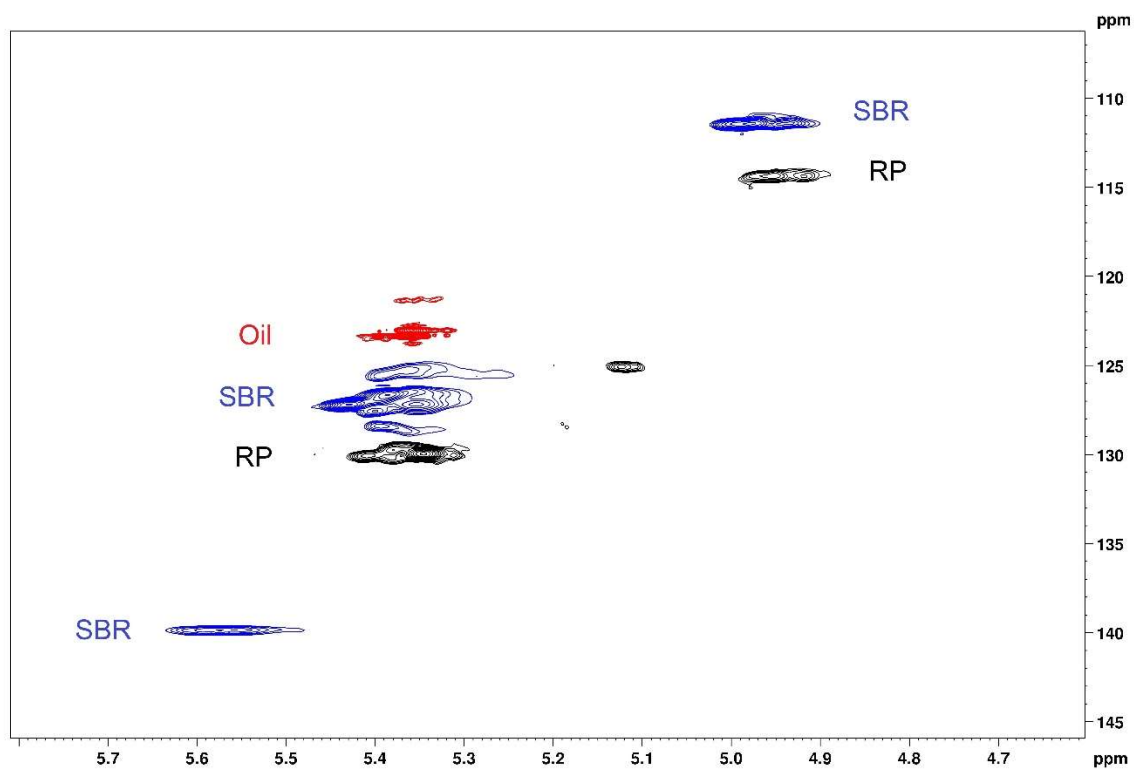
37 2D HSQC spectra were performed on chloroform RP extract, oil and SBR standard to highlight  
38 potential contribution of other compounds. Comparison of the aromatic region ( $\delta_{\text{H}} \sim 7.0\text{--}7.2$   
39 ppm) on the 2D HSQC spectra revealed the presence of several other signals which cannot be  
40 assigned to SBR (Fig. S2), making this region unreliable for SBR monitoring in RP extracts.



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42 **Fig. S3.** Liquid state HSQC NMR spectra of SBR in CDCl<sub>3</sub> (blue) and 21-day chloroform  
43 extract of RP (black) ( $\delta_{\text{H}} \sim 6.90\text{--}7.45$  ppm)

44  
45 In the butadiene proton region ( $\delta_{\text{H}} \sim 4.8\text{--}5.7$  ppm), the signals corresponding to oil unsaturated  
46 fatty acids and 1,4-butadiene protons cannot be distinguished by 2D HSQC either (Region B).  
47 On the contrary, the regions A and C, assigned to 1,2-butadiene ethylenic protons, were  
48 validated by 2D HSQC as any other contribution was observed (Fig. S3).

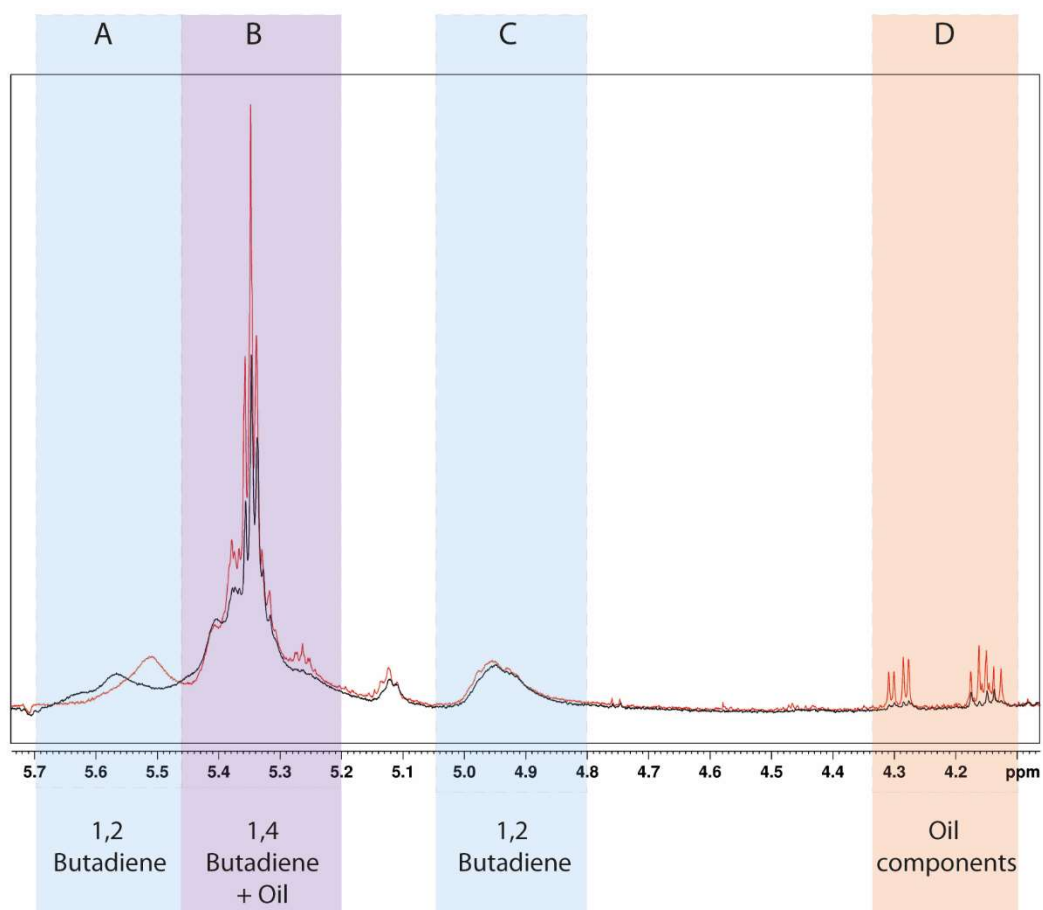
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51 **Fig. S4.** Liquid state HSQC NMR spectra of SBR (blue) and oil (red) in CDCl<sub>3</sub> and 21-day  
 52 chloroform extract of RP (black) ( $\delta\text{H} \sim 4.7\text{--}5.8$  ppm). For a better understanding and  
 53 vizualization, the spectra of SBR and oil have been shifted up.

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56 **Fig. S5.** <sup>1</sup>H NMR spectra of RP extracts (CDCl<sub>3</sub>) of abiotic (red) and *Rhodococcus ruber* ATCC  
 57 29672 (black) incubation after 14 days ( $\delta^H \sim 4.1\text{--}5.7$  ppm)

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