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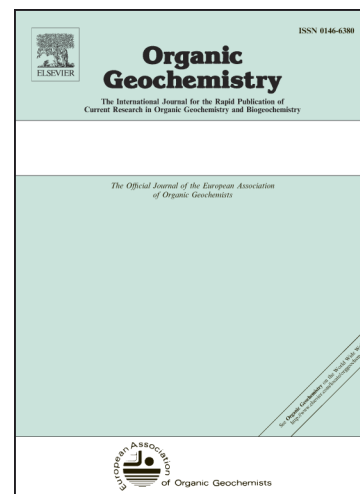
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# Assessing the diversity of lipids formed via Fischer-Tropsch-type reactions

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## Abstract

Lipid biomarkers are commonly used for tracking life through Earth's history and are also gaining in importance in the search for extraterrestrial life. However, some lipids may also be formed in-situ via abiotic Fischer-Tropsch-type (FTT) reactions. These processes have been considered as a source of prebiotic organic matter. Here we report on a FTT synthesis experiment performed under hydrothermal conditions, focusing on more complex, previously undescribed FTT products that may potentially mimic biological signals. The experiment was carried out in stainless steel reactors by heating aqueous solutions of oxalic acid mixed with montmorillonite to 175 °C for 3 days. Organic extracts of the products and extraction residues were analyzed by gas chromatography-mass spectrometry (GC-MS) and combustion-infrared detection, attenuated total reflectance Fourier transform infrared spectroscopy and pyrolysis GC-MS, respectively. FTT reactions led to a number of biomarker-like lipids such as linear and methyl-branched alkanes and alkanols as well as *n*-alkanoic acids. However, FTT reactions a priori produce unimodal chain length distributions and isomeric mixtures of methyl-branched compounds, as opposed

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