

Possible Reaction Pathways for the Formation of Organic Compounds in Volcanic Hydrothermal Systems in Iceland

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Conditions in volcanic hydrothermal systems (high temperature, high pressure and availability of metals for catalysis and redox control) make them perfect reactors for a broad range of organic synthesis reactions. In this study, several hydrothermal fluids from various environments in Iceland were sampled using a solid phase extraction, and after desorption were analyzed for organics with a Gas Chromatograph coupled to a Mass Selective Detector.

The sampling for this study was done in Iceland, a basaltic ridge-hotspot system, where the original fluid percolating through the rocks ranges from seawater in the Reykjanes Peninsula to meteoric water in the Nesjavellir area for example.

A first group of high temperature fluids was obtained in 2003, using the installations at the thermal wells exploited by geothermal companies in Reykjanes, Svartsengi and Nesjavellir. In 2005, hot fluids, around 80 to 97°C were sampled, directly from the geothermal wells at Geysir and Borgarfjörður. Some cool fluids, ranging from 3.5 to 4.5 °C were also sampled from springs located in the lava field from the 2000 eruption on the slopes of the Hekla volcano.

The first results for the fluids sampled from geothermal wells show a rather uniform composition, suggesting that the origin of the water recharging the system is less determinant than the reactions taking place inside the hydrothermal system.

Tentative reaction pathways, based on organic synthesis literature are suggested to account for the presence of some of the organic compounds commonly found in those fluids