Rapid Assessment of Organic-rich Rocks for Astrobiology

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The recently-developed technique of quantitative pyrolysis-Fourier transform infrared spectroscopy (FTIR) has the potential to reduce assessment of organic matter-containing rocks to a single analytical process (Figure 1). The technique is rapid (typically taking around 5 minutes), quantitative (following construction of calibration curves) and ideally suited to gas analysis.

Figure 1. a) A new quantitative technique which uses heat to liberate and generate gas from organic-rich samples. b) The products are detected, identified and quantified using FTIR.

The technique allows targeted thermal extraction of materials to be released and FTIR allows rapid analysis of the generated vapours. Infrared spectroscopy is a powerful optical method for detecting vibrational and rotational modes of molecules. Gentle heat can liberate interstitial gas and then adsorbed gas. Higher temperatures can degrade the kerogen to gas further revealing the organic contents of a rock. The work will have implications for sample return missions including those to the asteroids and Mars.

The research will use equipment in the Imperial College Organic Geochemistry Laboratories (right). Full training will be provided. The project would suit a candidate with a background in Earth Science, Chemistry or a subject that develops similar skills.

Contact: Professor Mark Sephton (m.a.sephton@imperial.ac.uk) for more information. Details of how to apply can be found at: http://www.imperial.ac.uk/study/pg/apply/how-to-apply/