A novel technique for species-specific Hg isotope ratio measurements using Hg-Thiourea complex ion chromatography

M. DZURKO[1]* AND H. HINTELMANN[2]

[1]Trent-Queen's Graduate Program, Trent University, Peterborough, On, Canada (*correspondence: mdzurko@trentu.ca)

[2]Chemistry Dept., Trent University, Peterborough, On, Canada (hhintelmann@trentu.ca)

Measurements of the natural fractionation of mercury (Hg) isotopes are a powerful tool to directly identify biogeochemical processes controlling the fate of mercury in the environment. In this study, we investigate the possibility for Hg isotopes to undergo biological fractionation during bioaccumulation in aquatic food webs.

The investigated technique permits the separation of monomethyl Hg (CH_3Hg^+) and mercuric Hg (Hg^{2+}) from water and biota on the basis of the difference in charge of their respective thiourea ($S=C(NH_2)_2^0$) complexes. A cartridge containing thiol-functionalized silica resin traps Hg^{2+} and CH_3Hg^+ from prepared sample solutions without retaining interfering sample matrix components and is capable of eluting the Hg species without the need for any further chromatographic separation.

An on-line Hg reduction technique using stannous chloride as the reductant is applied for accurate and precise mercury isotope ratio determinations by Cold Vapour - Multi-Collector Inductively Coupled Plasma - Mass Spectrometry (CV-MC-ICP/MS).

The results from this study may show that Hg isotope ratios could be used as a tracer technique to provide important information into the sources, and biogeochemical cycling of natural and anthropogenic Hg.

Changes to oil fluorescence by the invasion of gas or water

P. EADINGTON[1]*, R. KEMPTON[1], S. GEORGE[2], H. VOLK[1], J. BOURDET[1] AND C.E.S. COEHLO[3]

[1]CSIRO Petroleum Research, PO Box 1130, Bentley, WA, (*correspondence: Peter.Eadington@csiro.au)

[2] Department of Earth and Planetary Sciences, Macquarie University, Sydney, NSW 2109, Australia

[3]Petrobras Research & Development Centre, Av. Jequitiba, Ilha do Fundao, 21941-598 Rio de Janeiro, RJ, Brazil

Fluid inclusions that trap residual oil after most has drained from a reservoir have attributes that reflect interaction with imbibing (invading) gas or water.

Grains in oil reservoirs often contain one or more oil inclusions that collectively constitute oil inclusion assemblages (OIAs). Grains containing oil inclusions (GOI™) is the proportion of reservoir grains that contain one or more OIA. Fluorescence colour, location in the grain, and size of the gas bubble are three of eight attributes assigned to OIAs in GOI determinations samples from two wells on the North-west Shelf Australia.

At Jabiru 1A the predominant OIA in samples from the current oil zone has oil inclusions with uniform near-blue visual fluorescence. Only samples from the residual zone contain an OIA with near-white to near-blue fluorescence. At Gas Well A, which has an oil leg, there is an OIA that is comprised of near-yellow fluorescing inclusions with small gas bubble and inclusions with a large gas bubble that nearly fills the chamber and a rim of near-blue fluorescing oil.

In the field where water imbibed, the shift of fluorescence colour to near-white is consistent with lower mono-aromatic molecules having dissolved into the imbibing water. In the field where gas imbibed there is a shift to near-yellow fluorescence of oil inclusions consistent with enrichment of oil in heterocycles, and inclusions in the same OIA containing gas with a rim of near-blue fluorescing oil consistent with the imbibing gas having dissolved light hydrocarbons.