Thermogenic hydrocarbons in Fe-Mn nodules from the Gulf of Cadiz: A new tool for oil and gas exploration

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Ferromanganese nodules were firstly sampled during the Tasyo Project cruises from mud-carbonate mounds and mud volcanoes at the Guadalquivir Diapiric Ridge (Central eastern Atlantic). The metallogenetic study has revealed their genesis, linked to the anaerobic oxidation of hydrocarbons via bio-mineralization processes [1]. N-alkanes have been discovered in all the nodules, which were analyzed by Gas Chromatography, comprising a unimodal distribution maximizing at the n–C_{18} isomer with an important presence of n-C_{16} and n-C_{20}. Pristane and phytane and/or crocetane (2, 6, 11, 15-tetrametilhexadecane) were detected in all the samples analysed. Isotopic values of $\delta^{13}C$ for these compounds, measured by Gas Chromatography-Combustion-Isotope Ratio Mass Spectrometry, ranged between -20 and -37 per mil (vs. PDB). These values are supporting the idea of deep thermal maturation. Moreover, the carbon preference index (CPI) ranged from 0.66 to 1.15, which is also characteristic of mature samples. In the same way, polycyclic aromatic hydrocarbons as phenanthrene and anthracene, present in mature substances such as petroleum, have also been detected in the nodules.

We propose the use of these ferromanganese nodules as tools for reconstructing the fluid venting history in modern or ancient hydrocarbon-seeps from the Gulf of Cadiz. The nodules acted as 'traps' for fluids during their growth, remaining for long time when the fluids responsible of the mineralization have disappeared in the area. Therefore, they can be useful for seep detection. In addition, these nodules and their thermogenic hydrocarbons may be used as indicators to explore and define deep-seated reservoirs for oil and gas, giving important information on sub-seafloor fluids composition and migration patterns, geology and tectonic conditions.

[1] González *et al*. (2009) *Mar. Geol*. **261**, 64-81.

The environmental aspect of mercury emission from coal fired- power plants – An example from Western Canada

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The environmental aspects of coal from mining to emission from coal fired power plant is discussed and attempted is made to reduce mercury by selective mining of coal to reduce the part that includes high Hg. The nature of organic matter also studied in fly ash and it was found that the reactive carbon is able to capture Hg in tandem with other elements such as Cl and S reduce the emitted mercury.

The mercury in feed coals was reduced by 15-58% using selective mining as compared to routinely prepared feed coals and by eliminating the high Hg dirt bands (partings) from the coal seam (s) and the emitted mercury by 36-58% decrease in to total emitted Hg (g/h).