Fe and S isotope compositions of hydrothermal sulfides from the Northern Lau Basin

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Massive sulfides belonging to the extinct hydrothermal field of the North Lau Basin were studied for their Fe and S isotope compositions. Sulfide samples belonging to pedestal slab, peripheral chimneys (remnants of white smokers) and oxide precipitates filling the hollows of pillowed basalts were studied. Detailed mineralogical and geochemical studies on the same set of samples indicated the similarites between the Lau hydrothermal field and the Trans-Atlantic Geotraverse (TAG) active mound [1]. The sulfides of pedetal slab mainly consisting chalcopyrites and pyrites with minor barite and sphalerite show $\delta^{34}S$ values between 8.4 to 9.6 ‰ (V-CDT). The major constituent of sulfides belonging to peripheral chimney is sphalerite, whlie pyrite and chlcopyrite being minor. The $\delta^{34}S$ values range from 5.5 to 8.3 ‰. These $\delta^{34}S$ values are very similar to those of TAG hydrothermal sulfides [2]. Such high $\delta^{34}S$ values for TAG hydrothermal sulfides were interpreted as a result of mixing of sulfur of sulfate reduction origin and that of the hydrothermal fluids. The high $\delta^{34}S$ values in case of Lau Basin also corroborate the influence of sulfate reduction. The sphalerite-rich sulfides of the peripheral chimney have slightly depleted $\delta^{34}S$ values when compared to the pedestal slab indicating increased effect of hydrothermal solutions in them.

The $\delta^{56}Fe$ values of samples belonging to pedesatl slab show a range between -0.3 to -1.1 ‰ (IRMM-014), while those of the peripheral chimney vary from -0.6 to -1.7 ‰. The oxide precipitates show maximum fractionation in Fe isotope compositions having $\delta^{56}Fe$ values of -0.8 and -3.0 ‰. Among the oxide precipitates, the MnO-rich top layer is characterized by lowest $\delta^{56}Fe$ value indicating the influence of temperatures. Further, role of redox conditions can be envisaged in controlling Fe isotope compositions based on the correlation between $\delta^{56}Fe$ and Ce anomalies.

[1] Paropkari, A.L. *et al*. (2010) *J. Asian Earth Sci*. **38**, 121–130. [2] Gemmell, J.B. & Sharpe, R. (1998) in Herzig *et al*. (eds) *Proc. ODP Sci. Results* **158**, pp. 71–84.

Assessment of heavy metal contamination in surface water of Ranipet industrial area, Tamil Nadu, India

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Environmental geochemical studies were carried out in and around Ranipet industrial area, Tamil Nadu, India to find out the extent of chemical pollution in surface and groundwater due to waste disposal from tannery industries. Ranipet is located at 79°19′ – 79°22′ E longitude and 12°53′ – 12°57′ N latitude, about 120 km from Chennai on Chennai-Bangalore highway and it is chronic polluted area and one of the biggest exporting centers of tanned leather. It is one of the biggest exporting centers of tanned leather in India. The total number of industries located in and around Ranipet town are 240 tanneries along with ceramic, refractory, boiler auxiliaries plant, and chromium chemicals.

Studies were carried out to find out the contamination of surface water bodies due to industrial effluents. The results reveal that the surface water in the area is highly contaminated showing very high concentrations of some of the heavy / toxic metals like Cadmium ranging from 0.2 to 401.4 μg/L (average of 51.1 μg/L), Chromium 2.4 1308.6 (average of 247.2 μg/L), Copper 2.1–535.5 μg/L (average of 95.5 μg/L), Nickel 1.6–147.0 μg/L (average of 36.7 μg/L), Lead 6.4–2034.4 μg/L (average of 467.8 μg/L) and Zinc 20.8–12718.0 μg/L (average of 3760.4 μg/L). The concentration levels of these metals are much above the permissible limits in surface water and are health hazards especially for the people working in the tannery industries. It was observed that the people in the area are seriously affected and suffering from occupational diseases such as asthma, chromium ulcers and skin diseases. Distribution of metals, their contents at different locations, and their effects on human health are discussed in this paper.