

## The quality and isotope geochemistry of Garow saline water springs, Mashhad –Iran

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The origin of Garow saline water springs, are located 50 km South of Mashhad city-Iran, and the groundwater quality in these springs are investigated using geochemistry and stable isotopes. Garow springs is surrounded by red sediments of Neogene formation and precipitated travertan. Field observation indicated that these spring are faultly conducted. However, the high electrical conductivity (11000  $\mu\text{mohs/cm}$ ), high concentration of Na, Cl, and  $\text{SO}_4$  (3150, 2870, 1375 mg/l, respectively) and scaping gass bobles from these springs is attributed to the long residence time of water and firly deep origination of water.

The  $^{18}\text{O}$  and  $^2\text{H}$  isotopes and the carbon isotope mass balance between three water, solid and gass phases indicates strong rock/water intractions. In general, the fairly enriched  $^{13}\text{C}$  value of dissolved inorganic carbon in springs water (average of 5.8 ‰) confirms the contribution of calcite dissolution from geological formations and  $\text{CO}_2$  releasing at lower depth due to precipitation of travertan (with average of 11 ‰).

## Geochemical distribution of heavy metals in the downstream of polluted Tsurumi river water and sediments

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Water and sediments samples from downstream of Tsurumi River in Yokohama, Japan were collected and analysed to determine the extent of heavy metal content viz. zinc (Zn), copper (Cu), cadmium (Cd), lead (Pb), chromium (Cr), arsenic (As), mercury (Hg), nickel (Ni), strontium (Sr), and manganese (Mn) etc. Total trace metal concentration of sediments were measured by X-Ray Fluorescence Spectroscopy. A certified reference stream sediment sample (JSd-2) provided by the Geological Survey of Japan was also analysed using the same procedure as a check. Trace metals and anions in water samples were analysed by inductively coupled plasma atomic emission spectrometry and ion chromatography, respectively. The mineralogical constituents in the sediment samples were identified by X-Ray Diffraction. Results show that Cr concentration in water samples greatly exceeds the standard values (0.7ppb) for surface water quality. Sediment samples were dominated by different minerals like quartz, chlorite, kaolinite, chamosite, calcite, montmorillonite, biotite etc. The total concentration of Zn, Cu, Cd, Pb, Cr, V, Br, I and As in sediment samples were ranges from 56.1-530.5, 16-229.9, 0.1-5.7, 9.7-74.5, 29.7-252.7, 58.1-208.5, 3.4-114.7, 2.2-15.5, 1.8-21.7  $\mu\text{g g}^{-1}$ , respectively. The pollution load index (PLI) proposed by Tomlinson *et al.* [1] has been used to access the pollution load of different sampling sites. The PLI values of different sites ranges from 0.124-7.65 and area load index (ALI) was 6.53, which confirmed that the river sediments are in polluted condition.

[1] Tomlinson *et al.* (1980). *Helgoland Marine Research* **33**, 566-575.