

## Effects of arsenic-bearing deposits on groundwater resources along Zagros Orogen in Iran

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Recently, there has been an increasing concern over the toxicity of arsenic and its health effect caused by exposure to high levels in the geochemical environment. The risk to human health as a result of arsenic poisoning has been recognized in many countries including Iran. The common symptom of chronic arsenic poisoning including; hyperpigmentation, keratosis have been observed in many areas. The source of arsenic is geochemical in nature, locked in many minerals, including Fe-oxides and sulfides. The main cause of elevated arsenic concentrations in many regions in Iran seems to be oxidation of sulfides from mining activity resulting in contamination of groundwater with subsequent detrimental health effects. The concentrations of arsenic reach levels of 100–1000 ppb in wells in mineralized areas.

The regions along in the NW to SE Iran have been the subject of arsenic poisoning. The arsenic contamination covers areas along the Zagros Orogen including; the Sanandaj-Sirjan tectonic zone and metallogenic setting of the Tertiary Urumieh-Dokhtar magmatic belt and its ore deposits, including porphyry copper and skarn deposits.

The ore deposits and metal producing mines in the district contain excessive amounts of arsenic and groundwater resources in these regions appear to contain very high levels of arsenic in the water. The arseniferous groundwater belts are mainly located in the Zagros Orogen.

Occurrences of mineralization tend to give rise to high concentrations of arsenic. Increased amounts of arsenic may be released into the groundwater over metalliferous mineralization because of the increased solubility of many ore minerals. Arsenic in the groundwater is quantitatively related to the release of arsenic that absorbed on the surface reactive Fe-oxides and hydroxides. Lowering the water table and allows the penetration of oxygen which oxidizes the sulfides and releases the arsenic into water.

## LEPR 2.0

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LEPR (the **L**ibrary of **E**xperimental **P**hase **R**elations; [1]) is a web-portal (lepr.ofm-research.org) and search engine to a database of published experimental phase equilibrium data that documents liquid-fluid-solid phase relations in magmatic systems. In addition to information on the major element chemical compositions (including reported uncertainties) of all documented experimental run products, LEPR makes accessible data on run parameters (*e.g.* temperature, pressure, redox state) and experimental conditions (*e.g.* duration of the experiment, analysis procedures, experimental apparatus). LEPR is interoperable with the rock composition databases (NAVDAT, GEOROC, PetDB) of EarthChem [2], which permits cross-database searches to be performed that link experimental results to naturally occurring rocks.

In LEPR 2.0, the web-portal has been upgraded to allow privileged users to input their own experimental data or to augment the archive with additional published material. Unpublished user data are maintained as private sources that are only accessible to the user who entered these data (the data owner). In addition to providing a structured environment for storage of unpublished experimental data, the owner may edit, search, and analyze these data using LEPR interface tools; once data are published, it is a simple matter to move them into the public LEPR data archive. The goal is to provide a simple to use data storage and manipulation environment that will encourage experimentalists to use LEPR to maintain data prior to publication and make them cognizant of data and metadata standards. This workflow simplifies transfer of these data to the public archive once they are published.

User interface search tools in LEPR 2.0 have been upgraded and augmented to include filtering on derived compositional quantities such as CIPW normative components in both bulk and liquid compositions, common compositional indices (*e.g.* Mg # and alkali index), and cation concentration per formula unit in mineral run products. These upgrades have necessitated a major revision of the relational database schema. In addition, an extensive user-configurable plotting facility has been created and the search interface has been improved to streamline user interaction. An on-line help facility and tutorials are available.

[1] Hirschmann, Ghiorso, Davis, Gordon, Mukerjee, Grove, Krawczynski, Medard & Till (2008) *G3* **9**, Q03011.

[2] Ghiorso, Walker & Ash (2009) *EOS* **89**, V13D-2053.