

Geology and mineralogy of Bidakhavid industrial soil

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Bidakhavid industrial soil is located 70 km southwest of Yazd city, central Iran. This area is a part of Cenozoic magmatic belt. According to the geological map of geology survey of Iran (1:250000 map of Yazd, Iran).

Bidakhavid feldspar mine is near the Shir-Kuh massive intrusion and Jamal limestone formation with Jurassic age. Darreh-Zereshk is the main fault in this area.

Petrologically, predominant rock is sandstone in this area. With attention to the Folk classification, these sandstones include: litharenite, arkosic arenite, arenite and sublitharenite. Quartz, alkali-feldspar and jarosite are the main minerals and biotite, muscovite and hematite are minor minerals. X-ray diffractometry results show, quartz, albite, orthoclase, jarosite and clay minerals are the main minerals in the Bidakhavid sandstones (Fig. 1).

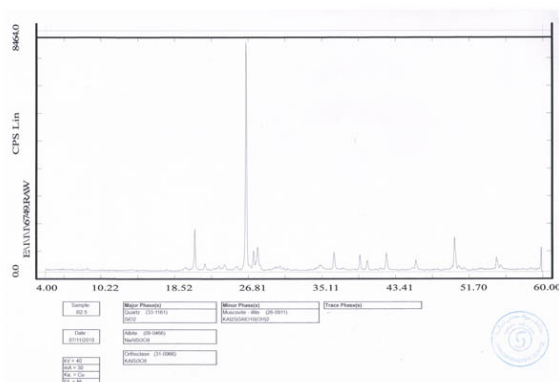


Figure 1: sample figures of XRD diagram

Because of weak roundness structure and poorly sorted of sandstones grain it is obvious that, parent rock is near the Bidakhavid mine. According to field evidence, petrography and mineralogy studies sandstones composition is similar to the Shir-Kuh granite. So we can conclude that Shir-Kuh intrusion has an important role for the providing of primary material for the industrial soil in the Bidakhavid area. Also it must be noted that Darreh-Zereshk fault movements may have supported fluids for alteration of Shir-Kuh granite.

[1] 1:250000 map of Yazd, Iran. [2] Folk R.L. (1965) *Petrology of Sedimentary Rocks*, Hemphill.

The role of fluid residence times in controlling the chemical fluxes and isotopic compositions of rivers

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The role of fluid residence times and catchment length scales in controlling the chemical composition of rivers is evaluated by comparing numerical simulations and scaling arguments to concentration-discharge data from small catchments and global rivers. The analysis suggests that the actual residence time of fluid relative to the residence time required to approach chemical equilibrium is likely a dominant control on solute fluxes. Catchments that show little variability in concentration with discharge (or 'chemostatic behavior') likely have average fluid residence times that exceed the time required to reach chemical equilibrium. Conversely, decreases in concentration with increasing discharge are explained by average residence times shorter than required to approach equilibrium, resulting in dilution. Increases in runoff associated with climate change can result in either a proportional increase in weathering fluxes, or a plateau in weathering fluxes if the fluid residence times become shorter than the time required for equilibrium. The same theoretical considerations can be applied to interpret the behavior of Sr and U isotopes in rivers. The extent of isotopic equilibrium and the final isotopic composition reflected by river waters will also depend on the ratio of the fluid residence time to the time required to reach isotopic equilibrium, where the latter varies widely across isotopic systems and weathering environments.

This framework also has implications for weathering rates in the past. As a consequence of the thermodynamic and hydrologic restrictions on the amount of weathering outlined above, global solute fluxes may depend more strongly on the geometry, relief, runoff and permeability of basins than on temperature and rates of erosion. If fluid residence times and catchment length scales are a dominant control on weathering fluxes, the chemistry and isotopic composition of different rivers could vary entirely as a function of the nature subsurface flow paths and the composition of the system at chemical equilibrium, which is complex to predict and strongly coupled to biological processes.