The multivariate statistical analysis of geochemical data to determine the genetical model of chromite in Soughan region, Esphandaghe, Iran

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The aim of working on multivariate analysis of geochemical data, geochemical and statistical analysis and their interpretations, is to determine the correlation between major and minor elements and possibility to utilize these correlation to achieve an exploratory pattern. In this research, the effort is to use the application of exact multivariate statistic for analysis and interpretation of geochemical data of Soughan region, genetical regions and geochemical characteristics of chromate mineralization of the area. Therefore in order to study the geochemical variation of the area, sampling has been done on the ore body and the country rocks of the restricted deposit. Collected samples in this area analyzed for 31 elements. The elements are classified in two main groups with the help of univariate and multivariate statistical methods for data processing. The soughan chromites is confined and categorized to the stratiform (stratum) deposits with the use of dispersion elemental diagrams, especially TiO_2 vs Cr_2O_3 in the stratiform and podiform kind of mineral deposits and comparison of those with same ratio in the soughan chromites mineralization. With the help of microscopical and geochemical studies about the analysis of the samples, the concluded result is that the soughan chromites correlated with the Bushveld model of stratiform deposits.

Arsenic bioaccessibility through *in vitro* extractions of mine wastes

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As a result of the extraction and processing of ore from gold and silver mines such as those found in the Mojave Desert, CA, elevated concentrations of associated toxic metal (loid)s including arsenic (As) are often mobilized by the transport of mine wastes into surrounding communities. Mine waste materials can leach arsenic through exposure to surface and rain water, become airborne and inhaled, or be statically attached to surfaces (such as skin, clothes, and food) and ingested, making their bioaccessibility highly relevant.

Bulk samples were collected from a number of mines throughout the Randsburg Historic Mining District, CA and separated through a dry sieving method to generate eleven distinct size fractions. BET analysis was conducted to determine the surface area of each size fraction (ranging from >2830μm to <20μm). ICP-AES was then used to identify the initial As concentration present in each size fraction. Finally, As bioaccessability as a function of particle size was studied utilizing simulated gastric fluid (SGF) and water extraction tests.

Results indicate over an order of magnitude As mobilized by SGF than by water (Fig. 1) and, for both media, a positive correlation between the inital As concentration present and the amount of As released. The percentage As released was further normalized for surface area in order to compare results between size fractions. It was determined that as particle size decreases, both As concentration and surface area increase, suggesting that finer size fractions can release a greater percentage of As and thus are potentially more harmful. This information will help to assess the potential toxicity of wastes from different mines as a function of particle size and the corresponding threat to human health.

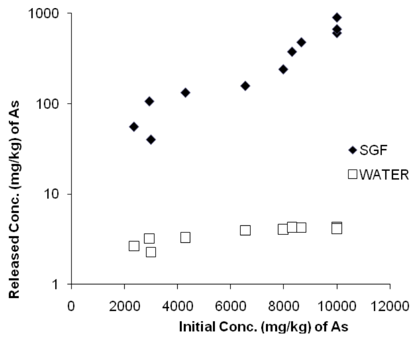

Figure 1: Released concentration of As vs. initial concentration of As in both water and SGF.