Geochemistry and mineralogy of the arid region, Hormozgan province (southern Iran), in relation with geo-pedological factors of soil evolution

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The concentrations of trace elements in soils depend mainly upon the bedrock type, from which the soil parent material is derived, and pedogenic processes acting upon it [1]. Geochemistry of trace elements, mineralogical characteristics of soil diagnostic horizons and relevant parent rocks were measured with regard to determining amount and distribution of elements concentration in soils developed from different parent materials in Hormozgan province (southern Iran) to assess distribution, evolution and influential processes of the elements behavior in soils. The studied area has an arid climate with predominant sedimentary and basic igneous parent rocks. Elements concentration in soil and parent material are higher than the proposed range of world's soil average and relevant parent material by different references; however, Se and Pb concentrations are much lower than arid world's soil average. Statistical analysis of elements with soil properties and mineralogical characteristics suggest that different elements are classified in three cluster: i) samples with the highest amount of trace element concentration coinciding with highly developed soils and phyllosilicate minerals dominant; ii) soils with high percentage of quartz and sand; and iii) with partially lower amounts of elements coinciding with gypsiferous soils containing gypsum and dolomite minerals. No significant difference between horizons A and B in relation to C horizons were found representing early stages of weathering and pedogenic processes, and indicating that trace elements composition of the soil will be inherited from the parent material. Enrichment factor results show that lithogenic origin is the dominant source of elements, especially Mn, Fe, Sb, Bi, Sr, Sn and Co, and pedogenic origin is more notable for elements like As, Pb and Cu.

[1] Mitchell (1964) Trace elements in soils. pp:320–368.

Investigation of geochemical properties of Khonj bentonite mine (East of Iran)

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Bentonite usually forms from weathering of volcanic ash, most often in the presence of water. However, the term bentonite, as well as a similar clay called tonstoin, has been used for clay beds of uncertain origin. Konj Bentonite mine with area about 15 km2 locate in South Korassan province in the east of Iran. Lithology exposes of the rocks is consisting of Shale and Sandstones (Jurassic), Limestone and Marl (Cretaceous), Andesite and Dacite (Oligomiocene), green sandstone, Andesite, Tuff, Argillite and Conglomerete (Eocene). Form geological viewpoint, a Bentonite horizon with 10 m and more thickness have been extended in mine area and have been formed more than 1800000 ton Bentonite. Forming of this Bentonite horizon is because of acidic submarine colcanism activities and part of silicate rocks, Montmorillonite, Tuff and volcanic ash with Eocene age. These complexs in diagenes level undergo mineralogy changes and after that have been affected by surface weathering. Bentonite horizon divides to 4 classification super quality, high, normal and low quality. Mineralogy studies by XRD analysis show that main former mineral phase of Bentonite is consist of Montmorillonite, crystobalithe, and Calcite and secondary phase is consist Quartz, Albite and Gypsum. Chemical analysis result by XRF show that Khonj Bentonite is Soda type as maximum amount of Na20 is about 3.29 % while maximum amount of K2O is less than 1.5 %. According to chemical and physical test result like acidity (ph-9-10) and absorption index (597-705), best application for this Bentonite is using in sinker and found industrials.