

The Role of Regional tectonic on the bauxite deposits Jajarm

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Abstract

The Jajarm bauxite deposit with over 22 million tons of storage is the most important deposits of bauxite in Iran. Disharmonic morphology with tectonic structures, is the most important characteristics of Jajarm deposit. In the two Golbini and Taguee regions and also total deposit area of Jajarm, existence constant profiles (Kaolinite, hard bauxite, soft bauxite and Kaolinite) in all karstic bauxite and drill holes can be seen. The quality of minerals and especially changes in the thickness and complexity of its structure in the Taguee zone is less than of the other parts deposit in Jajarm. Due to be uniform carbonate bed rock of the Taguee bauxite zone, its bauxite grade and quality is less than of Golbini zone.

Introduction

Bauxite is the principal ore for the production of aluminum metal. The Jajarm bauxite, is the most important deposits of bauxite in Iran that located in the South-West of Bojnourd city and in 1349 was discovered by Valleh. Stratiform deposits much thinner than the above ones (2 to 4 m thickness on average) are known from North west Iran (Bukan region) and from northern Iran (near Jajarm) (Bardossy, 1982). Karst bauxites formed on the permo - Triassic boundary are known in Northern and Northeastern Iran (Bardossy, 1982). Jajarm bauxite ore deposits, is a karstic bauxite reserve and Mediterranean type deposits and the major identified minerals (XRD method) are diaspore, shamosite, hematite, anatase, illite, kaolinite, quartz, rutile, calcite, krandelite and alunite respectively.

Geography Location

Jajarm Bauxite deposit located in North Khorasan province and 15 km North-East Jajarm town. This region has been lengths between $56^{\circ} 27' 30''$ East and $37^{\circ} 2'$ to $37^{\circ} 4'$ North latitude. This region has dry desert climate and low rainfall, about 150 mm a year. population of this region is close to 12 thousand people.

Geological setting

According to studies Afsharhrb (1373) and The Exploration of alumina project (report of Iran 1369-1371) The oldest exposed sediments in this region belong to Padha formation with lower Devonian age that overlying by Khoshyeelagh (mid to late Devonian) and Mobarak (Carboniferous) formations. On the Mobarak formation located a bauxite horizon That it is called A horizon. Afsharhrb (1979), Nasserri (1382) and bauxite exploration unit Jajarm (1369-1371) believe that Cap rock of this bauxite is Red shale formation (lower Triassic), but studies that has been by Alavi Naini (1372), Darvish Zadeh (1370) and partove Azar (1374) shows that Cap rock is Nasan formation. Analysis of several samples from A horizon bauxite showed that AL₂O₃ percent less than the 40 percent and And SiO₂ is more than 20 percent

(table 1 and fig. 1). The B horizon bauxite overlay Dolomite Elika formation and underlay by Shemshak formation. This horizon is much better than the A horizon bauxite, and thereby further exploration and exploitation works is done on this horizon (fig. 2).

Geomorphology

Disharmonic morphology with tectonic structures is the most important characteristics of Jajarm deposit. Three Taguee, Zoo and Golbini zones respectively from East to West have geological, structural and mining identical conditions, But their differences can be seen as Intensity to karstic bed rock, the thickness and quality of minerals. The structural strike area, is generally east - west and applied tectonic forces is basically the type of compression and shearing. Zoo Mountain is as a long anticline with both sides plunge (double plunge). The western Plunge located in the most point of the western anticline in the block Golbini (the beginning of mine) that changed stike structure and reducing slope layers and covered Elika formation under the alluvial deposits. Eastern Plunge located in the most point of the eastern anticline in the block Taguee. Although Taguee zone have silent morphology than Golbini and zoo zones, but repeated ore minerals at heights, sudden cutting in other areas and as well as Repeat mineral outcrops in East area Taguee Indicate the effect of various thrust, reverse, strike slipe and normal faults in this area (ITUK company reported 1375) (fig3 and 4).

Conclusion

- It was developed by Harrassowitz(1926), according to whom gibbsite, the primary bauxite mineral, was transformed into boehmite by overburden pressure and structure strains of folding(Bardossy1982). Disharmonic morphology with tectonic structures, is the most important characteristics of Jajarm deposit that Has led to different methods extracted type and only in Golbini block open pit mining method is possible But the other blocks such as Zoo and Tagvy, the extraction method should be subsurface.

- Three Taguee, Zoo and Golbini zones respectively from East to West have geological, structural and mining identical conditions, But differences can be seen as intensity to karstic bed rock, the thickness and quality of ore minerals. This issue show that this deposit is non-uniformity and inconsistency.

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**Table1- chemical composition of A horizon bauxite
(Mo=Module)**

NO.	Fe2O3	AL2O3	SiO2	TiO2
J1	6	35.5	39	4
J2	38.5	32.9	13.6	4
J3	9.7	36	35.7	4
J4	55.4	16.2	9.6	2.6
J5	23.4	38.4	19.4	4.4
J6	13.8	33.4	32.2	4
J7	18.8	37.7	15.9	4.7
J8	18.5	39.8	23.5	4.8
J9	21.5	43.9	10.5	5.4
J10	11.3	31.9	31.6	4
J11	18.8	32.9	26.7	4.1
J12	10.6	36.3	31.4	4.3
J13	18.8	40.1	21.7	5.7
J14	14.1	34.2	30	3.6
J15	16.6	37.3	24.8	4.3
J16	30.4	34.4	16.1	4.3
J17	28.6	40.9	12.3	5.2
J18	38.8	31.3	13.3	6.1
J19	13.7	41.9	24.5	5

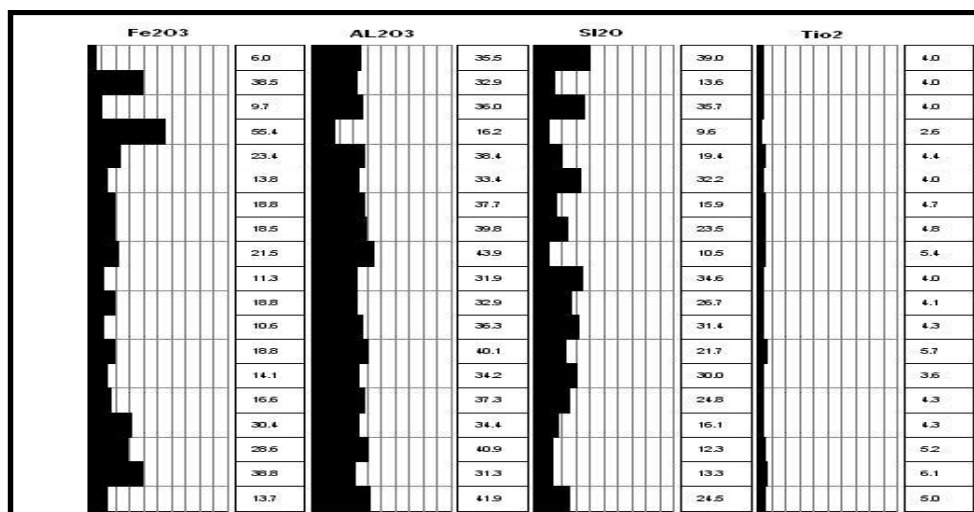


fig.1.Diagrams of mass changes for major element A horizon Bauxite.

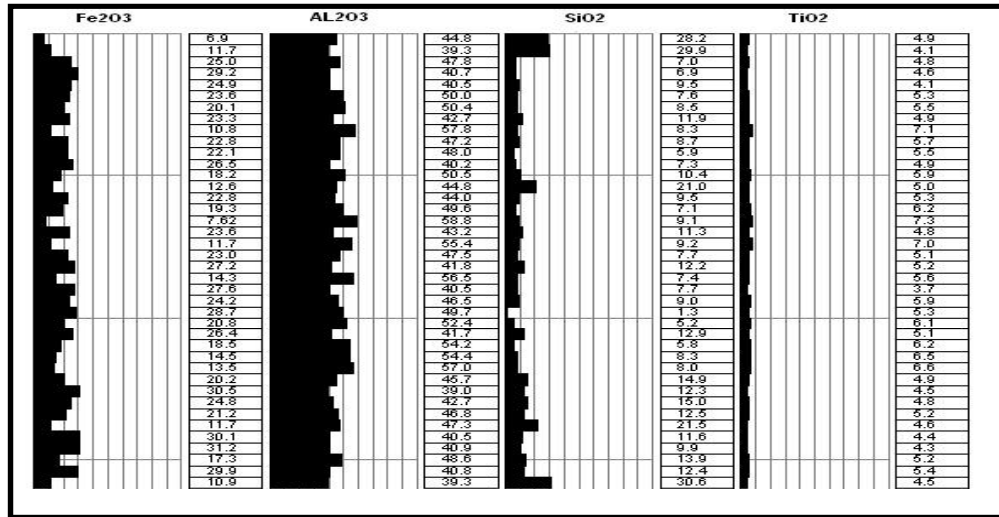


Fig.2. Diagrams of mass changes for major element B horizon Bauxite.

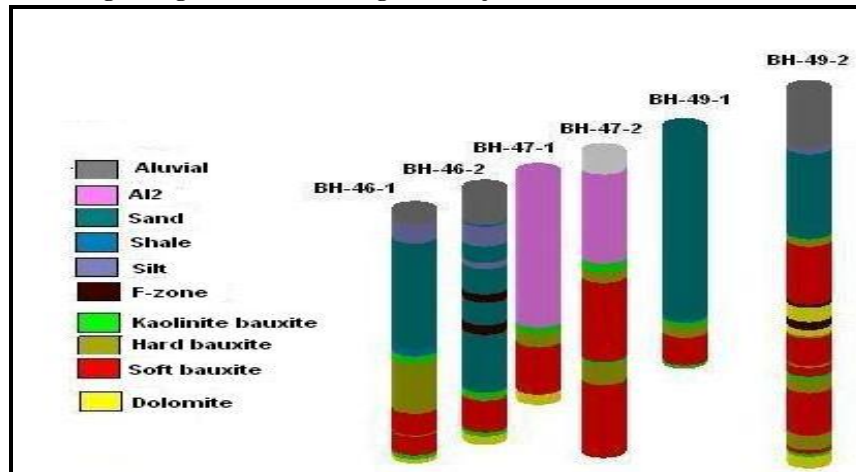


Fig.3. lithostratigraphic dimension columns along six bore hole across West Taguee bauxite zone.

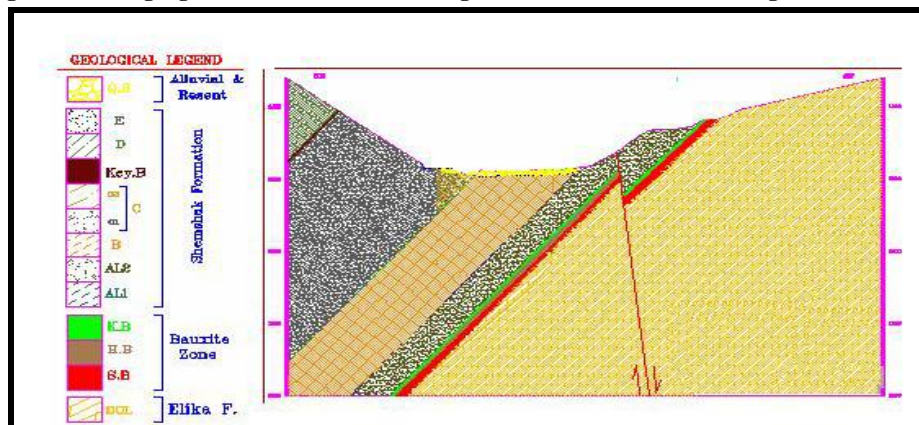


Fig.4. schematic cross-section in the study Taguee zone.