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GENESIS OF UDGIRI BAUXITE DEPOSIT, SHAHUWADI TALUKA, KOLHAPUR DISTRICT, MAHARASHTRA

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Abstract:

In the present study, Udgiri bauxite deposit of Kolhapur district has been selected. The area forms a part of Survey of India toposheets number 47 H/13 and 47 G/16. The bauxite in the study area are overlain by lateritic soil and vesicular laterite capping. Thus, the occurrence numerous laterite capping's on the bauxite over the hills in the area are separated by narrow valleys thereby indicating an extensive peneplained surface with gentle southerly slope and moderate slope.

The litho-units in the area belongs to Panhala Formation of Wai subgroup of Deccan basalt group. The rocks exposed are amygdaloidal basalt and compact basalt with associated structures. For the purpose of genetic study of bauxite, five lithological sections were observed on the traverse from Village Lavale to Udgiri. These lithosections indicate the bauxite horizons are present at different elevations. This difference is due to unequal weathering process. Further, it is also observed that the formation of bauxite is often restricted to some plateau or part of plateau. This suggest under similar weathering conditions of host rock bauxitization process has not been taken place on uniform scale. Thus, it is concluded that bauxite of the area are product of in situ.

The textural and mineralogical study are undertaken to know the genesis of bauxite ore. The data suggest that progressive enrichment of alumina is essentially a process of preferential and removal of silica and alumina. The bauxite which are underlain by clay horizon in study area probably formed due to fluctuation in water table with variation in P^H conditions.

Keywords: Peneplain, weathering, textural, mineralogical, etc.

Introduction:

The bauxite is economical ore of Al which contains not less than 45% Al_2O_3 not more than Fe_2O_3 and 3% to 5% combined silica. Bauxite deposit can be classified by various ways. Harrassowites (1926) divided bauxite into 'silicate bauxite' and calcareous bauxite. Cox (1932) subdivided bauxite on the basis of genesis. Valeton (1972) proposed bauxite classification on bedrock lithology while Grubb (1973) gives classification based on altitude. The Deccan trap of Maharashtra is capped by lateritic and bauxitic deposit. Kolhapur district of Maharashtra contains richest bauxite deposit. The Udgiri bauxite deposit Shahuwadi taluka, Kolhapur district forms part of Survey of India toposheets number 47 H/13 and 47 G/16 of the scale 1:50000 and having latitude 16^0 56' to 17^0 06' and longitude 73^0 47' to 73^0 53' (Fig. 1). The topography of the region indicates moderate slope and dissected valleys which indicate mature topography. The area contains heavy rainfall. Due to the humid and tropical climate, thick vegetation and heavy rainfall the bauxite was formed which capped the host rock.

GEOLOGY

The litho-units in the area belong to Wai sub group of Panhala formation of Deccan basalt group. Basalt is the main rock unit exposed all along the area and are of two types; 1) Amygdaloidal basalt 2) Compact basalt with associated features. Two flows were observed around the Udgiri deposit; flow number one which is exposed near village Lavale, varun, Chhandoli, Dhangarwadi. This flow is thick and amygdaloidal in nature. The amygdales are partly filled by secondary minerals and can be traced at top level. Second flow occupy bottom portion and represented by compact basalt. The compact basalts are exposed at the village Kadavan, Shirale, Shitur, Vittalchiwadi, Guravwadi and Udgiri.

Above the basalt, the altered basalts of about 10 to 12 feet and thick narrow clay filled basalt of about 3 to 4 feet were observed. This clay filled zone is composed of reddish brown to yellowish coloured lithomargic material. The bauxite horizon rests on this lithomarge clay zone which is around 4 to 10 feet thick. The bauxite horizon shows brecciated, pisolitic and concretionary textures. The bauxite horizons are overlain by 4 to 10 feet thick vesicular laterite followed by 2 to 4 feet lateritic soil. Geological map of the area have been prepared and presented in fig. no. 2.

OCCURRENCE OF BAUXITE

Five profile sections of the bauxite deposit at various altitudes have been studied and given below;

Section 1: North of Guravchiwadi (Plate 1): This section taken at North of Guravchiwadi at 950 meter above sea level. The top portion represented by about 0.7 meter laterititc soil followed by 0.5 meter vesicular laterite. The

vesicular laterite is soft and exclusively made up of kaolinite and hematite. The main bauxitic horizon underlies this vesicular laterite and attains a thickness of about 5 meters. Three different zones were identified in bauxite layer; the upper zones is of pisolitic bauxite which is slightly harder and are of 2 meter thick followed by grey, massive and coarse grained massive pisolitic bauxite. The gibbsite become major mineral encountered, the traces of hematite and kaolinite are also observed. Four meter thick clayey bauxite horizon at the base can be noticed which rest on basement basaltic rock.

Section 2: Near Vittalchiwadi (Plate 2): This section was taken near Vittalchiwadi at 1000 MSL. The lateritic soil covers top portion of the section and composed of ferruginous material which is grey to red in colour. The lateritic soil layer underlain by vesicular laterite followed by thin layer pisolitic bauxite and then again a thick layer of grey pisolitic bauxite. This layer is highly aluminous showing reddish white to pink colour. The isolates are larger in size as compared to other layers. The bauxite is of concretionary type and pink in colour. Gibbsite is major mineral constituent. Kaolinite, quartz, goethite and hematite are also observed but in smaller amount. The bottom portion of the section composed of clayey material.

Section 3: North of Udgiri Village (Plate 3): In this area mining activities was carried out for aluminium ore. The laterite soil and vesicular laterite attain a maximum thickness of about 2.2 meter. The laterite is red in colour and rich in ferruginous material. The pisolitic bauxite is found to be a thick layer of about 3 meter below the vesicular laterite. This bauxite is bouldary, grey, massive, slightly ferruginous and forming main ore body. Gibbsite is the major consitutent while goethite fairly observed mineral.

Section 4: East of Kedarlingwadi (Plate 4): This section is taken at distance 400 meter east of Kedarlingwadi at 900 MSL. The top horizons represented by lateritic soil and vesicular laterite. The thick of laterite more as compared other section taken in this area. Below this layer bouldary, massive, pisolitic bauxite which is highly aluminous can be noticed.

Section 5: Dhangarwadi (Plate 5): This section was taken at 840 meter abovesea level near village Dhangarwadi. Thick vegetation observed in this area. Lateritic sool and vesicular laterite attain a maximum thickness of about 5 meter followed compact basalt flow of about 7 to 8 meter. Here a thin layer of pisolitic bauxite is sandwiched between vesicular laterite and compact basalt. This section showing intense weathering thus exact boundary of bauxite deposit cannot be demarcated.

Petrographic study

The Udgiri bauxite deposit lies above the NE-SW trending plateau having 3000 meter strike length as lensoidal body. (GSI, 1994) Total estimation of the ore reserves is about 9.5 million tonnes.

For the purpose of the genetic study thin and polished sections of bauxite have been prepared as per the methods suggested by Craig &Vaughon, (1981). Three types of bauxite were identified; pisolitic, massive and pisolitic and concretionary. The pisolitic bauxite sometimes appear tobe brecciated with angular fragments of grey bauxitic material set in the ferruginous clayey groundmass (Plate 6). The petrographic examination of thin sections of bauxite show that they are composed mainly of gibbsite and cliachite (Plate 7) with minor constituents of boehmite, anataze, goethite and limonite. Various stages of formation of Gibbsite to cliachite are observed under the microscope. Relict anhedral grain of gibbsite filling the cavity was noticed in hard massive pisolitic bauxite. (Plate 8) Brown to yellowish brown limonitic material is noticed in some sections which occur mainly as crustation or coatings on gibbsite.

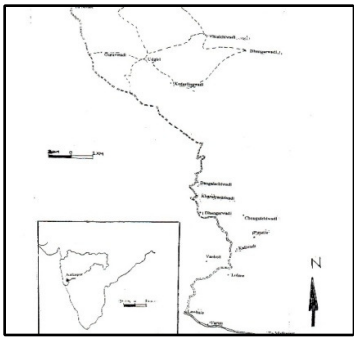


Figure 1: Location map

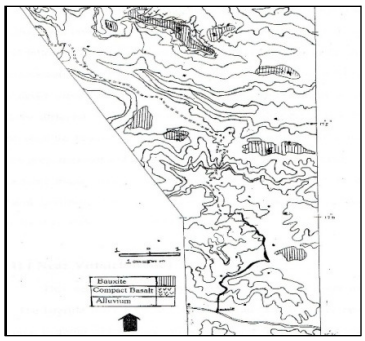
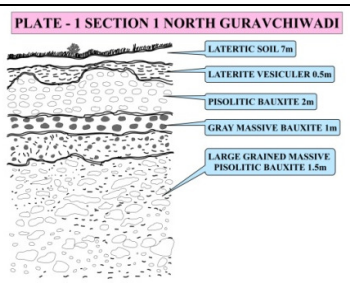
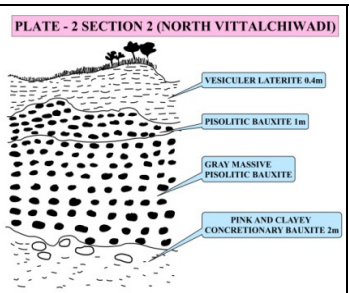
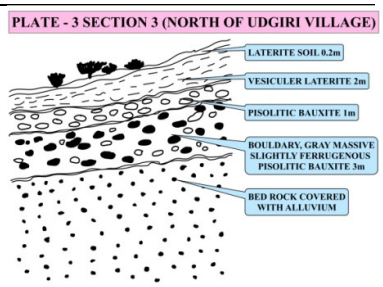
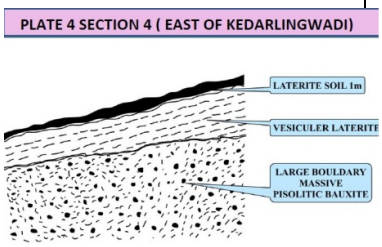


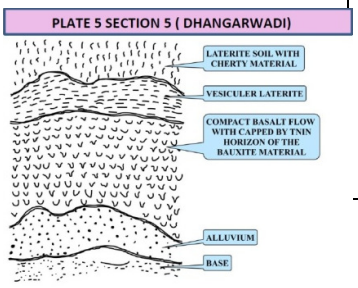
Figure 2: Geological Map











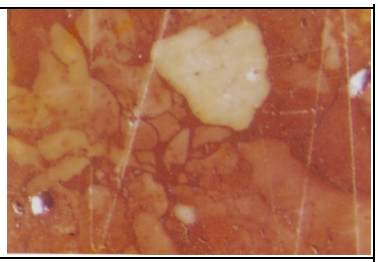


PLATE 6: Microphotograph showing bauxite appears to be brecciated with angular Fragments. Reflected light (10 X).

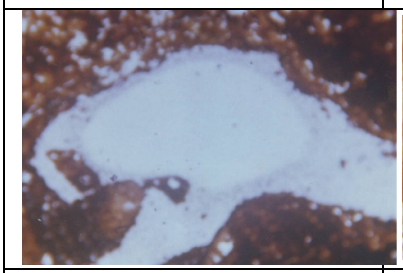


PLATE 7: Bauxite showing Gibbsite (light coloured) and Cliachite (Opaque) (10 X).

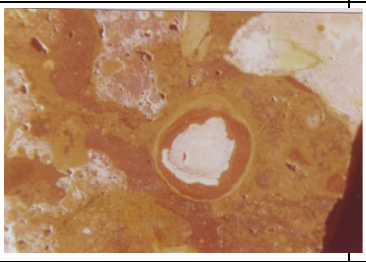


PLATE 8: Photograph exhibiting relict euhedral grain of Gibbsite filling the cavity (Transmitted light 10 X).

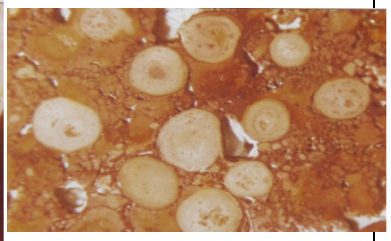


PLATE 9: Pisolitic texture (10 X).

Discussion

Fieldand laboratory investigation carried out on the samples collected from Udgiri deposit helped us to acquire data on various aspects of this deposit. Basalt is the major rock type in the area and is of two types. The amygdaloidal zeolitic basalt exposed at south side while compact basalt at northern side. To study the genesis of bauxite, five lithosections have been taken from different locations. (Fig. 2) These sections indicate the bauxite horizon is present at different elevations. This difference is due to the unequal weathering process. Geological and geomorphological studies of area suggest peneplained surface with southerly slope. Presence of several relict features of basalt both of megascopic and microscopic scale in lithological unit of laterite profile suggest basaltic parentage.

The study of number of sections in the area suggest bauxite formation is not uniform and is often restricted to some plateau or part of the plaeau. This indicate bauxitization process is uneven. Thus formation of bauxite is in situ.

Conclusion

1)Observation amd study of five llitho sections suggest lateritization and bauxitization proceeded over on Peneplain surface with gentle southern sope.

2)The presence of relict texture indicting the basaltic parentage.

3)The of study of bauxite profile indicate that the bauxitization has guided by the lateral and vertical movement of the leaching solution.

4)The typical colloform texture of the bauxite at many places indicate in situ formation.

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