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Analysis on geological characteristics and ore-controlling factors of Wujiawan bauxite in Chongqing

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Wujiawan bauxite is located in Nanchuan of Chongqing city. The tectonic position mainly belongs to the Yangtze continental block, the NNE large block type folds and faults formed by Yanshan movement. the oldest outcropping strata is the upper Cambrian (ϵ_3), the latest formation is middle Jurassic Shaximiao Fm (J_2s). Daganba syncline and Wujiawan overturned anticline are mainly fold structure, with some small drag folds by two relative displacement of the formation. Effected by the thrust fault zone—— fault Daganba (F1), the secondary fault (F3, F4, F5, F6) is developed, in addition to F3 (NNW), a normal fault, the tendency of SEE, and Daganba thrust fault (F1) approximately parallel, forming a group of imbricate structure (Fig.1).

1 Ore deposit geology

1.1 Ore-bearing rocks and ore body characteristics

The ore-bearing rock series under the Middle Permian Liangshan Fm (P_2l) (Li Junmin, 2012), which shows disconformity on silty shale of the middle Silurian Hanjiadian Fm or limestone of the Middle Carboniferous Huanglong Fm are clay rocks with aluminium-contain.

Ore bodies are mainly located in footwall of Daganba thrust fault, Wujiawan overturned anticline plunging end and the eastern wing of the anticline. The ore bodies are lenticular occurrence in the ore-bearing rocks in the upper part, thickness of ore body located Wujiawan anticline near surface and the eastern wing of the anticline section is larger than other parts with no rules. Ore occurrence and stratigraphic occurrence is consistent, but at overturned anticline plunging end, attitude changed, the ore bodies are arcuate distribution.

Bauxite ore includes four types, earthy—half earthy, beans (oolite), compact and gravels shape. Among these types, best quality is the earthy, beans (oolite) shape of bauxite is second, the compact ore is relatively poor. The main minerals are diasporite, kaolinite, chlorite; secondary

minerals: boehmite, aluminum gel, gibbsite, illite, siderite, hematite, goethite. Diasporite as the main ore of aluminum mineral, is usually colorless, light yellow, light brown, light green, usually in aggregate form output.

1.2 Main elements and associated elements.

Due to the faults, ore bodies were broken into a plurality of ore block, the average grade: Al_2O_3 59.87%, SiO_2 17.07%, Fe_2O_3 3.45%, TiO_2 2.78%, S 1.16%, Loss 14.12%, A/S 3.51.

Often a variety of useful trace elements content in bauxite deposit is far more than the minimum index of its comprehensive utilization, and the same time, resources of Ga, Sc, Li and other elements have a certain amount (Chengdu Center, China Geological Survey, 2011). Ore dressing and smelting experimental results show that, scandium, gallium associated can be recovered and used at present.

2 Ore-controlling factors

Wujiawan bauxite in the process of formation, by

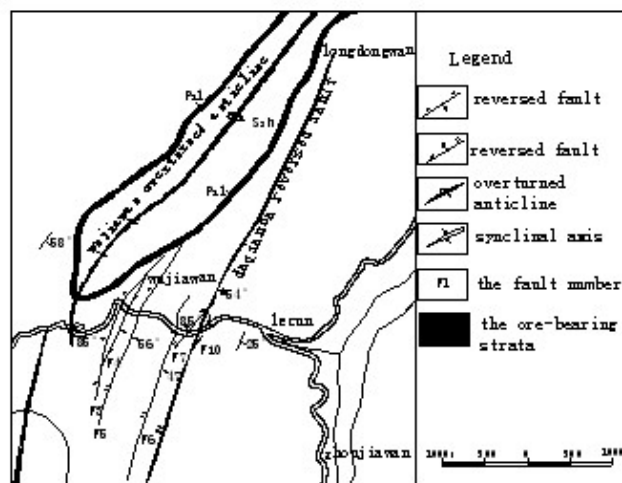


Fig.1 Geological sketch of Wujiawan bauxite

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Table.1. Major elements in Dafuyan bauxite deposit.

	Major elements (%)						
	Al ₂ O ₃	SiO ₂	Fe ₂ O ₃	TiO ₂	S	LOSS	A/S
maximum	76.87	27.62	16.60	4.81	6.84	16.92	33.94
minimum	44.40	2.18	0.90	1.57	0.00	12.00	2.00
commonly	50~70	5~25	1~4.5	1.8~3.5	0.0~1.0	13~15	2.2~5
average	59.87	17.07	3.45	2.78	1.16	14.12	3.51

stratigraphic constraints, restricted by landform, paleoclimate, paleogeography and other factors, at later Silurian Period, influenced by Caledonian movement, the entire Southeast Chongqing generally rised to land, suffered weathering and erosion, resulting in the Silurian Upper to Devonian, Carboniferous, partial or total loss of strata, sedimentary formation section for a billion years. At early Permian, the Hercynian orogeny happened, crustal declined, residues eroded (paleoweathering crust bauxite material) is piled up in autochthonous place or near, so the formation of aluminiferous rock system is constructed.

2.1 Formation factor

Only under Liangshan Fm of Permian and above Hanjiadian Fm of Silurian (or Huanglong Fm of Carboniferous), ore-bearing horizon of bauxite is found. To date, we have not yet found bauxite in other formations in Chongqing.

2.2 The ancient landform

Peneplain formed by long-term weathering and denudation is another important condition of bauxite ore. For bauxite mainly formed during chemical weathering, if peneplain degree is low, and physical weathering is stronger than the chemical weathering, then not conducive to the formation of bauxite. In contrast, Peneplain with higher degree, is in favor of chemical weathering. Parent rocks comed together in Karst depression and valley landform in the beginning (Liu Youping, 2010), Wujiawan bauxite is constructed on the unconformity of the middle and later Silurian Hanjiadian Fm or upper Carboniferous Huanglong Formation, in water medium, the acts of permeability, leaching process of bauxite parent material, weathering, taking a soluble substance, which accompanied by removal of silicon, iron, aluminum rich laterization, are conducive to the formation of bauxite.

3. Environmental factors

Warm and humid climate is a prerequisite for bauxite mineralization (Liao Shifan, Liu Changling, Liu Xunfeng, Liu Yingjun, Liu Baojun etc.). The paleomagnetic study of Late Paleozoic, this area is in low latitude and equatorial belt (8.2 ° around), tropical, subtropical climate and environment. The early Permian and before, this region on the Yangtze, according to lithofacies analysis, the East for the lower Yangtze shallow sea, the South as a watershed in northern Guizhou, on the basis of analysis about bauxite associated elements, the geographical position is in the offshore, at lagoon or between lagoon and intertidal - subtidal bounded region, by the humid and rainy climate, the various weathering comes into effect.

4 The structure factor

The relatively stable tectonic environment is necessary conditions of bauxite formation because after weathering crusts formed, there must be a relatively stable geological tectonic environment, in order to save weathering crust bauxite material, not lose.

Conclusion Wujiawan bauxite of Liangshan Fm, is strictly controlled by the strata, direction and distribution regulated by NNE syncline. Peneplain formed by long-term weathering and denudation and relatively stable tectonic factors are conducive to the formation and preservation of bauxite, ancient landform factor is an important factor to directly control the mineralization, the environmental factors restrict the development of bauxite.

Key words: bauxite, geological characteristics, ore-controlling factors

References

references in this article were omitted