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Necessity analyse of Occurrence state of Scandium in bauxite, Southern Chongqing, China

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Three rare elements(rare-earth element, rare metal, dispersed elements) are important strategic resource, and widely used in economic and high-tech fields. It is understood that the “three rare elements” in chinese bauxite, in particular, Sc has not yet been fully integrated recycling, which resulted in an enormous waste of valuable resources, and have an adverse environmental impact.

On the one hand, scandium as an extremely important strategic materials, has high market value. There are a lot of scandium resources with potential economic value in bauxite in China. On the other hand, the scandium resources is difficult to smelt, in addition to red mud outside, there are a large number of mineral processing tailings, not only scandium resources wasted, but also leaving a lot of worries about environmental protection, production safety and national resources and support. We think the reason for this situation, mainly the occurrence state of scandium in bauxite is unclear, and the enrichment mechanism of scandium in bauxite is unknown.

There is a huge waste of scandium in bauxite in China, and there are a lot of hidden dangers to environmental protection, production safety, the comprehensive utilization of national resources protection. One of the important reasons is that the occurrence state of scandium in bauxite is unclear. Few are engaged in this research in china, and the foreign case may be similar, the number of published articles about the occurrence state of scandium in bauxite is small. The reason is that the United States, Japan, Canada and the European Union and other developed countries is mainly dependent on imports of bauxite, and product aluminum by Bayer oxygen (aluminum Chongqing Branch, has been successfully copied), then extract scandium in the red mud. In other words, the developed countries have no the problem of

scandium resources and the environmental safety pressure. due to lack of bauxite resources in Russia (Богатырев, В. Н. и др. 1987), there is less the study on scandium in bauxite(Холодов, В. Н. 1959; Борисенко, Л. Ф. и Щербина, В. В. 1960) .

According to statistics, the world's scandium resources about 200 million tons(Cordier, D. J. *et al*, 2011). Which 1/3 of the amount of resources in China(Guo Yuansheng, *et al*, 2012), the scandium resources related bauxite. However, What's form of scandium in bauxite and red mud? why scandium enrichment in Red mud? The enrichment mechanism? And so on, are unclear. Firstly, this is not only related to academic theory to explain and the full recycling of scandium resources, but also to the security issues of environmental protection and national resources. Secondly, most of bauxite's ore mineral have lower Al / Si ratio in China(Liu Xunfeng, *et al*, 1990; Liao Shifan, *et al*, 1991; Liu Changling, *et al*, 1992). High-energy production of aluminum oxide sintering method is very poor compared to the Bayer process production of alumina. In the "Ninth Five-Year", we create a new process of beneficiation - Bayer alumina production (Bayer production of aluminum oxide through beneficiation by Al: Si ratio of flotation concentrate). However, relative to the Bayer process, mineral processing - Bayer process made more than a amount of beneficiation tailings but red mud (flotation 1 ton of bauxite, will produce 0.25 tons of tailings). The tailings has fine grain, high water content, small compression ratio, and difficult stockpiling. At present, although Scandium applicated widely, but the status quo and the utilization rate of China's bauxite Scandium is very equivalent to the sustainable development of the national economy, to security, to protect the environment and to resources conservation (Liu Zhongfan, *et al*, 2000, 2001; Ye Lin, *et al*, 2007; Tuo Biyang, *et al*, 2007; CUI Ping-ping, *et al*, 2008; Lu Aili, 2010; Feng Ruihua, *et al*, 2010).

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Because Scandium is substantially isomorphous form of occurrence state, so the content is not high, it is recycled from metal smelting process(Liu Ping, 1994;Zhang Yuxue, *et al*, 1999). Addition to isomorphism in Bauxite, there may also be sporadic and adsorbed on the diaspoire clay minerals such as kaolinite, the occasion of the boundary of heavy minerals or mineral(Chai Donghao, *et al*, 2001), but there has less research of which mineral and which manner of adsorption scandium. Someone speculated that the rare earth elements don't exist in mineral form, but disperse adsorption on the main components of the bauxite mineral - diaspoire and kaolinite (both content above 90%) in palaeoweathering bauxite, the type of REE is not same as the general metal minerals in the presence of a metal. The study on migration and enrichment mechanism between scandium elements and the host minerals is very lacking.

Through continuous technological innovation, many domestic enterprises extracted scandium from red mud or producted scandium alloy, so that the red mud has been a certain degree of comprehensive recycling. In a way, the Scandium potential economic value is more than alumina. At present, the extraction of scandium is time-consuming, cumbersome, big spending and arduous. Therefore, we need to explore the relatively fast and economical refined scandium technology. Due to the vast majority of scandium are associated with bauxite, preferably bauxite for the extraction of scandium source, it must be combined with the practical and theoretical identification of

scandium in which the mode of occurrence.

With the rapid economic development at home and abroad, the rapid growth in the consumption of mineral resources, including three rare (rare, rare earth elements and scattered), a variety of mineral resources increasingly faced with tight or depleted state. Increasing due to the demand of the domestic and foreign markets of the three rare elements and means of science and technology is constantly evolving. Although the study on the occurrence state of the three rare elements in bauxite is a time-consuming, labor intensive, costly, laborious work, but it contains with huge economic benefits and social benefits of environmental protection. So, the study on occurrence state of three rare elements in bauxite will growth gradually from the downturn to the system and urgent.

In recent years, Chongqing's aluminum industry has been phenomenal growth, self-contained step-by-step progress of the exploration project with the Chongqing Iron bauxite, bauxite and its associated three rare elements have been added to the huge amount of resources. Meanwhile, the utilization of three rare elements has in bauxite become a important part, southern Chongqing. Therefore, it is a Significance to improve the utilization value that identify the occurrence state of scandium in bauxite, and then clear the enrichment mechanism of scandium in bauxite ore-bearing series.

Key words: Scandium, occurrence state, enrichment mechanism, bauxite, Southern Chongqing