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Integration of Resources and Technological Advantages, Creation sustainable Qinghai Potash Fertilizer Industry Base

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1 Introduction

Qaidam Basin in Qinghai, including 43 salt lakes with multiple dominant mineral such as potassium, magnesium, lithium etc., is the most intensive distribution of Saline Lake resources, the largest area and the most perfect regional of basic condition development. It has great potential value in comprehensive development and utilization. With characteristics of Saline Lake resources in the Qaidam Basin, combined with changes of potassium, magnesium and other products at home and abroad market and comprehensive utilization demonstration base construction achievements in management, technology, etc. in recent years, this paper puts forward that digging the value of resources comprehensive utilization and integrating the technology advantages, pushing the salt lake development and construction in the Qaidam Basin to the recycling economy development of the last, reasonable, orderly and high value, to achieve the comprehensive and green development of the limited salt lake resources and make more contribution to Chinese economic and social development.

2 The main content

2.1 Qaidam Basin in Qinghai contains important salt lake resources in China and there is a huge value in comprehensive exploitation and utilization

Qaidam Basin in Qinghai is the most densely populated region. It has the most concentrated resources, the biggest area and the most perfect regional development basic condition. It is the most important salt lake resource in China which has many kinds of minerals and sulfate

and chloride types are the most foremost salt lakes.

According to the available statistics, there are 43 salt lakes. The deposition area of salt lakes and modern salts is about 11000 square kilometers. There are 12 kinds of salt minerals including magnesium salt, potash, plaster and so on. Among them, the reserves of KCl is 735 million tons and $MgCl_2$ is 5832 million. Among, $MgCl_2$ proved reserves in Chaerhan salt lake is 4 billion tons which can product magnesium of 4 billion tons and they can be used for 1000 years.

The boron proven reserves in Qinghai in 2012 is 10.013 million tons. Among, reserves are 4.8560 million tons. Also, the strontium ore proven reserves in Qinghai in 2012 is 1743.23 million tons. Among, reserves are 14.7799 million tons.

These mineral resources have important potential comprehensive exploitation and utilization value.

2.2 Currently, most enterprises mainly recovery potash and many associated resources are let out on the earth's surface. This phenomenon will not only waste resources but also pollute the environment.

At present, the development of Qinghai salt lake resource mainly concentrate in the salt lake potash production. In addition, industrial minerals such as boric acid, soda and NaCl are producing. The exploiting of Magnesium and Potassium resources of salt lake just started. Salt lake resources such as Magnesium, Lithium, Rubidium do not form a large-scale production ability.

There are 7 KCl production enterprises in Qinghai province in China and production capacity is about 5 million tons. In addition, there are 2 K_2SO_4 production enterprises and 2 Magnesium fertilizer production enterprises. And the total production capacity is more than 6.3 million tons.

In the process of extracting potassium, the discharge

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amount of MgCl_2 per year is about 40 million tons. A large number of high-grade mixed water including MgCl_2 , NaCl and Li_2SO_4 was let out to the surface of the earth and the water was not used effectively. Thus, it caused some impact on the ecological environment of salt lake.

In recent years, potash fertilizer industry in China is developing rapidly and production increased year by year. The result of it is the salt lake brine is excessive mining which leads to the water has fallen sharply and the quality of brine decreased quickly. Currently, some production scale of our salt lake potash has exceeded natural carrying capacity of itself. What is worse, there are insufficient reserve resources. So there exit two problems of mining of Qinghai Salt Lake .One is excessive exploiting. Another is the shortage of comprehensive extraction and use.

2.3 We have made some progress in magnesium and lithium technology in Qinghai Qaidam salt lake. But they need to be further improved.

Qinghai salt lake group has introduced the technology and equipment from Norsk Hydro ASA in 2008. So we can product potash fertilizer with Chaerhan salt lake and smelt Magnesium by electrolysis. It is recognized as the most advanced technology in the world. More resources, reactants, low energy consumption, less slag discharge and carbon dioxide emissions by 75%. Pidgeon's magnesium reduction is partly replaced. It also reduce dolomite, coal consumption, and reduce carbon emissions. It will guide the Chinese magnesium industry from high pollution mill to modern green economy. The old brine after Chaerhan salt lake potash production contains magnesium chloride emissions by 32%, which is 55 times of seawater. It is the same with the brine which is processed by magnetite in Norsk Hydro ASA. It has the advantage of saving materials, decreasing production cost and it reduce waste emissions and pollution to the environment, at the same time. It can produce 10 million tons of magnesium. The total investment is expected to 27.8 billion yuan. Now investment of 10.6 billion yuan has been completed. It is expected completed and put into operation in 2014. It is expected that we can produce 400000~ 600000 tons every year in the next 10 years. This project can produce 100000 tons magnesium, 1million tons MTO and 800000 tons PVC every year in the first phase of construction. There are also some difficulties. The first is that the energy consumption is too high, another is that the PVC production is over capacity.

Qinghai salt lake brine in China is sulfate type with high percentage of magnesium and lithium. It is difficult to separate lithium and magnesium. The national high-tech

industrialization demonstration project by Qinghai lithium company is conducting trial and experiments. The production line hosted by Lithium company CITIC Guoan which is set for K_2SO_4 , Li_2CO_3 and boric acid products, has realized the separation of lithium and magnesium by calcine lithium carbonate .But it has long process, high energy consumption, and high cost. And the hydrogen chloride gas is drank corrosive. The technology is still in the semi industrial test stage.

3 Conclusion and Suggestion

3.1 Conclusion

The main salt production enterprise is single, the comprehensive utilization efficiency is low, the resource consumption is too fast and the downstream industry chain is missing.

3.2 Suggestion

(1) In the case of high cost, low efficiency and serious waste of salt lake, the country should vigorously support and encourage the development of new technology, use lithium resources preferentially and make a cooperation with some enterprises which have existing technology and research and development capabilities, for example Shanghai institute of space power, to construct the new production line.

(2) Do some research for how to protect the lithium resources in the old brine from losing and wasting. Three methods are mainly used. The first one is to make less or no exploitation of salt lake brine resources before the completion of comprehensive utilization process. The second one is to put the old brine back into the lake. The last one is to use advanced, economic and feasible methods to extract magnesium and lithium.

(3) To develop the industry standards of salt lake comprehensive utilization and we can limit or stop the pure potassium scale and production Encouraging enterprises to upgrade production technology and process to improve economic efficiency and reduce pollution.

(4) Let the domestic potash production enterprises make cooperation with import enterprises and downstream compound fertilizer enterprises. So we can form a complete industrial chain to increase the market share of security and competitiveness.

(5) In the case of potassium excess capacity and low prices, we can use importing potash preferentially to reduce domestic production and resource consumption, and we can also reduce environmental pollution.