Magnesium-bearing minerals discovered on the earth so far occur mainly as solid or liquid. The former include magnesite (MgCO₃), dolomite (MgCO₃·CaCO₃), carnallite (MgCl₂·KCl·6H₂O), bischofite (MgCl₂·6H₂O) and serpentine (3MgO·2SiO₂·2H₂O). The latter include salt lake brine, subsurface brine and seawater. Magnesium salt mineral raw materials used across the world mainly include magnetite and dolomite, followed by seawater bittern, salt lake brine and subsurface brine.

Salt lake magnesium salts are generally associated with potassium salts either as interbeds or associated in brine. Commonly found magnesium salt minerals include bischofite (MgCl₂·6H₂O), astrakanite (Na₂SO₄·MgSO₄·4H₂O), epsomite (MgSO₄·7H₂O), kainite (KCl·MgSO₄·3H₂O), and carnallite (KCl·MgCl₂·6H₂O). Uses of salt lake magnesium resources mainly include the production of magnesium chloride by beach drying, and the production of magnesium metal using carnallite as the raw material. The characteristics and effective utilization of salt lake resources are the focus of our discussion.

First, the current situation of China’s magnesium resources is analyzed. China is one of the richest countries in the world in terms of magnesium resources. As of the end of 2012, China topped the world with 87 identified magnesite orefields and measured reserve of 3.218 billion tons. The measured reserve of magnesium-smelting dolomite was more than 1.15 billion tons. The four largest salt lake regions of China contain rich magnesium salt resources. Magnesium salts in the Qaidam Basin, for example, are mainly found in Qarhan, Yiliping, East and West Taijinar Lakes, Dalangtan, Kunteyi and Mahai salt lakes. Magnesium salts there typically appear in the form of magnesium chloride or magnesium sulfide. The measured reserve is 6.003 billion tons or about 85% of the country’s total, ranking the first in China.

On this basis, production and supply of magnesium metal and magnesium oxide in and out of China is reviewed. So far, China has a production capacity of 10 million ton magnesium oxide, making up 64.83% of the world’s total. In 2012, China produced 7.5 million ton magnesium oxide, accounting for around 75% of the world’s total and making it the world’s first. As far as magnesium metal is concerned, in 2012, China had 126 smelting facilities delivering a total capacity of 1,522,500 tons and producing 698,300 tons of primary magnesium (the world’s total was approximately 811,300 tons), contributing 86% to the world’s total primary magnesium production.

So far, magnesium metal is prepared either by electrolysis or thermal reduction (the Pidgeon Process). The Pidgeon process using dolomite as the raw material is the typical way of producing magnesium metal in China. Close to 4 billion tons of the byproduct, Magnesium chloride, in the Qaidam Basin is a cutting-edge resource for salt lakes. Technical limitations, however, have prevented true development and utilization of this resource. The 10t magnesium chloride associated with every one ton of potassium chloride produced is showing marked negative impact on the development of salt lake potassium resources. While this is an undeniable fact, we still believe, after examining the geographical conditions, product cost and market capacity, that salt lake magnesium resources are not market competitive yet and recommend that future development should be achieved through the following three approaches: 1) Well structured discharge and storage of the salt lake byproduct - magnesium chloride to prevent contamination of the eco environment or potassium salt deposits; 2) Encouragement and support for the direct use of salt lake magnesium chloride in bulk products of magnesium-base building materials and other applications; and 3) Promotion of the development and utilization of salt lake magnesium-chloride resources in a progressive manner suited to the realistic conditions of magnesium.
resources and magnesium products in China, and more intensive studies into the efficient utilization of magnesium salt fine chemicals, magnesium alloys and the like.

**Key words:** magnesium metal, magnesium industry, magnesium resources, salt lake; the Qaidam Basin

**Acknowledgements**

This paper is co-funded by Chinese Academy of Engineering major consultation projects “Comprehensive Utilization and Sustainable Development of Qinghai Salt Lake” and the “Strategic Research on the Sustainable Mineral Resources Development in China (Chemical and Salt Lake Projects)”.

**References**


