

Research Group



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Magnesium Chloride Market Research in the CIS

Sample PDF

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Annotation

The report is devoted to investigation of current standing market of magnesium chloride in the CIS and forecast of its development. The report includes 7 Sections, 80 pages, including 47 Tables, 11 Figures and Appendix. The report is a desk study. As information sources, data of Federal Service of State Statistics (Rosstat), Federal Customs Service of Russia (FCS), official domestic railage statistics of Ministry of Railways of Russia, data of companies, the sector and regional press, annual and quarterly reports of companies, internet-sites of company-producers and consumers of magnesium chloride, as well as own InfoMine database were used.

The first Section of the report presents data on resources, used in production of magnesium chloride in the CIS, their characteristics, and description of the main deposits of magnesium salts in the CIS.

The second Section is devoted to production of magnesium chloride in the CIS. It describes in details technology of magnesium chloride production and methods used in industry, as well as quality parameters of the products. Besides, information on the main suppliers of the resources and flows of the supplies is presented.

The third Section of the report is devoted to production of magnesium chloride in CIS countries. The Section presents statistical and estimated data on volumes of magnesium chloride production in Russia, Ukraine and Turkmenistan. Besides, the Section describes current standing of Russian producers of magnesium chloride.

The fourth Section of the report is devoted to analysis of Russian foreign trade in magnesium chloride in Russia for 1999-2006 and 1 half of 2007 and in Ukraine for 2000-2006 and 1 half of 2007. It presents data on regional structure of export-import supplies, the main Russian and Ukrainian exporters and importers of magnesium chloride.

The fifth Section presents data on dynamics of prices on magnesium chloride at Russian domestic market, and analyses dynamics of export-import prices on the product in Russia and Ukraine from 1999 to the 1st half of 2007.

The sixth Section describes consumption of magnesium chloride in Russia. It gives detailed analysis of structure of the consumption of magnesium chloride, supply demand-balance of the product, sectoral structure of the consumption, as well as presents the main consumers and current standing and prospects of development of the greatest company-consumers.

The seventh Section presents forecast of development of Russian market of magnesium chloride up to 2010.

The Appendix presents contact information on company-producers of magnesium chloride in CIS countries.

Introduction

Magnesium chloride is the name for the chemical compounds with the formulas $MgCl_2$ and its various hydrates $MgCl_2(H_2O)_x$. These salts are typical ionic halides, being highly soluble in water. The hydrated magnesium chloride can be extracted from brine or sea water. Anhydrous magnesium chloride is the principal precursor to magnesium metal, which is produced on a large scale.

Magnesium chloride, $MgCl_2$, occurs in nature as mineral bischofite and is formed in large amounts in the course of evaporation of marine brines. To obtain magnesium chloride, bischofite $MgCl_2 \cdot 6H_2O$ is dehydrated to $MgCl_2 \cdot 2H_2O$, which is dehydrated further in flow of HCl at 100-200°C.

Bischofite (hydrous magnesium chloride $MgCl_2 \cdot 6H_2O$) is a product of crystallization of salts in closed water basins (a crystalline salt left after evaporation of an ancient sea (of Permian Age)). A German scientist Gustav Bischoff was the first to discover it in Zechstein formation, and later it was named after him.

As a mineral bischofite is encountered as a glomeroblastic salt rock. Pure bischofite crystals are aquatic-transparent, but may also be of white, rose and fallow colour depending on impurities. Bischofite has a bitter-salty, pungent, burning taste, its hardness is 1.5, specific weight - 1.59 - 1.6. It is electrically conductive.

Mineralogical composition of bischofite includes the following components:

Component	Weight, %
Bischofite $MgCl_2 \cdot 6H_2O$	88-99
Carnallite $KCl \cdot MgCl_2 \cdot 6H_2O$	0.1-5.5
Kiezerite $MgSO_4 \cdot H_2O$	0.1-2.8
Magnesium bromide $MgBr_2$	0.45-0.98
Anhydrite $CaSO_4$	0.1-0.7
Halite $NaCl$	0.1-0.4

Bischofite is known to contain several dozen of microelements. Some of them have concentration close to commercial values. It also contains insignificant quantities of sulphate minerals and groups of hydromica.

Bischofite is encountered on many continents, in different in age formations including modern ones. In the former USSR there were discoveries of small deposits in Western Ukraine, Belarus, Kazakhstan. All the discoveries were represented by thin (3 to 7 m) non-extended layers. Bischofite is extremely hygroscopic, it melts in the open air. Due to a number of objective and subjective reasons this unique natural mineral (raw material for bromine, refractory and magnesium metal production) stayed in shadow and was not used in various branches of production. Moreover, there was no reliable technology of its extraction and processing.

Magnesium chloride and its solutions are resources for production of magnesium metal, magnesia cements, refractories, balneotherapy preparations, pastes and other products.

I. Mineral resources base and mining of magnesium salts in the CIS

I.1. General characteristics

Total approved reserves of magnesium salts in category A+B+C₁ in the CIS territory are around 6.7 bln t by the moment, containing 1.16 bln t of magnesium oxide. Around 61.4% of all reserves of magnesium salts belong to Russia, 20% – to Turkmenistan, 18.4% – to Ukraine, 0.2% – to Kazakhstan. Deposits of magnesium salts are also available in Uzbekistan, but they are too small and not included in Balance of Reserves.

In composition of key minerals, deposits of magnesium resources are subdivided into deposits of chloride (sulfate-free) and sulfate salts; besides, mixed chloride-sulfate salts deposits exist.

Deposits of magnesium chloride salts are rather simple in mineral composition; magnesium-containing minerals are presented by carnallite and bischofite. This type is presented in Russia by deposits Gorodishchenskoe, Svetloyarskoe and Narimanovskoe in Volgograd region, and Verkhnekamskoe in Urals. These type deposits contain 98.3% of explored reserves of magnesium salts of Russia. Content of magnesium oxide in them averages: in bischofite – 19%; in carnallite rock – 8.5%; in mixed chloride salts, in which the main minerals are sylvinite and carnallite – 2.7%.

Deposits of sulfate magnesium salts are of complex mineral composition (up to 12 minerals occurs in some species). The main magnesium-containing minerals are kiezherite, langbeinite, carnallite, astrakhanite, schoenite and polyhalite. Representatives of this type are Stebnikovskoe deposit and Sasyk-Sivash lake in Ukraine, Kuchuk lake in Russia, Karabogazgol in Turkmenistan. Content of magnesium oxide in rocks and brines of this type deposits averages 2.2-2.3%.

Deposits of mixed sulfate-chloride magnesium salts refer to intermediate type. An example of such deposits is Kalush-Golynskoe in Ukraine.

In Table 1, data on deposits of magnesium salts in the CIS are presented.

Table 1. Deposits of magnesium salts in the CIS

Deposit	Type	Content of MgO, %	Degree of development	Reserves A+B+C ₁	Company-operator
<i>Russia</i>					
<i>Volgograd region</i>					
<i>Perm' region</i>					

Very large:	100 – 500 mln t
Large:	50 – 100 mln t
Average:	10 – 50 mln t
Small:	1 – 10 mln t
Very small:	<1 mln t

Source: State Balance of Reserves

I.2. Magnesium chloride salts

In the territory of Russia, unique deposit of potassium-magnesium salts is located – **Verkhnekamskoe (Perm' region)**. Besides sylvinit, being the main valuable component, Verkhnekamskoe deposit contains huge reserves of carnallite rocks (around 4 bln t). Content of $MgCl_2$ in carnallite rock deposits ranges from 11% to 32%, average composition of commercial-grade strata of carnallite is as follows: 24% $MgCl_2$, 19% KCl, 24% NaCl, 30% H_2O , 3% – insoluble residue.

Advantages of Verkhnekamskoe deposit are shallow (90-220 m) occurrence of thick strata of sylvinit and carnallite and practical absence of sulfates that simplifies flowchart of carnallite rocks beneficiation.

Carnallite rocks occur in Solikamsk, Novo-Solikamsk, Bereznikovsky, Durymsky, Bygelsko-Troitsky, Balakhontsevsky, Palashersky, Ust'-Yaivinsky sections of the deposit, and the main reserves belong to Solikamsk and Ust'-Yaivinsky sections (25.4% and 23.9%, respectively, of total reserves of the deposit).

At present time, carnallite is mined by underground method in Solikamsk section (by 1st Solikamsk Rudoupravlenie, being in structure of JSC «Silvinit») and in Bereznikovsky section (by 1st Bereznikovsky Rudoupravlenie (RU), in structure of JSC «Uralkaly»). Capacity of 1st Bereznikovsky RU is 1.3 mln t of carnallite rocks per year, 1st Solikamsk RU – 520 kt.

Besides Verkhnekamskoe deposit, in the territory of Russia, large deposits of **bischofite** have been explored in **Volgograd region – Gorodishchenskoe, Svetloyarskoe and Narimanovskoe**. Balance reserves of the deposits are 6.7 mln t (1.3 mln t MgO). Bischofite-bearing commercial-grade bodies of sheet-like shape contain 80-99% of bischofite, with additives of other chlorides, sulfates, and other minerals; the salt rocks contain large amounts of bromine (0.5-0.9%) and other microelements.

Exploitation and processing of the salts is complicated by rather deep their occurrence, so they can be mined by method of underground leaching only, which is applied on pilot-plant scale since 1980s. Narimanovskoe deposit was mined by Intersectoral Scientific-Production Concern Bischofite (by 3 drillholes), Svetloyarskoe – by JSC «Caustic» (1 drillhole), Gorodishchenskoe – by Gorodishchenskoe exploration company (2 drillholes).

In 1990s, various joint ventures were found for mining of the deposits but their projects failed. Later (in late 1990s), administration of Volgograd region and private investors found JSC «Bischofite Povolzh'ya» and «Bischofite-Avangard» for the same purpose. At present time, JSC «Bischofite Povolzh'ya» is not involved in mining and production of magnesium chloride.

In late 2004, in Volgograd region public auction on sale of license on exploitation of the above-mentioned deposits was held. JSC «Caustic», on 12.11.04, purchased license on exploitation of Svetloyarskoe deposits for the period of 25 years for 1.2 mln Rubles. Right of mining of Gorodishchenskoe deposit was purchased by LLC «Rusal-Bischofite» on 22.12.04 for 26.4 mln Rubles.