

HYDROCHROME LLC



CHEMICAL MODULAR PLANT FOR PRODUCTION OF MAGNESIUM OXIDE AND FUSED MAGNESIA



Russia, Ekaterinburg, 2017

www.magnesium-oxide.com

Magnesium oxide and the environment



- We have developed a continuous chemical technology for the production of high purity (98.5-99.5%) synthetic magnesium oxide from serpentinite.
- That technology's feature is the regeneration and recirculation of ammonium hydrosulphate's leaching solution.
- The cost of leaching is four times lower than in similar production.
- Environment friendly, wasteless manufacturing.



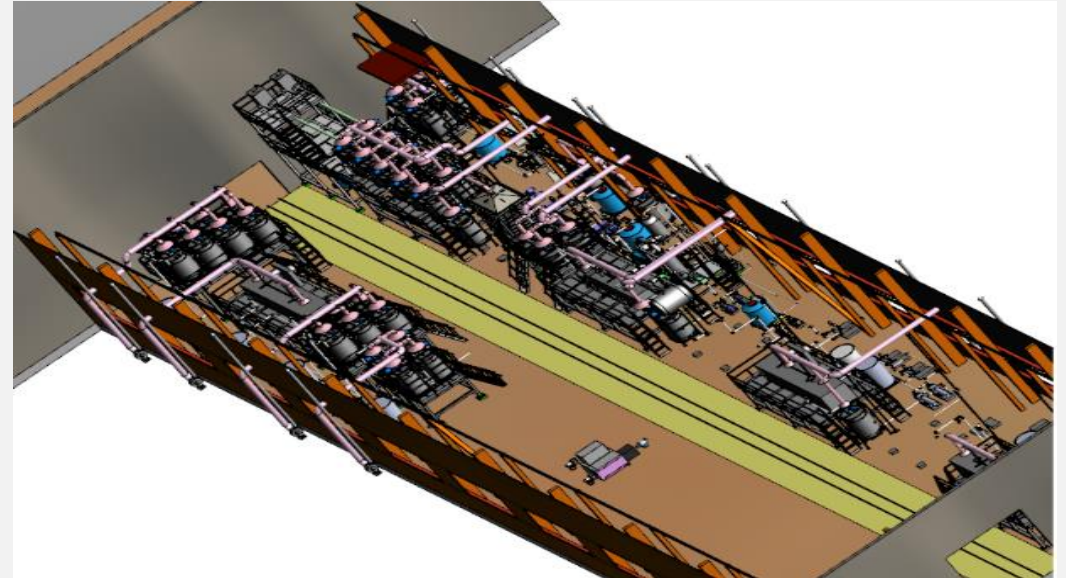
Analysis of competitive technologies



Gravitational enrichment and smelting of natural magnesite;

The raw materials are sea water or a bischofite solution. High energy consumption leads to high process costs;

At the output: 97% fused magnesia - with a large number of impurities.



- We produce magnesium oxide from serpentinite by continuous chemical technology with a recirculation cycle. At the output, we obtain 99.5% - fused magnesia at low production costs..

Chemical technology of recirculating acid solution:

The technology uses raw materials' leaching using ammonium hydrosulfate NH_4HSO_4 . For example, we use magnesium-containing wastes - serpentinite as raw material to produce magnesium compounds.



The undissolved acid-resistant part is deposited: $\text{SiO}_2 \downarrow$

Obtained sulfates solution is treated by ammonia solution to precipitate impurities which are separated by filtration.



The filtrate is clear solution with a main metal sulphate which is treated by ammonia solution to precipitate the main metal hydroxide, which is separated by filtration again.



Further, the technology uses an authors' patented ammonia solution regeneration technique.

RF Patent: 2519945



The producing's cost of 1 ton of ammonium hydro-sulfate from ammonium sulphate is 255 rubles / ton, which is four times cheaper than the replaced sulfuric acid.

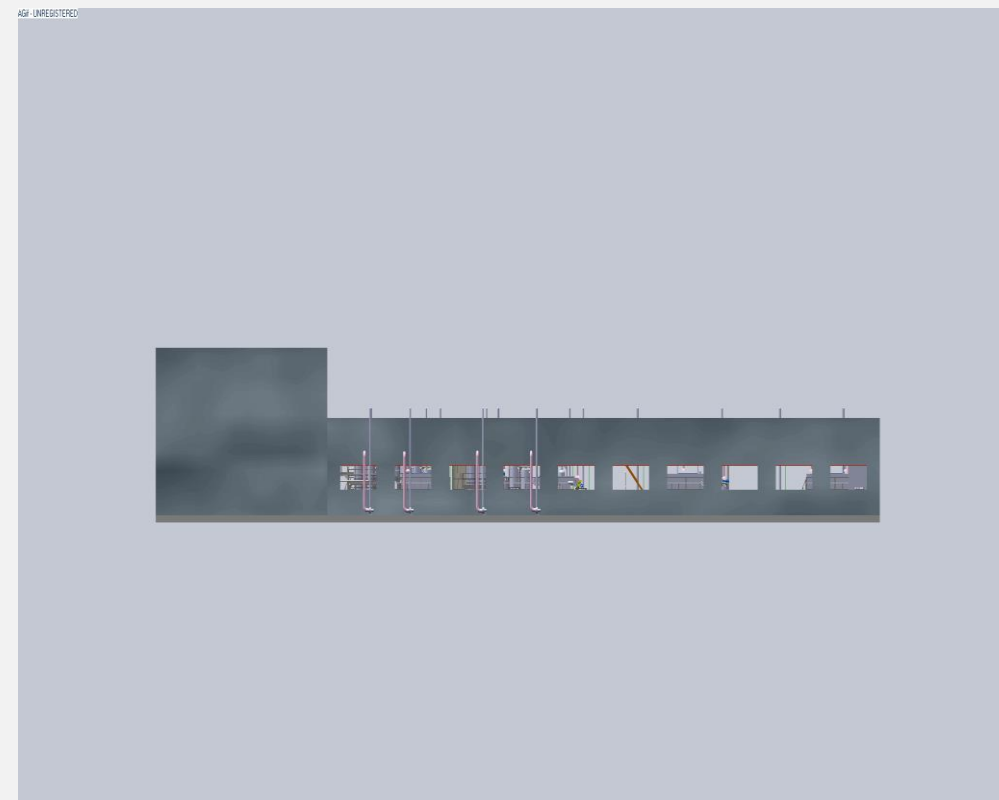
(The production of concomitant ammonia is included to the cost price)

The technology is patented!

Характеристики проекта



- We design and build environmentally friendly chemical plants on a “turn-key” basis.
- A unique continuous technology is the result of fifteen years’ work of our team.
- The plant designed on area of 1000 square meters, its capacity is four thousand tons per year of magnesium oxide in the form of fused magnesia. The first plant of such design is under construction near Yekaterinburg.
- Technologies are protected by Russian patents.
- The consumption of natural gas is 208 cubic meters per hour.
- The consumption of electricity is 210 kilowatts per hour installed.
- The water consumption is 2,385 cubic meters per hour.
- A melting furnace needs 5-8 megawatts of electricity.



The market of magnesium oxide and fused magnesia.



According to the research of the Federal Agency for Technical Regulation and Metrology of the Russian Federation, the capacity of the magnesium oxide market in various types in the Russian Federation is 650,000 tons / year. The world market capacity is 16.7 million tons per year (data for 2016). About 87% of the magnesium oxide is used for the production of refractories, of which 65% for the steel industry, 15% for cement production, and 20% for other consumers. Thus, our potential market is 16.7 million tons a year around the world, which is certainly not entirely correct, since we produce a high-purity product (98.5% or more), which is significantly different, primarily at a price, from product level of 96-97%. This means that our target audience is consumers of high-quality products, which already today get at least 97% purity of magnesia. We have identified the following consumers for themselves:

Manufacturers of refractories or metal (which have their own refractories production)

We produced an experimental batch of 2 tons of high-purity synthetic magnesium oxide by our technology, melted into fused magnesia, crushed, made refractory products and installed a bucket of real steel production in the bucket belt. The result is + 25% increase in the durability of refractories compared to the standard 97% periclase. We plan to occupy 20% of this market.

Manufacturers of transformer steel

The selling price of magnesium oxide in this market in Russia is about \$ 6,000. We plan to occupy 50% of the world market.

Consumers of electrotechnical periclase.

The sale price of magnesium oxide in this market is about \$ 1,500. We plan to occupy 50% of this market.

A similar product (high purity) accounts for approximately 10% of the total MgO consumption in the world, that is, approximately 1.7 million tonnes per year. In addition, in general, the market is drifting towards a better product, as this is an actual trend in the steel industry, higher quality steel grades are required. Thus, the expected annual growth of the market is + 10%.

Our production capacity will be 4000 tons / year, which will enable us to occupy about 0.2% of the world market. Build similar manufacturing facilities around the world and take 10-25% of the world market for magnesium oxide.

Raw materials and logistics of the project

As a magnesium raw material, we propose to use serpentinite, as the cheapest and most widespread mineral. Therefore, in the radius of 150 km around Yekaterinburg there are about 10 quarries of serpentinite. It is advisable to use asbestos waste products - chilled serpentinite. Such wastes accumulated a lot around the world. The content of MgO in serpentinite is approximately 38 percent. So next to Yekaterinburg is the city of Asbestos, where more than 4 billion tons of crushed serpentinite is accumulated (waste of work of the asbestos plant). Processing of asbestos waste is a global problem. Municipalities are interested in processing asbestos dumps. In Japan, there are also active deposits of serpentinite, and asbestos dumps. Large dumps are accumulated in Australia, Canada, USA, China, Italy.



The magnesium oxide melts at 2850°C . In the project for the melting of magnesium oxide in the fused magnesia, electric arc furnaces with a capacity of 5 to 8 megawatts are used per unit. An important role in choosing the location of the plant will be played by the availability of a ready infrastructure in the location of the facility and the cost of electricity. Logically, factories should be built as close as possible to deposits, technogenic and natural, taking into account the cost of electricity in the region or in the country. For example, China is famous for its cheap electricity. Therefore, it is worthwhile to set powerful arc furnaces by melting in the fused magnesia in China. On the other hand, factories producing MgO should be placed as close to consumers of refractories as possible. (Large metallurgical enterprises) and sources of raw materials.

Our technology allows processing and spent refractories, such as the fused magnesia-carbon and the fused magnesia-chromite. Profitability of processing of waste refractories is high.

Руководители проекта



Dmitry Ovchinnik,
Director, mining
engineer.
Project management.



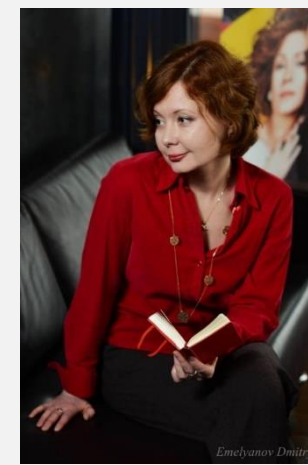
Andrey Doronin,
Chief Engineer,
The author of
technology.



Yuri Morozov ,
Professor of the
Ural Mining
University.



Kirill Zemlyanoy,
Ph.D.
Employee of the
Department of
Chemical
Technology UrFU



Julia Goldenberg
PR Director.



Alexander Fedotov
Project Manager.

The company has twenty three employees. Technologists, designers, chemists, mechanics.

Экономические показатели проекта



- Capacity of the plant is 4 000 tons per year of magnesium (98.5%)

The cost is:

- - dead burnt magnesia 98.5% – 200 USD per ton;
- - fused magnesia – 400 USD per ton;
- - crushed fused magnesia – 450 USD per ton;



- The price of crushed fused magnesia - over 700 dollars per ton.
- * The calculation is made at a cost of 1 kilowatt hour of electricity 0.037 dollars.

Offer to partners



- The construction budget for a single modular MgO plant is 2.82 million USD.
- Equipment - 2.1 million USD.
- Designing, project examination, industrial site preparing, installation and commissioning, adjusting of design parameters - 0.72 million dollars.
- The payback period of the project is 3 years.
- To the partner we offer the conditions of participation - 50 to 50% of the share in the joint venture. Provides a pledge or finances construction partner.
- During a year we plan to build 5-10 modular plants.

Contacts:



"HYDROCHROM" LLC.

The newest chemical technologies for the production
of Mg, Zn, Cr, Fe, W compounds.

RUSSIA Ekaterinburg, st. Furmanova 105a

Dmitry Ovchinnik

Tel .: +7 (910) 723-17-59.

Email: d9025838348@gmail.com

Julia Goldenberg

Tel .: +7 (912) 243-98-72

Email: gold_july@mail.ru

