Research Group

InfoMine

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in geology, mineral resources, mining and metal industry

Review of Potassium Chloride Market in the CIS

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Introduction

Potassium chloride, chemical compound, KCl, is a colorless or white, cubic, crystalline compound that closely resembles common salt (sodium chloride). It is soluble in water, alcohol, and alkalis. Potassium chloride occurs pure in nature as the mineral sylvite and is found combined in many minerals and in brines and ocean water. It is recovered (with other compounds) from the brine of Searles Lake in California. It is produced from sylvinite, a sodium chloride–potassium chloride mineral that is mined extensively near Carlsbad, N.Mex., and it is refined by fractional crystallization and by a flotation process. It is also recovered from lake brines in Utah and from ores in Saskatchewan, Canada. The chief use of potassium chloride is in the production of fertilizers; it is also used in chemical manufacture. For agricultural use it is often called muriate of potash; the concentration of potassium chloride in muriate of potash is expressed as a corresponding concentration of potassium oxide (K_2O), i.e., the concentration of potassium oxide that there would be if the potassium were present as its oxide instead of as its chloride. Thus, muriate of potash that contains (typically) 80% or 97% KCl by weight is said to contain 50% or 60% K_2O, respectively. Manure salts contain some potassium chloride.

THE MINERAL SYLVITE: properties

Chemistry: KCl, Potassium Chloride

Class: Halides

PHYSICAL CHARACTERISTICS:

Color is colorless or white, sometimes tinted red, blue or yellow.

Luster is vitreous.

Transparency: Crystals are transparent to translucent.

Density 1.99 g/cub cm.

Crystal System is isometric; 4/m bar 3 2/m.

Crystal Habits are cubes with frequent octahedral faces truncating the corners of the cube, crystals will often have a cavernous appearance from dissolution. More commonly massive and granular.

Cleavage is good in three directions forming cubes.

Fracture is uneven.

Hardness is 2 - 2.5

Specific Gravity is 3.9 - 4.1 (heavier than average for translucent)

Streak is white.

Other Characteristics: Dissolves easily in water, does not powder when the blade of a knife is scratched across its surface and has a bitter taste, not salty like halite. Associated Minerals include halite, carnallite, kieserite, gypsum, anhydrite and other evaporite minerals. Notable Occurrences include Strassfurt, Germany; Kalush, Russia; New Mexico, Texas and Kern Co., California, USA; Saskatchewan, Canada; France, Mt. Vesuvius, Italy and Spain. Best Field Indicators are bitter taste, associations and crystal habit.

Uses: As a major source of potash and as mineral specimens.

Sylvite, also called sylvine, is a major source of potassium or potash used in fertilizer products. So great is the need for potassium that sylvite deposits are considered very valuable economically.

As resources for potassium chloride obtaining, natural potassium salts are used, composed of potassium and potassium-magnesium minerals: sylvite (KCl; 52.44% K), carnallite ($KCI \times MgCl_2 \times 6H_2O$; 35.8% K), kainite ($KMg[SO_4]CI \times 3H_2O$; 14.07% K), polyhalite ($K_2MgCa_2[SO_4]_4 \times 2H_2O$; 12.97% K), langbeinite ($K_2Mg_2[SO_4]_3$; 18.84% K). The main potassium-containing natural rocks are: Carnallite rock – 45-85% carnallite and 18-50% halite with small content of sylvite, anhydrite, clay minerals and carbonates; Sylvinite – 95-98% sylvite and halite, and the rest is presented by insoluble components; and so-called Hard Salt – 8-25% sylvite, 18-30% kieserite, 40-60% halite, 0.5-2.0% carbonates, anhydrite and clay minerals.

Potassium salts precipitated from concentrated paleo-brines and precipitates now (for instance, in Dead Sea. Natural potassium salts occurs usually in Devonian, Perm and Neocene strata as layers and lenses tens-hundreds meters long, within rock salt sediments as rule. Content of K_2O in commercial-grade potassium salts layers ranges, as rule, 10 - 30%.

Besides the main end-use – production of potash fertilizers, potassium chloride salts are also used in chemical industry (in production of potassium compounds - K_2CO_3, KOH, KNO_3, K_2SO_4 and others for following use in electro-metallurgy, glass production, leather sector, pulp-and-paper industry, pharmaceutical sector, etc. Besides, in latest years, potassium chloride finds growing application as a component of drilling mud in oil-gas-production sector.

1. World mineral-resources base and market conjuncture of potassium chloride

World balance demonstrated reserves of potassium salts in equivalent K_2O estimate by now around 11.92 bln tonnes. The greatest country-holder of potassium salts reserves is Canada, to which around a third of the world reserves falls. Around 45.8% of the world reserves of potassium salts fall to CIS countries deposits (Table 1).

Table 1: World reserves of potassium salts (in equivalent K_2O)

Country	*Balance demonstrated reserves, bln tonnes*	*Average content of K_2O, %*
Canada	4.40	27.0
Russia	3.59	17.8
Germany	1.06	12.0
Belarus	1.00	14.5
Thailand	0.52	5.1
Other	1.35	
Total:	**11.92**	

Source: data of "InfoMine"

The great bulk of potassium salts reserves (95.6%) occurs in sulfate-free type deposits; around 2% fall to deposit of lake and sulfate types.

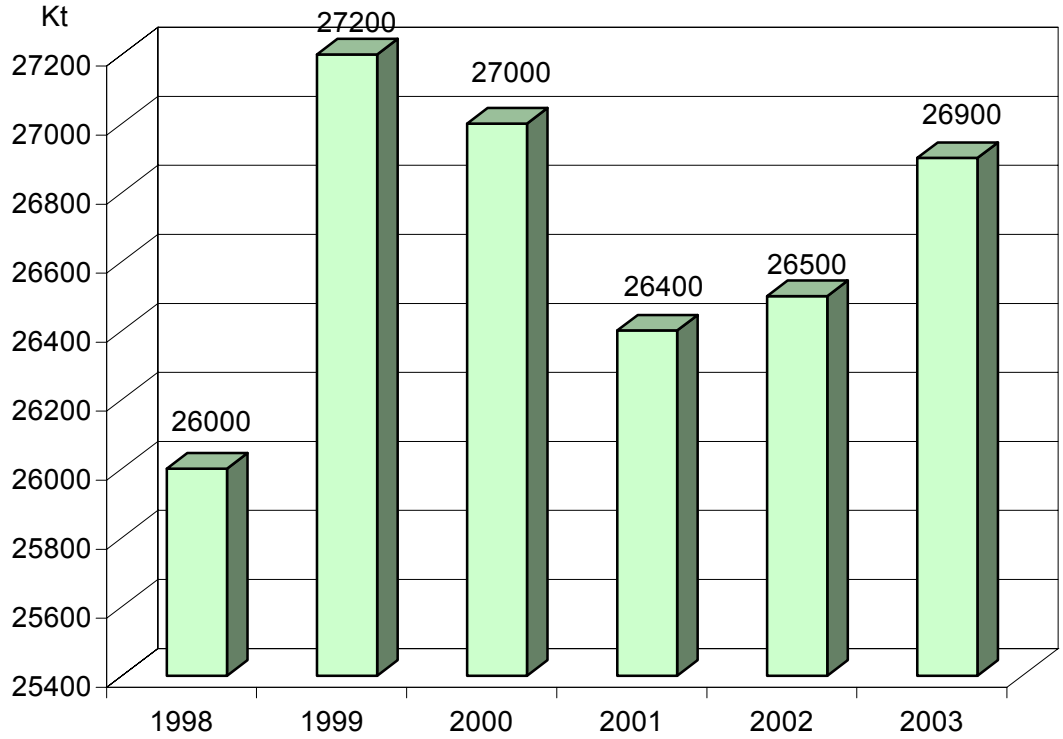
At present time, mining of potassium salts is conducted in 13 countries, and around 75% of the world mining volume fall to 4 countries: Canada, Russia, Belarus and Germany. Volume of mining of potassium salts by countries in 1998-2003 is presented in Table 2. Dynamics of world mining of potassium salts is presented in Figure 1.

Table 2: Volume of mining of potassium salts in the world in 1998-2003 (in equivalent K_2O, kt)

Country	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*
Canada	9201	8475	9202	8224	8200	8200
Russia	3500	4200	3700	4300	4400	4700
Belarus	3451	4553	3786	3700	3800	3900
Germany	3582	3543	3407	3550	3450	3500
Israel	1668	1702	1747	1774	1930	1950
Jordan	916	1080	1160	1177	1200	1200
USA	1300	1200	1300	1200	1200	1200
Other	2382	2447	2698	2475	2320	2250
Total in the world	**26000**	**27200**	**27000**	**26400**	**26500**	**26900**

Source: United States Geological Survey

Figure 1: Dynamics of mining of potassium salts in the world (in equivalent K_2O)



Source: United States Geological Survey

For the latest 5 years, shares of world market of potassium chloride, controlled by the main player-competitors, remain practically stable (Table 3). CIOS producers of potassium chloride controls around a third of the world market.

Table 3: The main players at the world market of potassium chloride

№№	*Company*	*Country*	*Market share, %*
1.	PotashCorp	Canada	19
2.	RUP PO "Belaruskalii"	Belarus	16
3.	IMC Global	USA	16
4.	JSC "Uralkalii"	Russia	10
5.	Kali und Salz	Germany	10
6.	Israel Chemicals Ltd	Israel	9
7.	JSC "Sylvinite"	Russia	7
8.	Arab Potash Company	Jordan	4
9.	Agrium Inc.	USA	3
10.	Other		6

Source: estimate of "InfoMine"

The main commodity product, obtained from potassium salts, is potassium chloride. Notice that available capacities on the product output in the world are

much in excess of demand for potassium chloride that depresses production growth and increasing world prices on the product. For the latest years the prices are rather stable, around $ 90-100/t KCL or $150-160/t K_2O contained (in equivalent K_2O).

On the other hand, a huge gap exists between the optimum input level and the existing use of potash fertilizers. Besides, the ratio between the main plant nutrition elements -nitrogen, phosphorus and potassium – is far from the ideal ratio as established by agronomic research. This results in the "mining" of potash from soils by crops, a situation which leads to the degradation over time of the farmer's most valuable asset, his soil. Unbalanced fertilization leads to the immediate waste of another asset, namely money, because excessive doses of nitrogen fertilizers are not utilized by the plants in the absence of potash.

We expect to see higher potash consumption levels due to the more widespread use of balanced fertilization; this will provide the CIS potassium chloride producers with great opportunities for increasing their export activities.

Another export opportunity is yet to open for the Russian producers: they. We hope that recently adopted legislation in the European Community providing market economy status for Russia will be executed in good faith, resulting in a relaxation of current prohibitive anti-dumping duties for Russian potash. The Belarussian producers hope that for Belarussian product the duties will end with the normal expiration of anti-dumping duties in May 2005 due to obsolescence. Besides, due to the closure of potash production in Italy and France, the European countries will need to increase their imports in order to meet the requirements of the internal markets. In addition, the entry of several Eastern European countries into the EC in 2004 will probably increase the problem of domestic product shortages during the application seasons, particularly as these seasons virtually coincide amongst countries within the region. The advantageous geographical position of the CIS potash producers suggests that they are the most logical source of supply for any additional potash volumes imported into the EC.

For the nearest years, according to International Fertilizer Industry Association (IFA), almost all leading producers of potash fertilizers plan to increase their capacities. The main project provide for expanding operating mines in Brazil, Canada, Germany, Israel and Jordan; the greatest growth in 2004 is expected at the expense of launching new mining capacities in China. Later production of potash fertilizers is expected to be commissioned in Argentina, Laos and Thailand.

By 2008, world capacities on potash fertilizers output are expected to reach 66.3 mln tpy. For 2004-2008, newly-launched capacities on KCl output are to exceed 4 mln tpy (by around 7.5% above current level), of which 70% will fall to country-exporters, 25% to China and 5% to Brazil.

By 2008, world capacities on potash fertilizers output in equivalent K_2O are expected to reach 35.8 mln tpy, whereas demand for the product will constitute 28.6 mln tpy, i.e. over saturation of the world market will remain in force.