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Soda Ash Market Research in the CIS

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ANNOTATION

The report focuses on research of current conditions of the soda ash market in the CIS and the forecast of its development in the financial and economic crisis. The report consists of 7 chapters, contains 162 pages, including 38 figures, 76 tables and the 2 appendices.

Methodologically, the work was carried out as a "desk" research. Multiple sources of information were analyzed, particularly data of state bodies - the Federal State Statistics Service (FSSS RF), State Statistics Committee of CIS countries, Federal Customs Service (FCS), the State Customs Service of Ukraine (SCSU), the statistics of railway transportation of the Russian Federation. In addition, we used data from the (industrial) and regional press, annual and quarterly reports of issuers of securities, as well as websites of companies-producers.

The first chapter of the report summarizes the global market of sodium carbonate (reserves of natural soda, production, prices).

The second chapter of the report presents data on resources required for the production of soda ash and its characteristics. Also in this chapter the technology of production of sodium carbonate is discussed in detail. In addition, data on the main suppliers of raw materials, flows and volumes of supplies are given.

The third chapter is devoted to the soda ash production in CIS countries. In this section, the report presents statistical data on volumes of soda production in Russia and Ukraine, and estimates for the production of soda in Uzbekistan. In addition, the qualitative data of the product are given.

In the fourth chapter of the report data on the foreign trade in soda ash in Russia in 1998-2009 years and in Ukraine for the period 1999-2009 years are presented. In addition, data on imports of soda in Belarus and Kazakhstan in 2004-2009 are given.

The fifth chapter presents data on the prices of different grades of soda in the domestic Russian and Ukrainian markets. In addition, the analysis of data on changes in export and import prices on the product in Russia and Ukraine is given.

The sixth chapter of the report describes the consumption of soda ash in Russia and Ukraine. This section gives a balance of production - consumption of this product, the sectoral structure of consumption, and describes the major consumers, and the current state and prospects of the largest enterprises-consumers.

The seventh chapter presents the forecast of the development of the Russian market of soda ash in the financial crisis for the period up to 2015.

Appendices present addresses and contact information of enterprises producing and consuming soda ash in the CIS countries.

INTRODUCTION

Generally, "soda" represents the technical name of sodium salts of carbonic acid H_2CO_3 . The given class of compounds is known to humans from the extreme antiquity. Even the ancient Egyptians used natural soda extracted from lake waters as a washing-up liquid, and also used it for glass melting. Up to the first third of the XVIII century sodium and potassium carbonates were united by the general concept "alkali" that means "alkaline compounds". However in 1736 the French scientist A.L.Djuamel du Monso for the first time distinguished these two substances: from that time the first became known as soda (through the plant *Salsola Soda*, from the ashes of which it was extracted), and the second – as potash.

Depending on a chemical compound there are *soda ash* (sodium carbonate, waterless carbonic sodium) - Na_2CO_3 , *baking soda* (sodium hydrocarbonate, sodium bicarbonate) - NaHCO_3 and *crystalline soda* - $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$, $\text{Na}_2\text{CO}_3 \cdot 7\text{H}_2\text{O}$, $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$.

Waterless sodium carbonate is a colorless crystal powder which density at 20°C is 2.53 gr/cm^3 . The bulk density of soda ash ranges from 500 to 700 kg/m^3 . Besides, a special grade of soda ash – so-called "heavy soda" - is produced, having the bulk density from 800 to 1000 kg/m^3 .

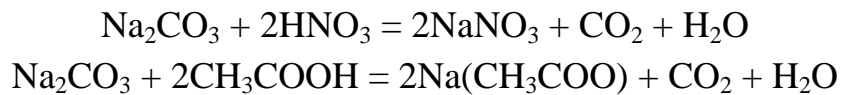
The melting temperature of the compound is 853°C . Sodium carbonate in the air absorbs CO_2 and water (with a partial conversion to sodium bicarbonate), which complicates the storage and transportation of the compound. Soda ash is well soluble in water, and its solubility increases with the temperature (Table 1). An aqueous solution of soda is alkaline due to the hydrolysis of the salt.

Table 1: Physical properties of sodium carbonate

Physical properties	Notation	Unit	Value
Molecular mass	M	-	106
Density	ρ	g/cm^3	2,532
Bulk specific gravity	ρ_b	g/cm^3	0,55-0,60
Melting temperature	T_m	$^\circ\text{C}$	853
Solubility			
at 0°C		%	6,5
at 20°C		%	17,7
at 50°C		%	32,1
at 100°C		%	31,3
Enthalpy of solution in water at infinite dilution	$\Delta H_{\text{sol}}^\circ$	kJ/mol	-26,65
Standard enthalpy of formation	ΔH_f°	kJ/mol	-1129,19
Heat capacity	C_p°	J/(mol·K)	112,3

Source: *Chemical Encyclopedia*

Under the action of many strong and weak acids sodium carbonate decomposes with a release of carbon dioxide:



At temperatures lower than 32°C a sodium decahydrate crystallizes from aqueous solutions of soda ash, in the interval of temperatures 32-35°C – a hexahydrate, above 35°C – a monohydrate, and above 112.5°C – an anhydrous salt.

Soda ash is one of the major products of the chemical industry. The product is used as a furnace charge component in the glass manufacture, in the soap and other detergents production and also in manufacturing of caustic soda and other sodium salts (for example, $\text{Na}_2\text{B}_4\text{O}_7$). Sodium carbonate finds wide applications for degreasing and refinement of metals, desulphurization in the blast furnace production and bauxites processing in the aluminum manufacture. The compound is used also in pulping, in skin tanning and water demineralization in steam boilers, and also for neutralization of acid components at oil refining. Moreover, soda is applied in the manufacture of textile, soft drinks, bakery and confectionery products

I. Brief characteristics of the world market of soda ash

I.1. World reserves of natural soda ash

World reserves of soda ash (trona, nahcolite, natural brine of soda lakes) at the beginning of 2010 were estimated by the U.S. Geological Survey (USGS) at 24 billion tons, the base of reserves – at 40 billion tons. The biggest reserves are concentrated in the U.S. (23 billion tons of reserves and 39 billion tons of the base of reserves). Large stocks of raw materials are also available in the following countries (million tons): Botswana – 400, Mexico – 200, Turkey - 200, Uganda - 20, Kenya - 7. These estimates did not change compared with 2006-2009 estimates.

In nature, sodium carbonate occurs in the form of groundwater brines, brines of soda lakes, as well as minerals - natron $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$, thermonatrite $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$, trona $\text{Na}_2\text{CO}_3 \cdot \text{NaHCO}_3 \cdot 2\text{H}_2\text{O}$, and nahcolite NaHCO_3 .

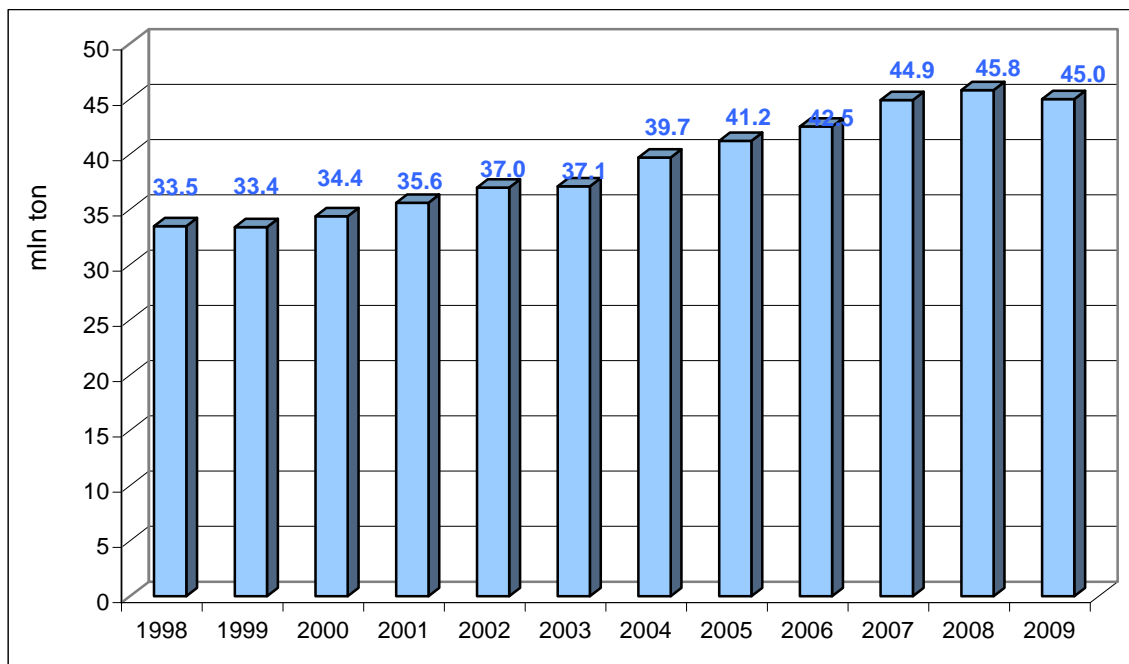
In the world there are at least 62 identified natural sodium carbonate deposits. Trona, having a commercial significance, was discovered in 1938 in the Eocene sediments of Green River (Wyoming, USA). Modern soda lakes exist in Transbaikalia and in Western Siberia; and Lake Natron in Tanzania and Searles Lake in California are well known.

I.2. The volume of production of soda ash in the world

The natural soda accounts for less than a third of the world production of soda ash. Mining of soda ash is mainly concentrated in the U.S.

In 2008, the world production of soda ash, despite the global financial crisis, increased by 2%. The negative impact of the global economic crisis in 2009 affected all countries, producing soda, except for China. According to preliminary data, the 2009 release of sodium carbonate was reduced by 1,7% to 45 million tons (Figure 1).

Figure 1: Dynamics of production of soda ash in the world in 1998-2009, mln t



Source: "InfoMine" based on USGS data

Until 2003, the U.S. was the world's largest producer of soda ash. Currently, however, China has the leading position (Table 2). The production in China and in the United States exceeds 10 million tons per year, whereas in Russia, which occupies the third position among the major producing countries, the soda production is much lower.

Table 2: Production of soda ash by country in 2003-2008, kt

Country	2003	2004	2005	2006	2007	2008
China						
USA						
Russia*						
India						
Germany						
Poland						
France						
Turkey						
Bulgaria						
Ukraine*						
Kenya						
United Kingdom						
Italy						
Spain						
Romania						
Netherlands						
Japan						
Australia						
Republic of Korea						
Mexico						
Pakistan						
Botswana						
Brazil						
Portugal						
Iran						
Argentina						
Egypt						
Chad						
Bosnia and Herzegovina						
Ethiopia						
Austria						
Total						

* – the production in Russia and Ukraine is different from the data submitted by USGS, and will be discussed later

Source: USGS, CEInet

I.3. Major countries-producers of soda ash

I.3.1. China

The share of China in the world production in 2008 was 41%. According to the China Economic Information Network (CEInet), the production of soda ash in the country in 2008 increased by 6,4% compared to the previous year and reached 18,813 kt. It should be noted that the negative impact of the crisis manifested itself in November-December 2008, when the fall in the output relative to November-December 2007 was -20.5% and -22.4%, respectively.

According to preliminary data, for 11 months of 2009 China had produced 17,627 kt of soda, which is 7,2% more than for the same period in 2008. Overall it can be expected that for the whole year the production of this product will exceed 19 million tons. Given that in most countries (including USA and Russia) the production of sodium carbonate declined, the share of China in the world production has increased to 43%.

In China there are over 60 manufacturers of sodium carbonate, most of which have a capacity of less than 100 kt/year. Most of soda ash in China is produced by a synthetic method. Until recently, the resulting product was characterized by a lower quality than the natural soda produced in Green River (USA), and therefore its use was limited. In this regard, the Government of China has attracted a number of American firms to the modernization of Chinese enterprises in order to produce soda ash of an adequate quality, especially for the needs of the glass industry. After the upgrades a number of companies began to produce heavy soda, which is in demand not only domestically, but also in foreign markets. Due to the tightening of environmental standards, the production in USA and European countries increases slowly, while the demand for soda ash in the international market continues to grow, and the shortage of supply triggers higher prices. All of this creates more opportunities for Chinese exports of soda ash and the development of the soda ash industry.

So, in 2008, China has delivered to foreign markets 2,130 million tons of sodium carbonate (11.3% of the total output), which is 24.8% more than a year earlier. The dynamics of export-import supplies of soda ash is shown in Figure 2.

Figure 2: Foreign trade of soda ash in China in 2003-2008, kt

Source: "InfoMine" based on UN-database

The main consumers of Chinese soda are located in the Asia-Pacific region (Table 3). The largest of them are the Republic of Korea and Indonesia, which shared in 2008 had 39.6% of total exports (46% in 2007).

Table 3: Export of soda ash from China by countries in 2006-2008

Country	2006			2007			2008		
	kt	thousand \$	\$/t	kt	thousand \$	\$/t	kt	thousand \$	\$/t
Indonesia									
Republic of Korea									
Vietnam									
Thailand									
Japan									
Philippines									
Bangladesh									
India									
Nigeria									
Malaysia									
Other countries of Asia									
DPRK									
Algeria									
Honduras									
Yemen									
Guatemala									
Kazakhstan									
Peru									
Pakistan									
China, Hong Kong									
Venezuela									
UAE									

Country	2006			2007			2008		
	kt	thousand \$	\$/t	kt	thousand \$	\$/t	kt	thousand \$	\$/t
Congo									
Myanmar									
Salvador									
New Zealand									
Kuwait									
Singapore									
Ecuador									
Tanzania									
Mauritania									
Sudan									
Dominican Republic									
Sri Lanka									
Namibia									
Ethiopia									
Brazil									
Mozambique									
Kenya									
Cambodia									
USA									
North Africa									
Tunisia									
Saudi Arabia									
Colombia									
Oman									
South Africa									
Uzbekistan									
Papua New Guinea									
other									
Total									

Source: «InfoMine» based on UN-database

The imports of soda to China exists, but it has no significant impact on the domestic market. The share of imports in the consumption does not exceed 2% (Table 4). The main volume of imports accounted for USA. In 2007, from USA to China was sent 37,8 kt of sodium carbonate (95.2% of deliveries), in 2006 - 140,9 kt (99%).

In 2008, the supply of soda to China was reduced to a minimum - 1,4 kt, including 0,65 kt from USA.