



## Solution of the region environmental problems by means of conversion of soda production large-tonnage wastes into construction materials

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The given article presents the actual environmental problem – cleaning of soda production wastes disposal yards. As a result of given type of wastes recycling, the lime-containing binder can be obtained for silicate and gas-silicate items.

Soda ash production provokes formation of great amount of wastes in kind of slimes. There are 8-10 m<sup>3</sup> of slimes per 1 t of product that contain 200-250 kg of solid phase. These wastes are poured into slime storages where solid particles settlement occurs. The solid phase of slimes (TOC) is a slime of 25-60% moisture containing fine particles consisting mainly of calcium carbonates. It contains also magnesium carbonate, hydroxides of calcium and magnesium, admixtures of gypsum and chlorides, clay compounds. Chlorides content depends on material moisture that increases with the depth of material being.

Investigations carried out with the Institute BashNIIstroy in 1970-1980 years showed that by means of TOC burning at  $t=850-950$  °C, a product is obtained the properties of which are similar to lime. Based on this product and with the combined grinding with quartz sand, the non-cement lime containing binder (LCB) was obtained. Laboratory investigations showed that autoclaved cellular concrete and silicate brick could be made of this binder. The Institute BashNIIstroy obtained several author certificates (No.505184 dated 05.11.1975, No.1076410 dated 28.02.1984) to non-cement binder of autoclaved and non autoclaved hardening and 4 foreign patents.

In 1980 based on technology developed by the Institute BashNIIstroy, the experimental production of LCB of burnt soda production wastes and quartz sand was built and put into operation. In 1984 the experimental line on production of building gas concrete blocks of autoclaved hardening based on non-cement binder

was put into operation. The blocks density was 600-700 kg/m<sup>3</sup>, the strength was 2,5...5,0 MPa, they were fully in line with the requirements of GOST 21520-89.

However, despite the successful production experience, in the process of operation there appeared a series of technological complications. Partially naturally dehydrated slime obtained from the slime reservoir surface and by this reason having the significant heterogeneous composition was used as initial raw material. Increased slime moisture made the process of its burning in kilns difficult, so the production line had to be periodically stopped. The heterogeneity of the initial raw material complicated the technology of binder production (periodical correction of composition was demanded) and decreased the quality of the final product. In 1986 the production line was stopped for reconstruction and then the production was not resumed.

At present, press filters are widely spread that allow slime dehydration and TOC ready to burning obtaining. This essentially simplifies the burning technology. Press filters can filtrate the fresh slime coming directly from production and having homogeneous chemical composition. This allows obtaining the maximum homogeneous final product (binder). While slime filtration in a solid phase, the content of chloride salts is decreased. This allows expanding the scope of non-cement binder application. As a result of this work, the Institute BashNIIstroy obtained the patent No. 2396227.

It should be noted that the suggested technology of wastes processing can be used at other plants producing soda ash. In particular, the Institute BashNIIstroy obtained the offer from Argentina at the beginning of 2000 years to work out the technological documentation for similar wastes processing.