

## The scientific basics of aluminium containing raw materials treatment by the chlorous method

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The technological basics for aluminium production from different raw materials were developed. Investigations were performed for aluminium oxide, produced by aluminium hydroxide dehydration (which desorbs by low temperature carbonization of aluminate solution or aluminium hydroxide decomposition at alkali treatment method of aluminium containing raw materials), and produced by saline decomposition, that forming at acid beneficiation of aluminium.

The thermodynamic analysis of a balance compound system was performed:  $\text{Al-Si-Fe-S-Ti-Mg-Ca-O-C-Cl}$ ,  $\text{Al-Si-Fe-S-O-C-Cl}$ ,  $\text{Al-S-O-C-Cl}$  and others at temperature interval 400–2000 K. This analysis allows choosing a term of maximum product yield.

The condition influence of aluminium oxide production from various raw materials was researched also. Different reaction ability of aluminium oxide, which produced by several means, at chlorination was noticed. This ability is conditional on various crystallization degree of high temperature modification of aluminium oxide.  $\text{Al}_2\text{O}_3$ , produced by aluminium hydroxide calcination at 700°C, desorbed by the aluminate solution carbonization at 40°C (containing 2.0%–2.5% hydroaluminium silicate), have maximum chlorination degree.  $\text{Al}_2\text{O}_3$ , produced at aluminium sulphate decomposition, have maximum chlorination degree too.

The optimal conditions of alumina chlorination process in a boil layer on pilot unit (with 20 kg per hour of chlorine production from a powder charge and pellets at the long mode with complete chlorine absorption) were defined. The chlorination degree of  $\text{Al}_2\text{O}_3$  active form was 95%–98%, dust outgoing was 1.7%–2.0% at this mode.

The alkali-chlorous and acid-chlorous methods were proposed for aluminium containing raw materials treatment due to accomplished research. These raw materials are expanding the aluminium producing base significantly.