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WAYS OF INCREASE OF EFFICIENCY FOR DECOMPOSITION PROCESS OF ALUMINIUM HYDROXIDE

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There are considered the main directions of improvement of technological process of decomposition. A review of new publications, concerning on increase of measure of decomposition for the aluminates' solution and obtaining a coarse-grained aluminium hydroxide.

Keywords: decomposition, aluminum hydroxide, aluminate solution, activation of seeding agent, growth modifiers, particle size distribution

In the whole world constantly requirements rise to quality of the got aluminium, increase of the productivity of production, improvement of conditions of labour, strengthening of ecological requirements, which results in development of new technologies of electrolysis and new electrolyzers which need certain types of alumina with the set properties.

In the industrial production of alumina of drawing out of aluminium hydroxide from aluminate solutions carry out as by a decomposition:

$$NaAl\ OH\ _4 \Leftrightarrow Al\ OH\ _3 + NaOH\ , \quad (1)$$

so carbonization at reactions:

$$NaAl\ OH\ _4 + CO_2 \Rightarrow Al\ OH\ _3 + Na_2CO_3 + H_2O\ . \quad (2)$$

The technological parameters of the noted processes in a considerable measure determine quality of the got products, speed, and also plenitude of decomposition of aluminate solutions and, on the whole, techno-economic factors of production of alumina.

For the increase of the productivity of aluminous production a decision value has an increase of measure of decomposition of aluminate solution, which is, usually, within the limits of 46-52 %.

It is set that coarse-grained aluminium hydroxide, considerably more easily to get from weak aluminate solutions (90-100 gs/dm^3 of Na_2O), than from strong (120-150 gs/ gs/dm^3 Na_2O) [1]. Except for that, such process notedly gets better with the increase of its temperature to the initial level (70-85 °C), eventual level (50-60 °C) with a inoculating relation less than 1.5, although the measure of decomposition of aluminate solution some goes down here.

Grain-size distribution of aluminium hydroxide is improves and separation stream of seeding agent on two parts with next distribution between first and second decomposers, here more active there is a process of agglomeration of particles.

Realization of method of sharp of temperature and separetion stream of seeding agent can to investigate on the example of developments of firm «*Alkan*» (Canada).

Aluminate solution with content 115-140 gs/dm^3 Na_2O at temperatures 77-88 °C give in the first two decomposera of the first stage of process of decomposition. Here also give затравку, thus her fine-grained part - only on first decomposer, and coarse-grained part is distributed between first and second decomposers. In noted decomposers aluminate solution is during 8-12 hours a temperature in them is gradually reduced to 71-80 °C. In future solution is added to rapid cooling not less than, what on 17 °C in two stages.

In the last years considerable attention is spared to developments, sent not to distribution of seeding agent on all stream of aluminate solution in a decomposers battery, but on previous introduction of inoculating aluminium hydroxide to part of this solution. So, on the patent of Ukraine [2] aluminate solution is distributed on two streams. In the first stream we enter inoculating aluminium hydroxide with a inoculating relation 0.05-0.50 and carry out its decomposition at temperatures 70-95 °C during 5-15 hours and separate a hard phase as productional aluminium hydroxide. In the second stream to aluminate solution or mixture of aluminate solution and liquid phase, got as a result of decomposition in the first stream, enter productional aluminium hydroxide with a inoculating relation 1.0-5.0 and after decomposition pulp at temperatures 30-70 °C a hard phase is distributed on productional aluminium hydroxide for the first and second stages.

Considerable role in the increase of the productivity of decomposition making and coarse-grained aluminium hydroxide activating of seeding agent plays. Use of active aluminium hydroxide as seeding agent reduces duration of process at least in three times, and inoculatinge relation - in 10-20 times.

For activation of seeding agent many different methods are worked out. So, on PAJ «Bogoslovkiy aluminium plant» method is worked out which consists in continuous admission the specially prepared seeding agent (size (≤ 10 mcm), which is measured out in an quantity approximately 1:2000 to mass of ordinary seeding agent [3].

For preparation of superfine seeding agent turbulization of its pupl is executed in cyclone-pellicle vehicles with circulation of suspension of aluminium hydroxide at a linear speed a 6-7 m/s. Together with seeding agent is suggested to add the negligible quantity of calcspar and fluoride of ammonium, that allows to increase the measure of decomposition of aluminateoro solution, and also quantity of large hydroxide of aluminium.

On the process of decomposition self-control of seeding agent influences with part of aluminate solution for temperatures 90-100 °C positively previous, here structural durability of crystalline grate of hydrarhyalitis goes down and begins forming of structure of boehmite with the simultaneous moving away from the surface of various admixtures (organic compounds, gydroaluminosilicate sodium and etc.). In the end more high-quality coarse-grained aluminium hydroxide goes out with the increased decomposition depth of aluminate solution.

The method of treatment of aluminate solution is industrially tested by the saturated aquatic pair with a temperature 110-170 °C during 15 minutes before a decomposition, here the measure of decomposition of aluminate solution rises on 0.6-1.5 %.

Possibility of increase of the productivity of decomposition is studied by the selection of shallow faction (≤ 45 mcm) aluminium hydroxide and its next lixiviating at temperature 165-170 °C during 10-20 s with the making of the supersaturated aluminate solution [5]. It allows during an increase of decomposition speed to get the greater and more strong agglomerates of aluminium hydroxide. Without regard to the additional consumption of heat energy on lixiviating of shallow hydroxide of aluminium the specific expense of pair on the whole during a process goes down approximately on 10 %.

Lately during a decomposition widely enough began to use the modifiers of increase of crystals (MIC), for example, NALCO 7832 [6]. So industrial research of NALCO 7832 on PAJ «Bogoslovskiy aluminium plant» allowed to reduce maximal level of faction -20 mcm from 15-18 to 7-8%.

Conclusions. For the simultaneous making of coarse-grained productional aluminium hydroxide and increase of the productivity of aluminous production it is necessary to apply combination of a few technological receptions simultaneously. To such receptions it is possible to take distribution of aluminateoro solution on two streams with different inoculating relation and temperatures of decomposition, and previous activation of seeding agent.

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