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## ABOUT IMPROVEMENT OF AN ELECTROTHERMIC PRODUCTION METHOD OF ALUMINIUM-SILICON ALLOYS

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The main directions of development and improvement of an electrothermic production method of aluminum-silicon alloys such as raw material base spreading, optimization of a charge composition, a choice of rational constructive and technological parameters of furnace units are analyzed. Possibilities of increase of aluminium and silicon extraction from raw materials in aluminum-silicon alloys are shown.

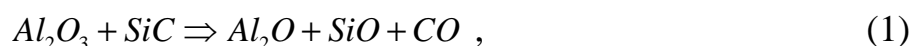
Keywords: aluminum-silicon alloy, silicoaluminium, aluminosilicates, electrothermic method, aluminium and silicon extraction.

The use of cheap ore and secondary raw material (kaolin ores, cleaning rejects, ashes coal, slags of metallurgical production and that like) which in a sufficient for the industrial use quantity is on Ukraine allows to get the aluminium alloys with silicon by compatible renewal of metals from their oxides by an electro-thermal method and has certain advantages in comparison with the method of alloying of clean metals.

At the beginning of 80th XIX century it was succeeded technically to carry out the method of electro-thermal receipt of not aluminium, but its alloys [1]. At that time industrial production of poor aluminium alloys (17-20 % aluminium) by an electro-thermal method could not compete with cheaper electro winning of aluminium.

In 1934 at the Dneprovsky aluminium plant (presently OAJ «Zaporozhe productive aluminium combine» is OAJ «ZApC») by direct renewal of kaolin with use a charcoal got silicoaluminium and by further dilution of its aluminium made commodity silumin. In 1939 at the plant it was first carried out smelting of rich on a content of aluminium (to 70 %) aluminium alloys, in an industrial scale on electric furnaces with power 10 MW. Thus it was attained high productive indexes after the output of alloy, by the expense of electric power and materials [2,3].

In work [4] it is set that during compatible renewal of aluminium oxides and silicon by carbon at first a carbon free reduced, and - silicon constrained in mullite. At temperatures over 1600 °C a carbon is almost fully bound in the carbide of silicon. In the interval of temperatures 1800-2000 °C reaction acquires development:



as a result there are losses of aluminium and silicon through a gas phase. To appearance of aluminum-silicon alloy the suboxide of aluminium, which enters into co-operating with the carbide of silicon, appears:

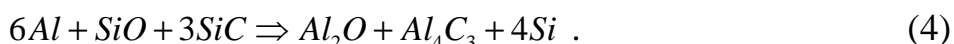


Results of physical and chemical modeling of processes of renewal aluminosilicates and argil generalized in work [5]. It is set that at cooling of reactionary gases on the finishing stage of reacting of aluminosilicates in a gas phase credible is passing of metallothermic reactions:

- in the interval of temperatures 2300-1950 °C



- in the interval of temperatures 2150-2100 °C



For prevention of melting of aluminosilicates to inflow it in the area of useful reactions from the insufficient rate of movement of charge and, as a result, to partial transformation of charge on slags in work [6] it is suggested lignin coal to add in the composition of argil-silica charges lignin coal in a quantity 10-27 %.

At replacement of part of kaolin in composition of charge on a cyanite or disphenefibrolate concentrate technology of drying is offered in two stages [7]. At first stage pellet charge with the initial humidity in an interval from 12 to 16 % heat with speed a 4...10 degree/min. to the temperature 60-80 °C. Farther she is irrigated by water or process a pair from the calculation of 1-3 % moistures from weight of material and adds to drying at temperatures 200-300 °C.

In work [8] it is suggested in the composition of charge to add metallized slags together with a lime and quartzite for decline of specific expense of electric power on the production of silicoaluminium on 12,8 % and expences of the briquetted charge - on 6,0 %, increase of exception of metal from carbides and oxides which are contained in slags on 52,2 %.

Renewal and melting of silicon- and aluminiumcontaining materials in work [18] it is suggested to carry out in different, connected chambers of plasma furnaces with coke nozzle. Previous renewal of powdery charge (quartz, electro-corundum, coke) to more subzero oxides and hydroxycarbides aluminium and silicon, and then melting provides the extraction of aluminium to 81-88 % and silicon to 92-96 %.

In work [19] it is suggested from a cyanite concentrate to get aluminium-silicon alloys by the division of melting and restoration operations and use of plasma technique for rapid renewal. Energy on melting of charge is created, with use to the charge aluminum-silicon alloy and burning it by oxygen. A charge which contains oxides is given during incineration of aluminum-silicon alloy, and renewal of oxides to the metal carries out after completion to the operation of charge melting.

*Conclusions.* For providing of competitiveness of electro-thermal method of receipt of aluminum-silicon alloys comparatively with traditional synthetic technology not enough to have stable technology. It follows to continue research of source of raw materials, carry out the search of new raw material materials, and also apply in industry there are already research developments.

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