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CHOICE OF RATIONAL COMPOSITION OF FLUX FOR MELTING ACCUMULATOR SCRAP AT SHORT-DRUM REVOLVED STOVES

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There are carried out critical consideration of most widespread technologies of receipt of lead by processing of accumulator scraps. By the results of thermodynamics analysis of the semi reactionary melting was shown, that substituting of flux of carbonate of sodium by carbonate calcium assists the increase of economic efficiency of process.

Keywords: secondary lead, methods of receipt, accumulator scrap, semi reactionary melting, thermo-dynamics analysis

At the volume of secondary plumbiferous raw material at the part of accumulator scrap there are to 75 % his commodity resources [1]. Therefore the rational processing of this type of raw material has a large value.

There are different technologies processing of secondary plumbiferous raw material, basic which it is served as from: melting in caldrons; melting is in shaft furnaces; the electro-thermal melting and melting is in the short-drum revolved furnaces.

Melting in caldrons is a simple and economical process from the cold temperature of lead melting (327.4 °C), and also his cold heat capacity. However her application is possible at the use of the only assorted scrap, in which oxides, sulfides and sulfates of lead, antimony and tin is absent. As a rule, melting in caldrons the scrap of beater lead, foil, and cable scrap is exposed [2].

Wide distribution was got the method of the reduction blast melting, which consists in the receipt of black lead by renewal of his oxides, sulfides, sulfates from an agglomerate and accumulator scrap, and also other plumbiferous materials, by the oxide of carbon. However it is useless for processing of raw material, containing bundle of lead (more than 60 %) and characterized by the cold output of lead, and also considerable output of slag (4000 kg/t).

Processing of raw material by the electro-thermal melting in furnaces carry out due to admission of heat through electrodes, submerged in slag bath. For renewal of sulfide of lead and antimony to a charge enter a ferrous flux. Sulfide of iron jointly with sulfides of natrium and lead form a matte with a closeness near to the closeness of slag. As a result, from a furnace produce matte-slag fusion, that negatively influences at extraction of lead and antimony to black lead [3].

At CJS «Lead» (Ukraine) is applied technology of the soda-reducing melting in the short-drum revolved furnaces with the use as flux of soda (Na_2CO_3) and ferrous shaving. Secondary plumbiferous raw material is alloyed with a soda and reduced connection of lead by the carbon of coke at a temperature 1100-1200 °C by blowing out of fusion oxygen with the use of the warmed-up blowing [4].

Technology is characterized by the high degree of extraction of lead (94-95 %), that is arrived at due to the complete contact of components of charge with the walls of furnace at its rotation, to the enhanceable temperature in its swept volume (due to heating of slow) and more complete flowing of reactions of reducing and cooperation of components for charge.

The lacks of technology serve formation of slag-natter fusion and considerable losses of lead with its, considerable expenses of reducer and energyresources, and also presence of the chemically constrained sculpture in slag-matted fusion, that requires the additional processing [5].

Some of listed defects are removed in technology of electrosmelting, worked out by the institute of «SICM» (Russian Federation) [6]. In particular, melting is carried out without participation by soda, id est the minimum output of slag takes place and a meted phase absents, and also considerably expenses go down to reducer. However the presence of substantial power inputs on realization of process does not result to the cutting of production cost.

In paper [7] for the short-dump revolved furnace it is suggested to realize principle of the reactionary melting, which is applied for processing of ore raw material, riches by lead. However at recycling of raw material with large content of this metal there is not a necessity to realize the partial burning.

For the receipt of lead sulfide to a charge the rated quantity of carbon ads and the temperature condition of melting change. At this case co-operating of sulfate of lead with a carbon becomes possible, and the remain of sulfate of lead enters into co-operating with the sulfide of lead. The maximal diminishing of quantity for slag-matted phase is possible, and, consequently, – and losses of lead. The caught gaseous sculpture can be used for the production of euphoric acid or gypsum.

It is set, that at realization of the semi reactionary melting it is expedient to execute at two stages:

– at a temperature 700-800 °C;

– at a temperature 900-1000 °C.

At the first period of melting with maximal probability the processes of reducing of sulfate of lead by a carbon at the value of energy of Gibbs from –367.661 to a 300.812 kJou/gram-molecular weight of clothes, reducing of oxide of lead, and also reactions of co-operation of sulfide of lead with his oxide. At a temperature higher 700-800 °C there take place reducing 50 % sulfate of lead by a negligible quantity of carbon at a hard phase. At the second period of melting balance of sulfate of lead, and also oxide of lead, which not reacted at the first period, co-operate with the sulfide of lead at a temperature in a furnace about 900-1000 °C at energy of Gibbs from -65.489 to 15.113 kJou/gram-molecular weight.

The task of researches consists in the choice of rational composition for fluxes, allowing at the conditions of the semireactionary melting in a short-dump furnace.

For reducing of chloride of lead ($PbCl_2$), being at the charge of the traditional melting in a short-dump furnace, as a flux use a soda (Na_2CO_3) which results to formation of matted fusion, that for the semireactionary melting is impermissible. The terms of the semireactionary melting allow to apply $CaCO_3$ because it is used

only for reducing of $PbCl_2$, unlike the ordinary soda melting, where it is expended to reducing of PbO and $PbSO_4$.

By calculations is set, that the reaction of renewal of chloride of lead by the offered flux $CaCO_3$ flows with more negative energy of Gibbs at the initiated interval of temperatures.

Conclusions. The realized researches is set, that reducing of chloride of lead by $PbCl_2$ flows more intensively at the use of calcspar of $CaCO_3$ as compared to the sodium carbonate Na_2CO_3 and, consequently, application of $CaCO_3$ is expedient for realization of semireactionary technology. Thus cost of $CaCO_3$ in two times below than cost of Na_2CO_3, that will allow considerably to reduce in price the process of the semireactionary melting.

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