THERMODYNAMIC ASPECTS OF FLUE DUST FORMATION IN THE PRIMARY COPPER INDUSTRY

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ABSTRACT

In the present-day primary copper industry flue dust plays an increasingly important role beside the creation of matte and slag. From a thermodynamic point of view, the chemically formed section of fine particles plays a technologically interesting role in comparison to the mechanical carry-over. Here, the volatilization and the subsequent condensation in the off-gas system lead to a characteristic distribution of the contained elements which are represented by various compounds of desired metals like zinc and lead. On the contrary, certain undesired components such as arsenic, bismuth and cadmium accumulate within the product as well. This paper describes existing models and theories concerning the formation of flue dust in the copper smelting process and presents a thorough investigation of the physico-chemical fundamentals by verifying assumptions with thermodynamic calculations. By fully understanding the formation patterns at different stages and temperatures within the process, better knowledge for flue dust in the first step of the pyrometallurgical copper smelting can be obtained – hence leading to new ideas and incentives for the following stages in the copper production cycle.

KEYWORDS

flue dust, primary copper, copper smelting