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Purification of wastes by sublimation ZnSe

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A possibility to purify zinc selenide wastes by sublimation has been shown. The equilibrium pressures of zinc and cadmium sulfides, selenides and tellurides have been calculated for the temperature range 1000–1300 K. Chemical analysis results for the initial zinc selenide powder and its sublimate are compared.

Показана возможность очистки отходов селенида цинка методом сублимации. Рассчитано равновесное давление паров сульфидов, селенидов и теллуридов цинка и кадмия в интервале температур 1000–1300 К. Приведены сопоставительные результаты химического анализа исходного порошка селенида цинка и его сублимата.

In the course of growing of metal chalkogenide crystals, in particular, of A^2B^6 compounds, and producing articles therefrom, the waste salts are accumulated. Taking into account high prices of initial products as well as complexity of their utilization methods, it is reasonable to recycle those wastes. This requires an additional purification of the wastes. The known methods of chalkogenide purification have some drawbacks hindering their use. So the purification in aqueous medium is unacceptable due to low salt solubilities. The recrystallization from melted salts requires to use the high-purity solvents as well as to their subsequent separation and utilization. The zone melting method is time-consuming and power-intensive.

It is just the sublimation method that is the most suitable. Many metal chalkogenides are known to have rather high vapour pressures increasing with temperature. The evaporation and condensation processes of metal chalkogenides are studied comprehensively enough, the various mechanisms are considered in [1]. Most of chalkogenides, including zinc group metal salts, evaporate congruently, thus, there is no stoichiometry distortions in sublimates with respect to the initial phase composition.

The temperature dependence of the saturated vapour pressure is described by the equation

$$\lg P = -A/T + B \ ,$$

where P is the vapour pressure; A and B, experimental coefficients.

Knowing P values at specified temperatures, it is possible to forecast the chalkogenide behaviour under heating. To that end, zinc and cadmium sulfides, selenides and tellurides vapour pressures were calculated (See Table 1). A and b values were taken from [1]. The calculations were performed within the temperature range where A and B values in the equation remain constant. For zinc chalkogenides, the A and B were determined by various researchers while for each cadmium salt, averaged data from four independent sources have been presented [1]. That is why the temperature ranges are different for each compound. For convenience, the data of Table 1 are related to the same temperatures for all com-