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RECEIPT OF RARE-EARTH METALS AND THEIR COMPOUNDS OF CLEANNESS HIGH DEGREE

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Different methods are considered affinage (chemical, electrochemical, vacuum, crystalphysical, complex), used for cleaning of rare-earth metals and their compounds from admixtures.

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Development of industry for rare-earth metals (REM) includes the wide circle of questions: from the crop of ores and use of secondary sources of raw material to the receipt of clean and especially clean individual rare-earth elements and their use in defensive and civil industries.

For the receipt of P3M of high degree of cleanness, mainly, use a vacuum distillation, and also area melting and electro migration. Last years all greater distribution is got cleaning of REM from admixtures by electrolytic methods.

A method of a vacuum distillation is one of the most effective methods of affinage for REM. It allows to execute the deep enough cleaning of REM from the admixtures of introduction and row of metallic admixtures for which pressure of vapor is either substantially higher or below, than for REM. Distillation in a vacuum flows with sufficient speed, when pressure of the saturated vapor of vapopable $\geq$ 665 Pa. By the method of distillation there is got majority of REM with cleanness higher 99.95 mass. %.

The lanthanum of high-purity was got from its chloride by the combined method of lithium thermal renewal and vacuum distillation. During one o'clock of renewal and distillation in one reactor at the temperature 950 °C and surplus of lithium 10 % a lanthanum was got by cleanness 99.974 % with an output 95 %.

The method of distillation recrystallization is get praseodymium and neodymium of increased cleanness. These metals were used for the synthesis of intermetallic compounds, related to greatly correlated electronic systems with unusual physical properties.

The method of electro migration is used for cleaning of refractory REM. Most full it is studied on a yttrium, gadolinium and lutetium. It is set that this method is effective for cleaning from the admixtures of introduction. At cleaning the dysprosium by method of electrical transport at the temperature of 1150 °C during 225 hours the

cleanness of metal grew to 99.996 %, and relative electrical resistance R(300 K)/R(4.2 K) increased to 124.

The process of the area melting of REM is carried out in high-vacuum furnaces (10^{-8} Pa) at a speed of area motion a 150-280 mm/hour. Maximal number of passage-ways of area - 60. For metals at which pressure of vapor is great at the temperature of melting, a process is carried out in the atmosphere of high-clean rare gas.

By the method of electrolytic affinage it is possible to get powders of metals of necessary dispersion and high degree of cleanness not only on metallic admixtures but also on gas admixtures. It is possible effectively control by process, choosing composition of electrolyte, and also changing the values of cathode and anodic density of current.

The complex affinage of REM foresees advance fulfillment of hydrometallurgical operations of cleaning of their compounds. So, complex technology of receipt of high-clean scandium foresees cleaning of feedstock (oxide), synthesis of galogenides of scandium at co-operating of his oxide with galogenides of ammonium, receipt of metallic scandium by metallothermic renewal of its galogenides, electrolytic affinage in molten salts with the receipt of crystalline scandium. As intermediate foods the receipt of high-clean connections of scandium is possible. A level of cleanness of metallic scandium is 99.998 %.

Rare-earth metals or their mixtures can be used for the affinage of refractory metals and alloys. In the process of melting of refractory metal in fusion enter lanthanides in an quantity sufficient for formation with the admixtures of the refined metal of separate phase which becomes separated from after (intermetallide affinage).