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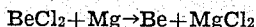
PROCESS FOR THE REMOVAL OF METALLIC
MAGNESIUM FROM MIXTURES OF BERYLLIUM
AND MAGNESIUMGustav Jaeger, Neu-Isenburg, and Alfred Rudert,
Heilbronn, Neckar, Germany, assignors to
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3 Claims. (Cl. 75-121)

Our invention relates to a process for removing metallic magnesium from mixtures containing beryllium and magnesium.

According to the hitherto known processes a really pure beryllium metal is not easily to be obtained without observation of special precautions. Working upon a technical scale involves nearly always the occurrence of certain impurities in the final product although the process is carried out with utmost precaution. The quantities of these impurities are only small, however, in many fields of utilization an absolutely pure beryllium metal is obligatory.

It has been known to carry out the process for the recovery of metallic beryllium by reducing certain suitable beryllium compounds with metallic magnesium. Thus, for instance, beryllium chloride may be reacted with magnesium according to the formula



To obtain a nearly complete reduction preferably magnesium is used in a small excess. As both metals do not or at any rate only slightly alloy with each other, a beryllium metal contaminated mainly with magnesium and to a lesser degree also with other metals is obtained. If no pure beryllium chloride is available and the reaction carried out with a technical product, containing besides magnesium less electropositive elements, liberated by the reduction means such as, for instance, iron, manganese, aluminium, nickel or copper or the like, all these elements either alloyed or mechanically mixed will be found in the resulting metallic beryllium.

In addition to these impurities all those coming from the vessel materials, such as iron, copper, nickel or the like, or those occurring by the utilization of not quite unattackable electrodes such as tungsten or graphite, will also be found in the metallic beryllium.

Obviously it is best to let all those impurities first pass into the final product and then to remove them in a one step operation instead of trying to remove all the impurities through a quantity of suitable multi step operations.

According to our invention the contaminated beryllium metal may be treated with aqueous solutions of definite acids. Magnesium as well as the other metallic impurities may be removed in a simple manner from the beryllium without difficulty and with a nearly imperceptible loss of metallic beryllium through a treatment with acetic acid, tartaric acid, citric acid and especially with nitric acid.

The fact that the solution contains also beryllium—after dissolving of the impurities—may be explained in such manner that all crude beryllium contains certain quantities of oxide which also dissolve in the acids. The treatment with acids, according to our invention, not only causes an improvement of beryllium with respect to its contamination with foreign metals but also in view to its contents of oxide, for instance, beryllium oxide and magnesium oxide or other metallic oxides occurring with the reduction of magnesium.

In carrying out our invention the beryllium is preferably ground and poured over with one of the above mentioned acids or the beryllium is added under stirring at room temperature to one of these acids, whereby care is to be taken that the temperature does not exceed 60° C. in order to avoid a substantial attack on the beryllium. It has proved advantageous to keep the temperature between 10 and 30° C. After finishing of the gas evolution, the beryllium is separated from the acid and then washed. Temperature and period of influence depend on the composition of the mixture as well as on the grade of distribution of the single components. Very simple preliminary tests may easily ascertain the best working conditions in every case.

The concentration of the acid may vary in wide ranges. An acid concentration of, for instance, 0.5 to 1% nitric acid is already capable of wholly separating the magnesium and other metallic impurities from the beryllium, during a period of several minutes only.

Example 1

100 g. cuttings of beryllium with a content of 4.5% magnesium, 0.8% iron, 1.2% aluminium, 0.7% beryllium oxide are added at ordinary temperature to 300 cc. of a 3% nitric acid; the suspension is cooled and stirred to keep the temperature below 30° C. After a period of 10 minutes the gas evolution has finished. The beryllium is filtered off and rinsed with water. The beryllium obtained was practically free from magnesium and other impurities, with a loss of 1.7% beryllium.

Example 2

100 g. beryllium powder with a content of 6.5% magnesium, 0.5% nickel, 1.2% iron, 0.6% beryllium oxide were added under stirring and cooling to 300 cc. of a 10% acetic acid, at room temperature. The gas evolution began immediately whereby the temperature did not rise over 25°

C. After a period of 15 minutes the gas evolution had finished. The stirring was continued for an additional 5 minutes, then filtered off and thoroughly rinsed with water. A pure beryllium with a loss of 2.1% was obtained.

What we claim is:

1. A process for the purification of impure beryllium containing magnesium as well as other metallic impurities which comprises treating the impure beryllium in subdivided form with dilute nitric acid at a temperature not exceeding 60° C.

2. A process for the purification of impure beryllium containing magnesium as well as other

metallic impurities which comprises treating the impure beryllium in subdivided form with dilute nitric acid at a temperature between 10° C. and 30° C.

5 3. A process for the purification of impure beryllium containing magnesium as well as other metallic impurities which comprises treating the impure beryllium in subdivided form with a .5% to 3% nitric acid at a temperature between 10° C. and 30° C.

10 GUSTAV JAEGER.
ALFRED RUDERT.