

Reprocessing Precious Metal

For years the increasing demand for valuable precious metals has made an alternative to primary extraction necessary. For this reason metals such as gold, silver, platinum, palladium, rhodium and iridium are being recycled more and more from metal waste and residues.

The creation of a cycle of fine metals, manufactured products and metal recovery

The term metal recovery, i.e. reprocessing precious metals, includes the separation of precious metals from non-precious metals and the reprocessing to fine metal which is then used in production or sold as a commodity.

Material Containing Precious Metal

The waste products which arise in companies processing precious metals are divided into two groups depending on their form:

Old material and residues

Old material

With the term *old material* we summarize materials which can be melted and which are contaminated by very little non-metallic material. On an individual basis, the materials can be items such as old pieces of jewelry and silverware, coins and sheet scrap. Furthermore, waste from filing and casting are also considered as old material.

Residues

Residues are materials that are contaminated with a high level of non-metals and which cannot be recycled without preliminary treatment. Sweepings from workshops or dried residues from filters and polishing machines, for example, are considered as residues.

Sampling the Material Received

For the metal which is sent in, an analysis forms the basis for determining the precious metal content. In this procedure the sample taken must be representative of the entire delivery lot.

Old material and residues are sampled separately due to their different compositions:

Sampling of Material for Refining

In the sampling of old material, the metallic waste products are melted down into "slabs". This ensures the preliminary homogenization of the material.

The incoming weight of the delivery lot to be reprocessed and the net weight of the slab always display a difference in weight (loss through melting). This arises through the combustion of non-precious metals and non-metallic constituents, **Precious metals are not lost in this process.**

In order to keep this difference in weight small, the non-metallic content of the old material should be as small as possible.

Sampling from the slab is done by drilling. Drill chips are taken from both the upper and lower sides.

One part of these shavings is examined in the analytical laboratory for its precious metal content, the other part is saved for reference in the archives for possible re-analysis at a later date.

Sampling of Residues

Unlike old gold / filings, residues cannot be melted. A special preparation process is therefore necessary for the sampling.

In the first step, all combustible constituents are reduced to ash and constituents containing iron (saw blades, drills, etc.) are removed by magnets.

The remaining material is ground in ball mills to "fine residue". Small pieces of metal are sieved out, classified as "coarse" and processed like scrap.

As in the procedure for reprocessing old material, a sample is taken for analysis from the fine residue and a possible later sample is saved in the archives for reference.

Analysis Methods

The samples of old material and residues are processed in the central analytical laboratory at Heraeus using various analysis methods:

Fire Assay

Fire assay is an old, very precise method of determining the precious metal content of the sample.

This is essentially a slag-forming melting process during which precious metal is separated from the non-precious elements in a thermal process.

A metallic grain remains which comprises the precious metals present in the sample material.

Aqueous Chemical Analysis

The metallic grain which results from the melting process is dissolved in acids and the various precious metals are subsequently separated from each other.

Spectral Analysis

Physical analysis procedures are also used alongside the aqueous chemical process to determine the precious metal content:

Based on the principles of light emission, spectrometry permits the determination of up to 40 elements in a solid metal or liquid sample within a few minutes.

This analysis method is also used for quality control purposes.

Credit Calculation

The calculation of the customer credit is carried out on the basis of the precious metal content.

The customer can sell the precious metal to Heraeus, have it credited to his weight account or receive semi-finished products / fine metals.

Aqueous Chemical Separation Process

In this process the old material is dissolved in acids and subsequently separated into the individual precious metals by precipitation yielding a metallic sponge.

Further Processing of the Metal Sponge

The precious metals thus extracted are in the form of sponge and in this form are either directly processed or converted into granules by a melting process.

After the manufacture of gold and silver granules, this form is used as a trading commodity or standard commercial bars of different sizes are manufactured by a further melting process.

Platinum and palladium are usually not melted to granules but are used as sponge for further processing in the manufacture of various articles or are directly processed to standard commercial bars of various sizes.

Sending in Old Material and Residues

Because of the tied-up capital we recommend reprocessing at Heraeus starting from refining lots of 500g gold, silver, platinum and palladium or 3 kg for pure silver.

Please request our processing price list.

Use our free hotline service: **+49800 / 186 06 08**

Please enclose a delivery note with your delivery stating which precious metals your material should be assayed for and in which form you wish to be credited for the precious metals.