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Understanding Scrap Refining

GAIN THE BEST POSSIBLE RETURN ON YOUR LABORATORY SCRAP.

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› **The age-old question** when considering scrap refining has always been, "How do I know I'm getting the most money for my scrap?" The honest answer is that you do not, however, you are not entirely blind because you know better than anyone what alloys you use. Nevertheless, to a large extent, you really are at the mercy of the refiner you choose.

With that in mind, you will want to work with an established company that is transparent throughout the refining process and that addresses all your concerns. Furthermore, with precious-metal values currently at all-time highs (and the only safe financial bet right now), you definitely want to deal with an established company.

You also want to work with someone who uses state-of-the-art smelting and assaying techniques to maximize your financial return. Whether you are a one-man laboratory or a 50-person operation, recovering the precious metals is not just a little bonus at the end of the year—it can impact your bottomline. The more you know about the refining process, the better able you will be to choose the right company and get the highest possible return. The following is a step-by-step guide:

STEP ONE—scrap collecting in the laboratory. Some laboratories use the "Let's just sweep up everything into a bucket and hand it over" approach. While scrap can be processed this way, it certainly is not to your advantage. It is more difficult for you to have a sense of what you are sending in.

There are several types of scrap in the laboratory. Grindings and solids are the cleanest, so careful collection and storage at the bench and casting well is essential. Another type of scrap is the build-up accumulated through the suction unit. Some laboratories do not realize the value in their vacuum bags and never send it in. Make sure you are not overlooking that source of precious material. The last type is lower-grade material, such as investment powder, crucibles with metal fused to them, and even aluminous oxide. Any competent refiner should be able to recover the value in even this lower-grade material.

STEP TWO—handling at the refining facility. A lot number is assigned to your scrap for easy tracking. Then the weight of each type of scrap should be accurately determined. Higher-grade scrap is typically not processed with lower-grade scrap, so separation is key.

STEP THREE—deciding how to process the material. Most laboratory scrap can go directly into a furnace to be smelted. Borax and soda ash are added to capture the impurities and to separate them from the metal. Copper is commonly used to help alloy the metals together so a homogeneous bar can be poured. Some scrap needs to be ball-milled to break it down for easier smelting. Ball-milling can also be used to produce a homogeneous mixture when dealing with powders. In some cases, as in treating vacuum bags, a controlled-pyrolysis oven is used to burn off extraneous material.

STEP FOUR—gathering a sample that is representative of the melt, which is essential for an accurate determination of the elemental breakdown. Two methods are used. In the first, a sample of the molten metal is pulled into a vacuum tube and then left to harden. In the second, a sample is drilled out of the bar once it has hardened. Both techniques are accurate as long as the sample is homogeneous.

STEP FIVE—pouring the molten metal into a mold. The melting points for precious metals vary from nearly 2,000˚F for gold to over 3,200˚F for platinum. The borax should have drawn out all the impurities, becoming the "slag," which should easily separate from the metal after it has cooled and hardened. If done properly, there should be no metal left behind in the slag slag—checking for even small amounts is imporant. Once the bar is free of slag, it is ready to be weighed.

STEP SIX—obtaining an accurate assay. The most commonly used method for determining the elemental breakdown of your scrap is Inductively Coupled Plasma Optical Emission Spectroscopy (ICP or I-CAP). This process provides the exact percentage of each element present. For example, an assay can show that a given sample contains 25% gold, 25% palladium, 5% platinum, 10% silver, 30% copper, 1% indium, 2% nickel, and 2% trace amounts of other elements.

Once the percentages of the various elements have been determined, they can be correlated with the weight of the sample. For example, if the assay above had been performed on a bar weighing 10-troy ounces (ozt), we would know that there are 2.5-ozt of gold, 2.5-ozt of palladium, 0.5-ozt of platinum, and 1-ozt of silver.

STEP SEVEN—determining the value of the sample as a whole, based on the current market value of the quantities of each precious metal present. The "London fix" is generally used. Ask up front what market price the refiner uses. The most common options are to lock in the price on a specific day or to use the average over the time it takes to process your scrap.

STEP EIGHT—crediting you for the value of the precious metals recovered. The most common method of settlement is issuance of a check. However, an increasingly common trend is to send back gold, silver, or platinum bullion.

Hopefully you will gain a better understanding of the process, dispelling some of the mystery and relieving some of the apprehension you may be feeling. One bit of advice I have often given during my 10 years in the refining industry—find someone you trust and feel comfortable with, as you would when choosing a good car mechanic. Hopefully, the refiner you select will earn your trust over time, so that you can confidently feel that you are getting the best return.

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Fig 1. Pouring the molten metal into a mold.

Fig 2. Separating the metal from the "slag."