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# THE LABORATORY AT THE BIRMINGHAM ASSAY OFFICE



# PRECIOUS METALS

## ANALYSIS & TESTING

### GOLD

The most appropriate methods of analysis for each sample are assessed by the Laboratory's expert staff. Typical methods used will be either traditional Fire Assay with a gravimetric or spectrometric finish or Fire Assay- ICP-OES (inductively coupled plasma optical emission spectroscopy).

### SILVER

Typical methods available for silver analysis include Gravimetric/Potentiometric techniques, used for high grade bullion/metallic samples, a Fire Assay Gravimetric technique with simultaneous analysis of proof silver and ICP-OES, which is suitable for trace levels.

### PLATINUM GROUP METALS

The Laboratory has the expertise to provide analysis of the full range of Platinum Group Metals in metallic, powder, solution, ore and a wide range of catalysts forms. In order to ensure impartial and accurate results, different separation procedures may be employed, followed by a variety of instrumental techniques (eg ICP-OES, AAS).

### WHITE GOLD

The Laboratory carried out the original research and formulated various testing methods including Colour Measuring Spectrophotometry for Gold Colour and White Gold Colour Measurement and these are now recognised as the International Standard.



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### PLATING THICKNESS

The Laboratory is able to verify the thickness of plated layers using both destructive and non-destructive tests (XRF). Articles of all shapes and sizes in both precious and non-precious coatings on metallic and non-metallic substrates can be measured.

### TARNISHING

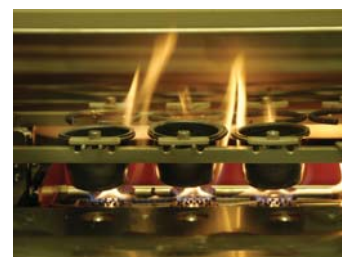
A variety of in-house tests have been developed from the appropriate International Standards for tarnishing. The Tarnishing Test exposes the articles to the most common accelerants of tarnishing including ultraviolet light, atmospheric oxygen, humidity, changes in moisture and temperature and even synthetic sweat. An additional Sulphurous Agent tarnish test is available for articles that have received a protective coating.

### DURABILITY

The Laboratory provides tests for Stone Adhesion, Reaction to Temperature/Humidity changes, and Impact Effect.

### PACKAGING, LEATHER AND TEXTILE TESTING

Packaging is tested for the presence of constituents that may tarnish or stain precious and non-precious articles. Leather and textiles are tested for colour fastness to perspiration.



# THE LABORATORY AT THE WORLD'S LARGEST ASSAY OFFICE



## FACILITIES

The Birmingham Assay Office is housed in a Grade II listed building, originally built in 1877 and subsequently expanded and improved to handle the requirements of modern industry.

Internal redevelopment of the building, which now combines Victorian splendour with 21st century technology, has been undertaken to improve workflow and to increase efficiency.

The Laboratory has been the subject of major, on-going investment and as a result is able to provide a wide range of both traditional and state-of-the-art testing techniques including non-destructive X-Ray Fluorescence (XRF) analysis which is used to establish the content of alloys and the thickness of plating.

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## SCOPE OF SERVICES

The Birmingham Assay Office, founded by an Act of Parliament in 1773, is now the largest Assay Office in the world. Some 12 million items manufactured from gold, silver or platinum pass through the Assay Office every year to be tested to ensure they contain the required legal amount of precious metal, prior to being hallmarked.

In recent years the scope of services provided by the Assay Office have been expanded beyond the statutory duties of Assaying and Hallmarking.

The Laboratory at the Assay Office is now widely acknowledged for its expertise and its extensive range of specialist testing and analysis procedures.

Fully Accredited by UKAS to the ISO 17025 standard, the facility has been the subject of considerable ongoing investment in state-of-the-art equipment. This, coupled with the continuous professional development of all technical personnel, has put the Laboratory at the forefront of analytical technology.

The services provided by the Laboratory were initially developed for the jewellery trade and this remains the biggest client sector. However, the services are appropriate to any potential customer requiring metal testing and analysis and the number of clients from other industrial sectors is increasing.



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# BASE METALS

## ANALYSIS & TESTING

The Laboratory also provides analysis of base metals such as copper, zinc, tin, lead etc for major as well as minor elements in samples of concentrates, bullion, smelting products, recycled materials, electronic scrap and other precious/non-precious bearing metals.

A variety of instrumental techniques are used including ICP-OES and AAS, together with X-Ray Fluorescence Spectrometry (XRF) Analysis, a non-destructive technique that allows the approximate determination of a considerable number of elements in complex matrices.

The accuracy of the results using XRF depends on the element being analysed, matrix composition and availability of appropriate reference materials. In the optimum analytical range, precision in the order of +/-0.5% to 1.0% can be achieved.

### UMPIRE ANALYSIS

Analysis between refiners and suppliers and between refiners and other traders in precious and non-precious metals is undertaken by The Laboratory. This work includes the analysis of complex samples including concentrates, bullion, smelter products, recycled materials, precious metal catalysts, electronic scrap and photographic materials.



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# NICKEL TESTING

Due to the increased popularity of body and ear piercing an increasing number of people have become sensitised to nickel and as a result can suffer lifelong, sometimes disabling, problems.

Sensitisation to nickel can occur when materials releasing nickel are inserted into a body piercing which is not fully healed.

People who are sensitised to nickel may then suffer allergic reactions when they come into contact with nickel, which may be released from many everyday items including coins and cutlery.

The European Directive to combat this problem controls the use of nickel in items which are intended to come into prolonged and direct contact with the skin.

The permissible release rate for post assemblies is 0.2 micrograms per square centimetre per week, while items that are not actually being inserted into a body piercing, but are worn against the skin, may release up to 0.5 micrograms. Items must be tested for compliance using the standard nickel release tests included in the UK legislation.

The Laboratory at the Birmingham Assay Office has been instrumental in the preparation of a UK Nickel Testing Policy which aims to standardise the interpretation and implementation of the Nickel release testing process.

These tests provide manufacturers, importers, wholesalers and retailers with a safety check for all items that may contain nickel. It also provides them with the facility to investigate the potential of new options for post assemblies, such as stainless steel and plating, where nickel release may not be a problem.



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