CHRYSOS CORPORATION
Assays at the speed of light

A REVOLUTION IN ASSAY SERVICES

Real-time analysis in the field or lab

PhotonAssay MAX technical information Model Number PA1408X

PhotonAssay Max, Chrysos' flagship product, offers a revolution in gold analysis for the minerals industry. Fast, accurate, fully-automated and chemistry-free assay of ores, pulps, solutions and other process materials is now possible.

PhotonAssay Technology

PhotonAssay uses a high-power, electronic X-ray source to activate gold atoms contained in a sample. These activated atoms then emit a unique signature that can be measured to accurately determine gold content.

Both the source X-rays and signature gamma-rays are extremely penetrating, meaning that a true-bulk analysis of large samples is possible. The assay is also independent of the chemical or physical form of the sample. Traditionally hard-to-assay materials such as carbon pulps, concentrates or highly refractory ores can now be measured straightforwardly.

The large sample size – typically around 0.5 kg – and penetrating analysis mean that sample preparation is significantly reduced compared to traditional assay methods. Coarse materials and slurries can be directly measured.

By adjusting the operating conditions of the source, and measuring different signatures, PhotonAssay can be used to measure a range of other elements, including copper and silver.

Applications

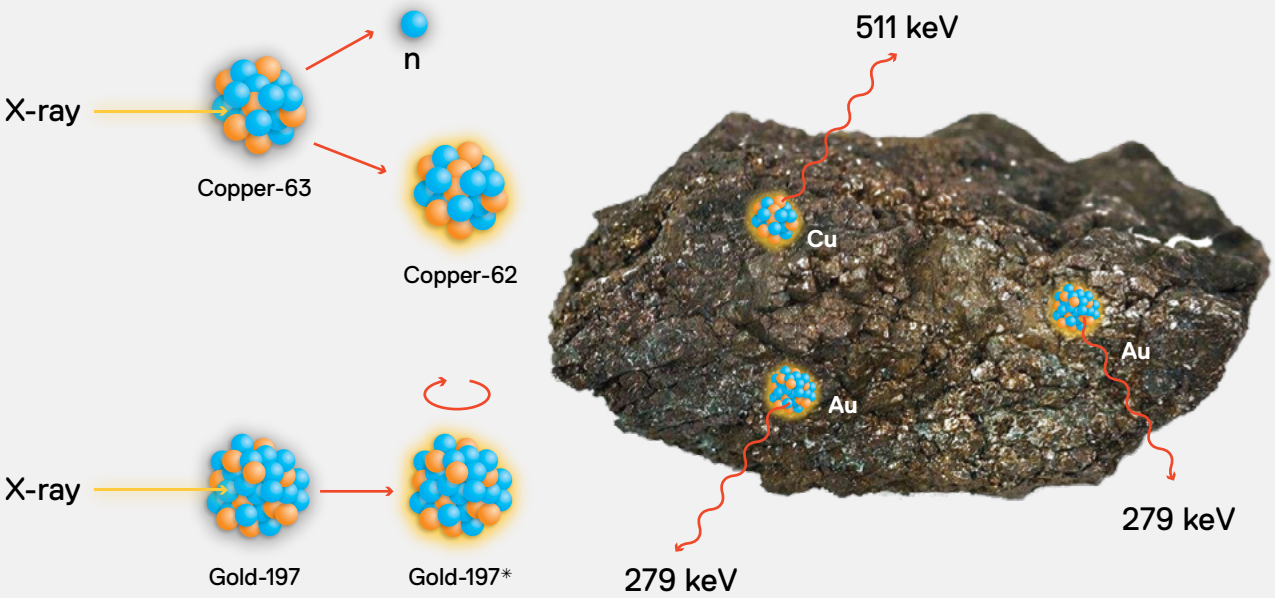
PhotonAssay is applicable across the mining value chain. It provides a direct replacement for conventional chemical analysis methods such as fire assay. Application areas include:

- Mine planning
- Grade control and blending
- Process monitoring.

Benefits

- Rapid turn-around, with analysis time of a few minutes
- True-bulk measurement of 500 g samples
- Little or no sample preparation required
- Fully automated
- Chemistry free – no toxic or caustic reagents required
- Reduced labour requirements
- Accurate and sensitive analysis
- Non destructive.

Principle of PhotonAssay: high-energy X-rays excite gold atoms in a sample. These emit characteristic gamma-rays that can be detected and counted to determine gold grade, even inside large samples.



PhotonAssay greatly simplifies analysis compared to conventional chemical approaches. Measurement accuracy is comparable to or better than that achieved using fire assay for most materials.

Comparison to Fire Assay

Traditional fire assay is a complex and laborious process. Extensive sample preparation is required, and experienced technicians are needed to carry out the steps of fusion, parting, cupellation and analysis.

PhotonAssay offers an alternative approach. Sample material is loaded directly into barcoded plastic containers and placed onto an input conveyor. From then on, the entire analysis process is fully automated.

Fire assay generates significant quantities of lead-contaminated waste which requires careful disposal and health monitoring of laboratory personnel.

In contrast, PhotonAssay generates no waste. The plastic samples jars can be fully recycled once they are no longer required.

Performance specifications

Assayed elements	Gold Silver and copper from mid-2018 * Please enquire about others.
Sample size	Containers hold 330 mL of sample (typically 400-650 g depending on material density)
Analysis time	Less than 2 minutes
Gold detection Limit	0.03 parts-per-million (3-sigma) * Detection limit is larger for samples containing elevated levels of U, Th or Ba.
Gold measurement precision	7-8% relative at 0.3 ppm 4.0% relative at 1.0 ppm <1.5% relative at grades > 10 ppm * All results quoted at 1 standard-deviation. Elevated U, Th, or Ba levels reduce precision.
Disposal	Samples are retained inside unit for 2 hours post-analysis, after which time they can be safely handled or discarded.
Re-analysis	Assay is completely non-destructive, so materials may be sent for additional measurements if required

Large volume samples with reduced preparation.

Automated analysis minimises labour requirements.

Technical specifications

Dimensions*	
Width	6,100mm
Depth	7,300 mm
Height	2,700 mm
Approx. weight	80,000 kg
Electrical	
Voltage	415V or 208V 3-phase 50 or 60 Hz
Supply rating	125 kVA
Power (standby)	20 kW approx.
Power (running)	65 kW peak
Energy use per assay	0.65 kWh approx.

Analysis Capacity	
Throughput	72 samples/hour
Input queue	160 samples
Output queue	120 samples
Environmental	
Operating temp.	0-40ºC
Radiation safety	
X-ray source	Electronic linear accelerator
Energy range	8-14 MeV
Max power	8 kW
Dose rate at surface	Below 2.5 µSv/hr

* Excluding sample conveyors and external heat-exchanger.

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