

# Case studies



The CM Solutions Lab has a wealth of experience to meet the metallurgical needs of its clients. Not only do we do testwork, we can also interpret it, model it and incorporate the results in metallurgical designs. Here are some examples of how we have delivered fit-for-purpose solutions to clients with our integrated team approach.

## Flotation for sample preparation, then multiple leaching tests for nickel extraction

The client had a limited quantity of feed sample. Existing flotation test procedures were followed to generate a concentrate which matched prior test work. Various leaching tests were then done on the sample (acid, alkaline, oxidising) to achieve a target product specification. The results were then used to evaluate several flowsheet designs (at a concept level). Capital and operating costs were determined, which were used in high-level project feasibility analyses.

## Magnetic separation tests for magnetite removal

The client provided large samples from various sections of their ore body. Individual and blended samples were subjected to magnetic amenability tests to determine the benefit of upfront magnetic separation. Solids were analysed in-house.

## Recycling of lithium batteries

CM Solutions was awarded a research grant from the Green Fund. The goal of the work was to develop, to the concept level of design, a lithium battery recycling facility. This highly open-ended project spanned 18 months, and included research, test work, process design, mass balancing, cost estimation and financial modelling. The final report made recommendations to government regarding lithium batteries.

## Upgrading of sand for glass manufacture

Several clients have approached CM Solutions for test work on sand samples to remove impurities. Sand for glass manufacture has strict requirements regarding purity. Test work included acid leaching and attritioning tests (under different conditions) to upgrade the samples.

## Whole-ore copper-cobalt leaching pilot plant

CM Solutions hosted and managed a whole-ore leach pilot plant. The plant ran in batches over several months, exploring multiple processing options. Vat and heap leaching options were explored. In addition several other industrial tests were conducted on a smaller scale in the lab (washability, acid regeneration). The test work was incorporated into a process design and mass balance completed by CM Solutions using Cycad process.

## Lime slaking test work

The project required testing the use of an attritioner to slake a burnt lime sample. Tests include lime activity, slaking rate. Process modelling was also included, using the lime characterisation test work results to model the anticipated maximum temperature expected.

## Limestone characterisation

Several projects for different clients have been conducted to characterise limestone. Several of the ASTM lime and limestone methods were conducted to determine characteristics such as available lime and calcium carbonate equivalence tests. In addition tests applicable to industrial application were conducted, such as neutralising capacity and settling rate. Limestone was also calcined under varying conditions to produce quicklime, which was then also characterised (purity, activity etc).

## Continuous cobalt precipitation pilot plant

CM Solutions was supplied with 3.5 tons of feed sample. This was bulk leached, and then processed through solvent extraction. The raffinate was then used as feed for a continuous cobalt precipitation circuit. The plant ran for 3 weeks, completing several different campaigns. Sample analysis and reporting was performed during the pilot run, allowing a draft report to be delivered in the week following the pilot plant shutdown.



To find out how the CMS laboratory can help you, contact us at [consultants@cm-solutions.co.za](mailto:consultants@cm-solutions.co.za)

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