Assessing ionisation efficiencies of small Pb loads by thermal ionisation mass spectrometry and investigating the effects of Re dopants on phosphoric-silica gel emitters

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1. British Geological Survey

World leading geological survey with headquarters in Keyworth, near Nottingham
Provides expert knowledge on all areas of geoscience to industry, academia and the public
Research areas include marine geoscience, groundwater, and earth hazards, among many others

Uses ID-TIMS to undertake U-Pb analysis of zircon minerals
Lab quantifies geological time to increase understanding of the evolution of the earth’s system
Obtained U-Pb dates are highly precise, granting the lab a strong international reputation in the field

0.1 \% PRECISION

2. Roles and Responsibilities

Zircon Selection
Annealing, Chemical Abrasion, Rinsing
Addition of Tracer and Dissolution
Chloride Conversion
Anion Exchange Chromatography
Sample dried down
Loading onto Rhenium Filaments
Using Colloidal Silica Gel
Analysis by TIMS

Routine Tasks
Sample preparation and analysis

Geochronology and Tracers Facility
Position: Isotope Studentship

3. Project Work

Aim:
Increasing Pb ionisation efficiency (IE) of zircon samples

Higher Pb IE = Better Analytical Performance = Greater Measurement Precision

4.2 \% Average Pb ionisation efficiency reported in Hyuskens et al., 2012

Unknown ionisation efficiency for our standard procedure

13.4 \% Maximum ionisation efficiency achieved through experiments

Proven huge potential in increasing Pb output from samples

If the data can be reproduced reliably, it will improve precision of all lab data

4. Achievements

Broke lab record for lowest Pb blank in a set of zircon samples
Became independent in the majority of lab processes at an early stage in the year
Planned and carried out a research project successfully, yielding results with huge potential for future work
Developed personal skills such as problem solving, public speaking and time management. Also developed technical skills in mass spectrometry, chromatography, and analytical interpretation of data