|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Supplementary Table A | | | | | | | | |
| element | **line** | **WDS channel** | **crystal** | **counter** | **count times, peak & background** | **calibration standard** | **standard source** | **interference corrections** |
| S | K | 3 | PETL | P10 | 10, 2x5 | Pyrite, natural | UTAS in-house | Pt |
| Fe | K | 5 | LIFL | Xe | 20, 2x10 | Pyrite Peru, natural | UTAS in-house |  |
| Co | K | 5 | LIFL | Xe | 20, 2x10 | Co metal | UTAS in-house | Fe |
| Ni | K | 5 | LIFL | Xe | 20, 2x10 | Pentlandite, natural | Astimex |  |
| Cu | K | 5 | LIFL | Xe | 20, 2x10 | Chalcocite, natural | Geller Microanalytical | Ni, Ir |
| Zn | K | 5 | LIFL | Xe | 20, 2x10 | Sphalerite, synthetic | P&H Developments |  |
| As | L | 1 | TAP | P10 | 60, 2x30 | Gallium arsenide | P&H Developments | Sb, Ru |
| Se | L | 1 | TAP | P10 | 40, 2x20 | Zinc selenide, synthetic | P&H Developments | As, Te, Ru |
| Ru | L | 4 | PETL | P10 | 10, 2x5 | Ru metal | RSES ANU | Ir, Bi |
| Rh | L | 4 | PETL | P10 | 10, 2x5 | Rh-Pt alloy | RSES ANU | Ru, Bi |
| Pd | L | 4 | PETL | P10 | 10, 2x5 | Pd metal | RSES ANU | Ag, Rh, Ru |
| Ag | L | 4 | PETL | P10 | 10, 2x5 | Hessite, synthetic | P&H Developments | Rh, Pd, Os |
| Sn | L | 4 | PETL | P10 | 10, 2x5 | Cassiterite, natural | P&H Developments | Sb, Ag |
| Sb | L | 4 | PETL | P10 | 10, 2x5 | Stibnite | Astimex | Pd, Te |
| Te | L | 4 | PETL | P10 | 10, 2x5 | Te metal | UTAS in-house | Ag, Sn |
| Os | M | 3 | PETL | P10 | 10, 2x5 | Os metal | RSES ANU | Te, Bi |
| Ir | L | 2 | LIFL | Xe | 20, 2x10 | Ir metal | RSES ANU | Pb |
|  | M | 3 | PETL | P10 | 10, 2x5 |  |  | Os, Au |
| Pt | L | 2 | LIFL | Xe | 20, 2x10 | Pt metal | UTAS in-house | Zn, Bi |
|  | M | 3 | PETL | P10 | 10, 2x5 |  |  | Sb, Os, Ir |
| Au | L | 2 | LIFL | Xe | 20, 2x10 | Au metal | UTAS in-house | Zn, Pt, Ir |
|  | M | 3 | PETL | P10 | 10, 2x5 |  |  | Pt |
| Pb | M | 3 | PETL | P10 | 10, 2x5 | Galena, natural | P&H Developments | S, Pt, Bi |
| Bi | M | 3 | PETL | P10 | 10, 2x5 | Bismuth selenide | Astimex | S, Au, Pb |
| Si | K | 1 | TAP | P10 | 10, 2x5 | Wollastonite, natural | UTAS in-house | Sn |
| Ca | K | 4 | PETL | P10 | 5, 2x5 | Wollastonite, natural | UTAS in-house | Sn, Sb, Te |

Detailed settings for the different elements are listed below. For elements Ir, Pt, and Au, X-ray intensities were acquired for both L and M lines. Depending on individual mineral compositions, the M lines were used for quantification, unless:

* Ir L used instead of M in case of major Os (>10 wt. %) due to strong Os interference on Ir L.
* Pt L in case of major Ir (>5 wt. %)
* Au L in case of major Pt (>15 wt. %)

Si and Ca were analysed as indicators for analysis contributions from gangue minerals across grain boundaries or from inclusions.

Conventional two-point off-peak background measurements were performed and converted to multi-point background curves using the shared background technique (Allaez *et al.* 2019). Background fit curves for each element were optimised individually for different mineral compositions.

A Thermo Pathfinder Pinnacle energy dispersive x-ray spectrometry (EDS) system with UltraDry Extreme 30 mm2 silicon drift detector and the JEOL backscattered electron (BSE) detector on the same EPMA instrument were used to aquire BSE images and semiquantitative EDS analyses to aid selection and documentation of microprobe analysis locations.

*Cr-spinel*

Compositional analyses were acquired on the same EPMA instrument as above at 15 kV accelerating voltage, 40 nA beam current, and 2 µm beam diameter, using K lines and two off-peak backgrounds with a linear or exponential background correction for all elements. For analytical details see Supplementary Table B.

Supplementary Table B

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| element/ line | WDS channel | crystal | counter | count times, peak & background | calibration standard | standard source | interference corrections |
| Mg K | 1 | TAP | P10 | 20, 2x10 | Olivine MongOL Sh11-2 | Batanova [1] |  |
| Al K | 1 | TAP | P10 | 20, 2x10 | Gahnite Brazil NMNH 145883 | Smithsonian institution [2] |  |
| Si K | 1 | TAP | P10 | 20, 2x10 | Wollastonite, natural | UTAS in-house |  |
| Ca K | 3 | PETL | P10 | 80, 2x40 | Wollastonite, natural | UTAS in-house |  |
| Ti K | 4 | PETL | P10 | 80, 2x40 | Rutile, synthetic | P&H Developments |  |
| V K | 2 | LiFL | Xe | 30, 2x15 | Calcium vanadate Ca3(VO4)2, synthetic | JEOL | Ti |
| Cr K | 2 | LiFL | Xe | 20, 2x10 | Eskolaite, synthetic | P&H Developments | V |
| Mn K | 2 | LiFL | Xe | 30, 2x15 | Rhodonite, natural | P&H Developments | Cr |
| Fe K | 5 | LIFL | Xe | 20, 2x10 | Hematite, natural | Harvard Mineralogical Museum |  |
| Ni K | 5 | LIFL | Xe | 20, 2x10 | Nickel Oxide NiO, synthetic | P&H Developments |  |
| Zn K | 5 | LIFL | Xe | 40, 2x20 | Gahnite Brazil NMNH 145883 | Smithsonian institution |  |

[1] Batanova, V.G. (2019). New Olivine Reference Material for In Situ Microanalysis. Geostandards and Geoanalytical Research, 43(3): 453-473.

[2] Jarosewich, E. (2002). Smithsonian Microbeam Standards. Journal of Research of the National Institute of Standards and Technology, 107(6): 681-685.