

Supplementary Online Material 2

Detailed conditions for EPMA chemical analyses of the examined heavy minerals:

Tourmalines: see Kotowski *et al.* (2020)

Rutile: see Kotowski *et al.* (2021)

Monazite: see Kotowski *et al.* (2023)

Zircon:

Accelerating voltage: 15 kV; beam current: 30 nA

Element	Reference material	Analytical line	Diffracting crystal	Mean detection limit (in wt%)
Na	Albite	K α	TAP	0.04
Si	Diopside	K α	TAP	0.02
Al	Orthoclase	K α	TAP	0.02
Mg	Diopside	K α	TAP	0.02
Hf	HfO ₂	M α	TAP	0.04
K	Orthoclase	K α	LPET	0.03
Th	ThO ₂	M α	LPET	0.06
U	UO ₂	M α	LPET	0.06
Mn	Rhodonite	K α	LIF	0.06
Fe	Fe ₂ O ₃	K α	LIF	0.06
Yb	YbP ₅ O ₁₄	L α	LIF	0.12
Zr	Zircon	L α	PET	0.14
P	LaPO ₄	K α	PET	0.04
Ca	Diopside	K α	PET	0.03
Ti	Rutile	K α	PET	0.03
Y	YPO ₄	L α	TAP	0.04
Nb	LiNbO ₃	L α	LPET	0.06

Cr-spinel:

Accelerating voltage: 15 kV; beam current: 20 nA

Element	Reference material	Analytical line	Diffracting crystal	Mean detection limit (in wt%)
Mg	Diopside	K α	TAP	0.02
Al	Orthoclase	K α	TAP	0.04
Si	Diopside	K α	TAP	0.03
Fe	Fe ₂ O ₃	K α	LIF	0.10
Ni	NiO	K α	LIF	0.13
Mn	Rhodonite	K α	LIF	0.11
V	V ₂ O ₅	K α	LIF	0.07
Zn	Sphalerite	K α	LIF	0.27
Cr	Cr ₂ O ₃	K α	PET	0.06
Ca	Diopside	K α	PET	0.03
Ti	Rutile	K α	LPET	0.02

Zn-spinel:

Accelerating voltage: 15 kV; beam current: 20 nA

Element	Reference material	Analytical line	Diffracting crystal	Mean detection limit (in wt%)
Al	Orthoclase	K α	TAP	0.04
Mg	Diopside	K α	TAP	0.02
Si	Diopside	K α	TAP	0.03
Zn	Sphalerite	K α	LIF	0.27
Fe	Fe ₂ O ₃	K α	LIF	0.10
Mn	Rhodonite	K α	LIF	0.09
V	V ₂ O ₅	K α	LIF	0.07
Cr	Cr ₂ O ₃	K α	PET	0.05
Ca	Diopside	K α	PET	0.03
Ti	Rutile	K α	LPET	0.02

Staurolite:

Accelerating voltage: 15 kV; beam current: 20 nA

Element	Reference material	Analytical line	Diffracting crystal	Mean detection limit (in wt%)
Na	Albite	K α	TAP	0.03
Al	Corundum	K α	TAP	0.03
Si	Diopside	K α	TAP	0.03
Mg	Diopside	K α	TAP	0.02
Zn	Sphalerite	K α	LIF	0.22
Fe	Fe ₂ O ₃	K α	LIF	0.12
Mn	Rhodonite	K α	LIF	0.07
Ti	Rutile	K α	PET	0.04
Ca	Diopside	K α	PET	0.03
Cr	Cr ₂ O ₃	K α	LPET	0.02

Garnet:

Accelerating voltage: 15 kV; beam current: 20 nA

Element	Reference material	Analytical line	Diffracting crystal	Mean detection limit (in wt%)
Na	Albite	K α	TAP	0.07
Mg	Diopside	K α	TAP	0.02
Al	Corundum	K α	TAP	0.03
Si	Diopside	K α	TAP	0.03
Ca	Diopside	K α	PET	0.04
Ti	Rutile	K α	PET	0.04
Fe	Fe ₂ O ₃	K α	LIF	0.10
Mn	Rhodonite	K α	LIF	0.10
Cr	Cr ₂ O ₃	K α	LPET	0.02
Zn	Sphalerite	K α	LIF	0.21