

The fluid compositions of lherzolite xenoliths in Eastern China and Western American

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The occurrence of fluids in the mantle is of crucial importance in interpreting the mechanisms and geochemical effects of mantle evolutions, the fluids trapped in mantle-derived xenoliths have provided unique and important constraints on the chemical composition of the mantle fluids.

Experiment and Results

In present study fresh lherzolite xenoliths, which are regarded as relict refractory mantle (Menzies, 1987; Zhang, 2004), have been collected from Dixiasenlin, Liuhefangshan, Xilong, Dayangcao in eastern China and Dish Hill, San Carlos in western American, the fluid compositions of lherzolite xenoliths have been investigated by vacuum step-heating MAT 271 mass spectrometer.

The fluids in lherzolite xenoliths were released by stages and formed two releasing peaks at about 400°C (low temperature peaks, LTP) and 800°C (high temperature peaks, HTP) in vacuum step-heating experiments, the fluid compositions of two releasing peaks in lherzolite xenoliths in eastern China and western American are list in Table 1.

Table 1 The fluid compositions in lherzonite ($\mu\text{l}\cdot\text{STP/g}$)

Peak	Locality	H ₂	CH ₄	H ₂ S	CO	N ₂	CO ₂	SO ₂
LTP	E-China	0.57	0.39	0.00	1.20	0.08	12.79	0.24
	W-USA	0.21	0.17	0.00	1.64	0.04	5.26	0.00
HTP	E-China	5.89	0.24	0.01	1.87	0.60	18.17	7.26
	W-USA	13.08	0.29	0.01	7.25	0.23	8.05	1.18

Conclusion

Fluids of HTP are formed by the bursting of early stage of fluid inclusions (close to their homogenization temperature) which represent the primitive mantle fluids (Zhang, 2004), fluids of LTP are derived from the late stage fluid inclusions which reflect the fluid of mantle evolutions. There are significant differences in chemical compositions of the primitive mantle fluids (except the fluid of mantle evolutions) between eastern China and western American.

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References

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