# Copper partition between olivine and basaltic melt: experimental data

N. A. Durasova — Vernadsky Institute of Geochemistry RAS, 117975 Moscow, Russia

I. D. Ryabchikov — Institute of Ore Deposits Geology, Petrography, Mineralogy and Geochemistry, RAS, 109017 Moscow, Russia

A. B. Slutsky, L. N. Kochnova — Vernadsky Institute of Geochemistry RAS, 117975 Moscow, Russia

Copper partition coefficients in the system crystal-basaltic melt have been studied experimentally. The obtained results were compared with data on copper distribution in nodules derived from various depths and in host basalt. One part of experiments was performed at high pressures using a piston-cylinder apparatus with $f_{O_2}$ in the field of wustite stability. Several runs were also conducted at low pressure and different values of $f_{O_2}$. At high pressures equilibrium reactions between olivine and water saturated melt were studied. Copper partition coefficient in the system olivine-water saturated basaltic melt at $T = 1100°C$, $P = 10$ kbar and $f_{O_2}$ in the field of wustite stability was determined as low the unit $K_{Cu}^{olivine-melt} = 0.05-0.32$. Earlier obtained data (Fig. 1) on copper partition between olivine and basaltic melt in dry conditions, atmospheric pressure and buffer Ni-NiO (Durasova *et al.*, 1994) gave practically the same values of $K_{Cu}$ (Fig. 1).

Samples investigated in oxidized conditions (air atmosphere) demonstrate $K_{Cu}$ value close to the unity. Therefore, oxygen fugacity is the main factor which determined the value of copper partition between crystal and melt. A similar picture of $K_{Cu}^{pyroxene-melt}$ dependence on oxygen fugacity was observed for melt of boninite composition. Published data on copper distribution in nodules and host basalts of Salt-lake volcano (Hawaii) give the relation of copper concentration between dunite and tholeiite about 0.2 which is close to experimental results obtained at strongly reduced conditions (Fig. 2). The ratio of copper concentration in pyroxenites from nodules to that one in alkaline basalt is similar to experimental results for samples treated at 1300–1350°C in dry condition and air atmosphere. The results of this study allow to suggest that

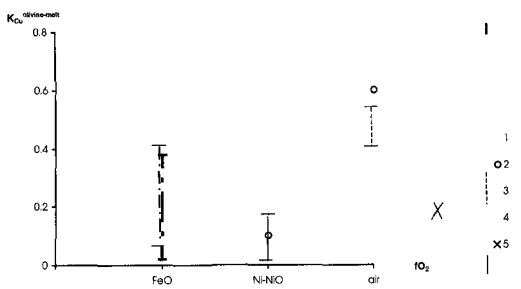


FIG. 1. Copper distribution in the system olivine–basaltic melt at various $f_{O_2}$. 1: olivine–water saturated basaltic melt; 2: olivine–basaltic melt; 3: olivine–melt of Al–Mg–Si–Ca–O composition (Irving, 1978); 4: olivine–basalt of pillow lavas (Durasova *et al.*, 1994); 5: dunite–host tholeiite of Salt-lake volcano (Durasova *et al.*, 1994).

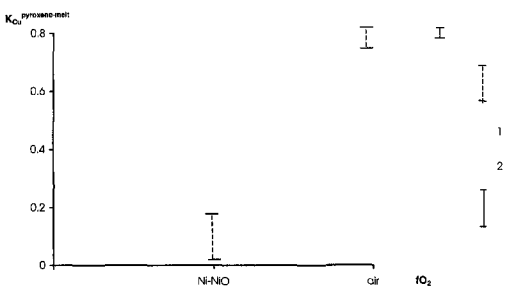


FIG. 2. Copper distribution in the system pyroxene–basaltic melt at various $f_{O_2}$. 1: pyroxene–basaltic melt; 2: pyroxenite–host alkaline basalt.

formation of alkaline basalts occur at more oxidized conditions by comparison with tholeiite.

## References

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