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RHODIUM AND PALLADIUM PARTITIONING BETWEEN COPPER-NICKEL-PYRRHOTITE AND SULFIDE LIQUID

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Partition coefficients for Rh and Pd between monosulfide solid solution (mss), $(Fe,Ni,Cu,PGE)_{1-x}S$, and sulfide liquid (matte) have been determined from experiments in which ~0.1g of simple sulfides doped with Rh or Pd were heated in silica tubes for several days, then quenched very rapidly, all using techniques of, and yielding major element contents of two-phase results highly consistent with, Ebel and Naldrett (1997). Multiple polished mss/matte interfaces were analyzed for PGE using the laser ablation ICP-MS facility at Chicago:

TABLE:

		Nominal bulk wt%					PGE in mss			PGE in matte			D(PGE)
exp	PGE	Fe	Ni	Cu	S	T(C)	*n*	ppm	1σ	*n*	ppm	1σ	mss/matte
PdN4	Pd	58.6	5.1	0	36.4	1100	12	1.99	0.44	12	30.47	6.48	0.065
PdC2	Pd	54.9	0.3	8.7	36.0	1100	6	4.35	0.38	6	204.1	9.97	0.021
RN2	Rh	58.8	5.1	0	36.1	1100	7	2.58	0.17	8	6.67	1.23	0.387
RN3b	Rh	47.2	14.7	0	38.1	1100	6	5.01	0.17	7	2.59	0.15	1.931
RC2	Rh	54.0	0.5	9.5	36.0	1100	8	1.29	0.46	8	0.69	0.46	1.877
RC1b	Rh	51.3	0.6	9.5	38.5	1100	7	29.04	1.95	12	8.78	1.24	3.307
RC3	Rh	57.0	0.6	3.2	39.1	1150	11	20.36	0.90	7	8.01	1.12	2.542
RC4	Rh	58.0	0.6	4.0	37.5	1150	20	15.71	0.51	15	11.52	1.06	1.364

Fleet et al. (1993) obtained major element equilibria broadly consistent with more recent work, and D(Rh)=3.0±0.7 and D(Pd)=0.21±0.08, at ~1020°C, in seven experiments with 20 to 50 ppm of each of six PGEs, ~5 wt% Cu, Ni at ~24 or 7 wt%. Our results suggest D for Rh and Pd decrease with decreasing $f(S_2)$, and both Rh and Pd "prefer" matte when the degree of metallic bonding in the matte increases. A value of $2.5<D(Rh)<3.0$ is consistent with the natural buffering effects observed in magmatic Ni-PGE ores. Further work clearly will be required, to establish the major element dependence of these and other PGE mss/matte partition coefficients of geological interest.