

Supplementary materials

Table 1 The conditions of the autoclave decomposition of raw materials and product of copper-nickel plant

№	Sample types, including standard samples	Mass of sample/g	Acid mixture; volume/mL			T/°C
			HCl	HNO ₃	HF	
I	Dump slags	5; 10	25	5	10; 15	230*
	Final tailings of impregnated ores	10	10	30	6	240
	Enrichment tailings, HO-1	5; 10	25	1-5; 2-7	10-15; 15-18	230
II	Impregnated copper-nickel sulphide ores, VT-1, VP-2	5	10	30	6	240
	Lode copper-nickelsulphide ores, G-3	2; 5	10	10	4	230
III	Pirrotine concentrate	2; 5	10; 20	8; 20	4; 10	230
	Copper concentrate, nickel concentrate, KN-1, KM-1; ore-melting stain, ShT-1	1; 2	(6; 9) [†] 12	(4; 5) [†] 12	1 [†] ; 4	200
	Nickel matte, FShT-30	1; 2	(6; 8) [†] 12	(4; 5) [†] 12	-	200

*Decomposition time 4 hr, for samples № 2 and 4 – 6 hr. [†]Two-chamber variant of the decomposition, HNO₃ is in reaction chamber, the sample with HCl and HF is in the insert.

Table 2 Relative standard deviation of the determination of PGEs and gold in extract (I, II) and in strip product solution (II, IV) in the analysis of standard samples and process materials by ETAAS(I, II) and ICP-AES (III, IV) methods (n*=3)

№	Pt	Pd	Rh	Ru	Au	Ir
The range of metal contents in standard samples (µg g ⁻¹)						
	0.43–19	0.84–101	0.096–6.3	0.029–2.0	0.07–2.8	0.04–0.54
	S _r					
I	0.10–0.02	0.04–0.01	0.05–0.02	0.14–0.04	0.07–0.04	0.12–0.06
II	0.12–0.03	0.12–0.02	0.13–0.07	0.13–0.03	0.11–0.03	0.17–0.06
III	0.16–0.02	0.03–0.01	0.03; 0.02	0.07–0.04	0.04–0.02	0.13
IV	0.13–0.04	0.07–0.02	0.13–0.04	0.12–0.04	–	–
The range of metal contents in process materials (µg g ⁻¹)						
	0.42–7.6	1.17–23.4	0.021–0.62	0.022–0.27	0.039–1.37	–
	S _r					
I	0.13–0.04	0.06–0.01	0.16–0.02	0.17–0.02	0.12–0.03	–
II	0.11–0.04	0.06–0.01	0.18–0.04	0.20–0.03	0.16–0.09	–
III	0.11–0.02	0.07–0.004	–	0.17–0.02	0.17–0.01	–
IV	0.17–0.04	0.09–0.02	–	0.19–0.07	0.11–0.08	–

*Number of replicates