

Supplementary Materials: Silicas Chemically Modified with Sulfur-Containing Groups for Separation and Preconcentration of Precious Metals Followed by Spectrometric Determination

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Table S1. ICP-OES operational conditions.

Parameter	Value
RF power	1150 W
Nebulizer gas flow	0.7 L·min ⁻¹
Auxiliary gas flow	0.5 L·min ⁻¹
Coolant gas flow	12 L·min ⁻¹
Analysis pump rate	60 rpm
Flush pump rate	100 rpm
Sample flush time	30 s
Pump stabilization time	5 s
Integration time	15 s
Observation view	Axial
Number of repeats	3
Element	Emission line, nm
Au	267.595
Ag	328.068
Pd	340.458
Pt	265.945
Rh	343.489
Ir	212.681
Ru	240.272
Os	225.585

Table S2. ICP-MS operational conditions.

Parameter	Value
Plasma power	1300 W
Plasma argon flow rate	15 L·min ⁻¹
Auxiliary argon flow rate	0.8 L·min ⁻¹
Nebulizer argon flow rate	1.0 L·min ⁻¹
Sampler orifice (nickel)	1.1 mm
Skimmer orifice (nickel)	0.7 mm
Acquisition mode	Peak-jumping
Number of sweeps	100
Dwell time	10 ms
Acquisition time	40 s
Number of measurements per peak	3
Element	-m/z
* Au	197
Ag	107
Pd	105
Pt	195
Rh	103
Ir	193
Ru	101
Os	189

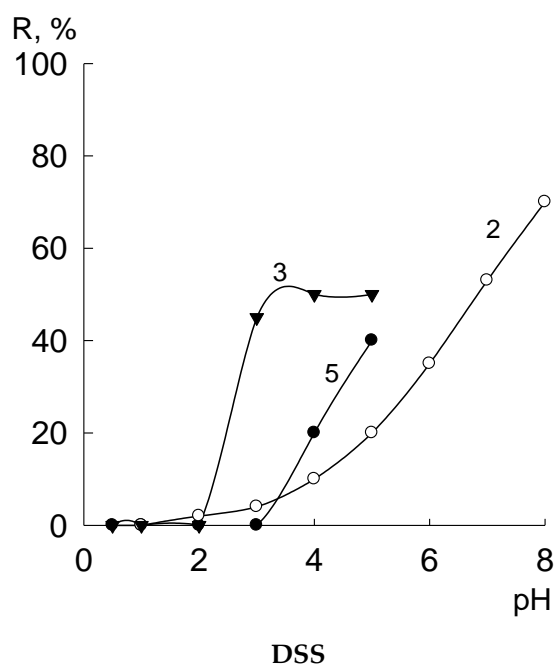
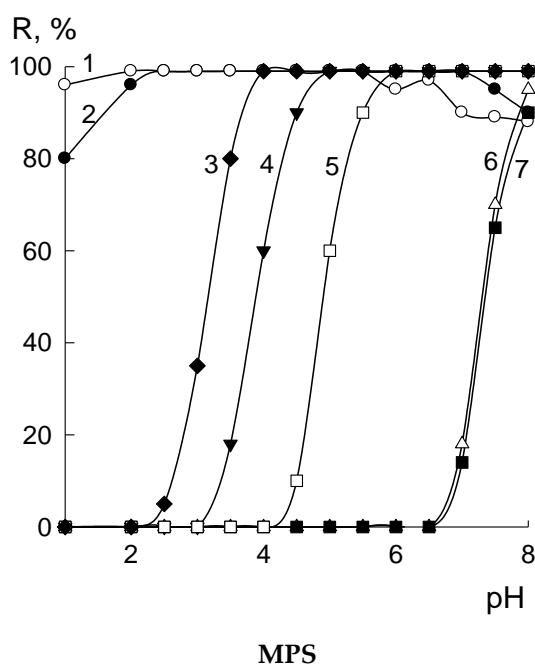
Table S3. FAAS and GFAAS operational conditions.

Atomizer	Background Correction	Slit Width, mm	Lamp Current, mA, Power Mode	Analytical Range, $\mu\text{g}\cdot\text{mL}^{-1}$	Analyte (Wavelength, nm)
Flame: acetylene-air	Deuterium	0.2	25 Continuous	0.2–10	Ag (328.0) Au (242.8)
Electrothermal: Pyro-coated graphite cuvette	Zeeman	0.2	50 Pulse	0.002–0.05	Pd (340.4) Pt (265.9)

Table S4. Average content of accompanying elements in analyzed samples.

Sample	Content of the Element, %(w/w).							
	Ni	Cu	Co	Fe	Pb	Zn	Se	As
Sulfide copper-nickel ore (VT-1 GSO no. 929-86)	0.8	2.4	0.02	-	-	0.0007	0.0035	-
Nickel concentrate (KN-1 GSO no. 1702-86)	5.4*	3.0*	0.4	40	-	-	-	-
Copper concentrate (KM-1 GSO no. 1701-86)	1.6*	23.6*	-	35	-	-	-	-
Concentration tailing (ChO-1 GSO no. 1703-86)	0.11*	0.070*	-	-	-	-	-	-
Matte of ore-thermal smelting (ShT-1 GSO no. 2432-83)	12.7*	5.1	0.5	48.5	-	-	-	-
Copper-nickel feinsein (FShT-42 GSO 9315-2009)	41.8*	31.74*	0.94*	2.62*	0.0136*	0.0007*	0.0282*	-
Gold ore SOP ZSR-1-99	-	0.01	-	2.5	0.027	0.01	--	0.25**
Gold-bearing flotation concentrate SOP ZSK-3-99	-	-	-	33.5**	-	-	-	3.82**

*certified data provided by PJSC SibtsvetmetNIIproekt (Krasnoyarsk, Russia) [*Standartnye obraztsy—Reference materials*, 2015, No. 3, pp. 30–36. (In Russian)], **certified data provided by PJSC Polyus (Krasnoyarsk, Russia), - there is no data.



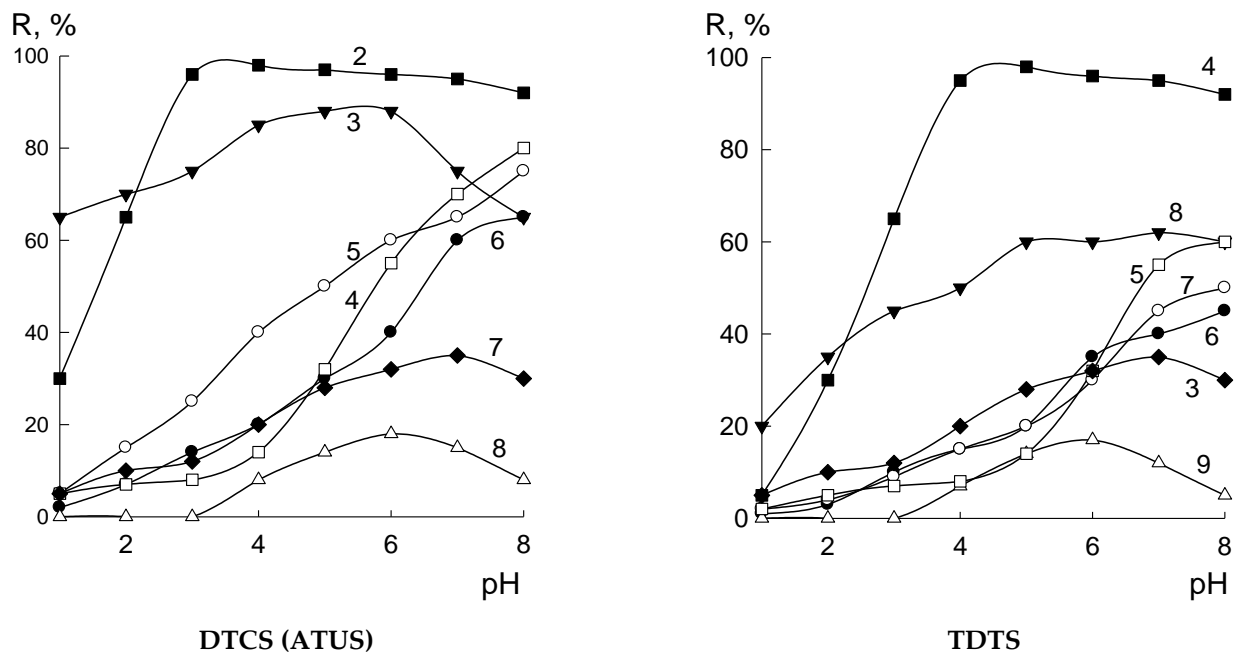


Figure S1. Extraction of Bi(III) (1); Cu(II) (2); Pb(II) (3); Cd(II) (4); Zn(II) (5); Co(II) (6); Ni(II) (7), Fe(III) (8); Fe(II) (9) with MPS, DSS, DTCS, and TDTS adsorbents vs. pH ($C_{Me} = 10 \mu\text{g}\cdot\text{mL}^{-1}$, $V = 10 \text{ mL}$, 0.1 g of adsorbent).