

Table S1. 95% Confidence intervals for RSM regression coefficients (Coded Factors), computed by Stat-Ease 360 v21. Only statistically significant terms (95% CI excluding zero) are shown. Factors: A = H₂SO₄ concentration (M, 1–5); B = leaching time (h, 2–6); C = temperature (°C, 25–85); D = N₂H₄ dosage (wt.%, 2.3–10.3).

(a) Zn extraction — Linear model (Eq. 3)

Factor (Coded Factors)	Coeff. Estimate	df	Std. Error	95% CI Low	95% CI High	VIF
Intercept	90.31	1	0.013	90.29	90.34	—
A — H ₂ SO ₄ Concentration (M)	0.15	1	0.019	0.11	0.19	1.00
B — Leaching Time (h)	0.042	1	0.019	1.43×10 ⁻³	0.082	1.00
C — Temperature (°C)	1.97	1	0.019	1.93	2.01	1.00
D — N ₂ H ₄ Dosage (wt.%)	1.24	1	0.019	1.20	1.28	1.00

(b) Cu extraction — Quadratic model (Eq. 4)

Factor (Coded Factors)	Coeff. Estimate	df	Std. Error	95% CI Low	95% CI High	VIF
Intercept	90.54	1	0.80	88.83	92.25	—
A — H ₂ SO ₄ Concentration (M)	6.92	1	0.52	5.81	8.02	1.00
B — Leaching Time (h)	-13.07	1	0.52	-14.18	-11.97	1.00
C — Temperature (°C)	2.90	1	0.52	1.79	4.01	1.00
D — N ₂ H ₄ Dosage (wt.%)	1.54	1	0.52	0.44	2.65	1.00
AB	4.40	1	0.89	2.48	6.32	1.00
BC	2.00	1	0.89	0.084	3.92	1.00
B ²	-4.04	1	0.70	-5.54	-2.53	1.08

† AC, AD, BD, CD, A², C², D² not shown — 95% CI includes zero (not significant at $\alpha = 0.05$).

(c) Cd extraction — Linear model (Eq. 5)

Factor (Coded Factors)	Coeff. Estimate	df	Std. Error	95% CI Low	95% CI High	VIF
Intercept	67.18	1	0.024	67.13	67.23	—
A — H ₂ SO ₄ Concentration (M)	−24.30	1	0.038	−24.38	−24.22	1.00
B — Leaching Time (h)	−1.44	1	0.038	−1.52	−1.36	1.00
C — Temperature (°C)	−0.48	1	0.038	−0.56	−0.41	1.00
D — N ₂ H ₄ Dosage (wt.%)	4.26	1	0.038	4.18	4.34	1.00

(d) Fe extraction — Quadratic model (Eq. 6)

Factor (Coded Factors)	Coeff. Estimate	df	Std. Error	95% CI Low	95% CI High	VIF
Intercept	87.42	1	0.047	87.32	87.52	—
A — H ₂ SO ₄ Concentration (M)	4.13	1	0.030	4.07	4.20	1.00
B — Leaching Time (h)	0.47	1	0.030	0.40	0.53	1.00
C — Temperature (°C)	4.21	1	0.030	4.14	4.27	1.00
D — N ₂ H ₄ Dosage (wt.%)	3.67	1	0.030	3.61	3.74	1.00
A ²	−0.13	1	0.041	−0.21	−0.038	1.08
B ²	−0.13	1	0.041	−0.21	−0.038	1.08
C ²	−0.14	1	0.041	−0.23	−0.051	1.08
D ²	−0.11	1	0.041	−0.20	−0.026	1.08

† All six interaction terms (AB–CD) not shown — 95% CI includes zero (not significant at $\alpha = 0.05$).