

**Supplementary Materials:**

**Table S1.** The summary of leaching parameters for As, Cu, Zn, and Fe leaching using Equation (2). The leaching conditions were a reaction time of 15 min, reaction temperature of 80 °C, and HNO<sub>3</sub> concentration of 0.1, 0.5, or 1.0 M.

<b>Elements</b>		<b>E<sub>t</sub> (%)</b>	<b>K (min<sup>-1</sup>)</b>	<b>R<sup>2</sup></b>
Nitric acid (0.1M)	Cu	20.83	0.38	0.99
	Zn	2.52	0.66	0.99
	Fe	9.20	0.43	0.99
	As	8.81	0.42	0.97
Nitric acid (0.5M)	Cu	41.21	0.08	0.99
	Zn	5.83	0.14	0.99
	Fe	35.23	0.11	0.99
	As	31.02	0.16	0.99
Nitric acid (1.0M)	Cu	85.80	0.18	0.99
	Zn	14.59	0.30	0.99
	Fe	98.66	0.21	0.98
	As	84.03	0.40	0.99

**Table S2.** The summary of leaching parameter for As, Cu, Zn, and Fe leaching, using Equation (2). The leaching conditions were a reaction temperature between 80 and 120 °C, HNO<sub>3</sub> concentration of 1.0 M, and reaction time of 15 min.

<b>Elements</b>		<b>E<sub>t</sub> (%)</b>	<b>K (min<sup>-1</sup>)</b>	<b>R<sup>2</sup></b>
Temperature (80 °C)	Cu	85.80	0.19	0.99
	Zn	14.59	0.30	0.99
	Fe	98.66	0.21	0.98
	As	84.03	0.40	0.99
Temperature (120 °C)	Cu	75.82	0.37	0.99
	Zn	10.51	0.28	0.99
	Fe	94.61	0.66	0.99
	As	92.51	0.40	0.99