Supporting Information

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Content

The chemical agents in the experiment are shown as follow:

Sodium sulfite anhydrous, ferric sulfate, copper sulfate, hydrogen peroxide, sodium hydroxide and potassium permanganate were obtained from Kemiou Chemical Reagent Co., Ltd. Perchloric acid (70 v%), thiourea, formamidine disulfide, sulfuric acid, hydrochloric acid and nitric acid were purchased from Sinopharm Chemical Reagent Co., Ltd. Sodium sulfite anhydrous, thiourea (Tu), formamidine disulfide (FDS), ferric chloride, hydrogen peroxide were guarantee reagent while others were analytical grade. Mercury sulfate (HgSO₄) and mercuric oxide (HgO) as the sources of divalent mercury were bought from Chengdu Kelon chemical reagent factory and the purity was higher than 99.9 %.



Fig. S1. Mercury thermal decomposition profile of precipitates during the oxidation process of Hg^0 . Experimental conditions: the heating rate = 8 °C/min; gas flow rate (N₂) = 0.6 L/min.



Fig. S2. The Hg⁰ removal efficiency in only 0.1 mol/L Tu solution and only 0.03 mol/L Fe³⁺ solution, respectively. Experimental conditions: SO₂ concentration = 3.5v%, solution temperature = 40 °C, solution pH = 1, Hg⁰ inlet concentration = $247 \mu g/m^3$, gas flow rate = 0.6 L/min.



Fig. S3. The effect of SO₂ concentration on Hg⁰ removal. Experimental conditions: solution temperature = 40 °C, solution pH = 1, [Tu] = 0.1 mol/L, [Fe³⁺] = 0.03 mol/L, Hg⁰ inlet concentration = 247 μ g/m³, gas flow rate = 0.6 L/min.



Fig. S4. The effect of FDS on Hg⁰ removal in presence of only 0.2 mol/L Tu. Experimental conditions: SO₂ concentration = 3.5%, solution temperature = 40 °C, solution pH = 1, [Tu] = 0.2 mol/L, Hg⁰ inlet concentration = 247 μ g/m³, gas flow rate = 0.6 L/min.



Fig. S5. The evolution of UV-visible spectra of Tu agent with time. Experimental conditions: pH value = 2.0 (H₂SO₄), solution temperature = 25 °C, scanning interval = 30 s, scanning time = 10 min.