

Supplementary Information

Removal of Chromium(VI) from Industrial Effluents Through Supported Liquid Membrane Using Trioctylphosphine Oxide as a Carrier

Robila Nawaz,* Khurshid Ali, Nauman Ali and Alia Khaliq

Institute of Chemical Sciences, University of Peshawar, 25120 Peshawar, Pakistan

Effect of nature and of stripping reagent

The stripping reagent plays a vital role in transport of metal ions from the organic membrane phase to the stripping phase. Different stripping reagents were used to study the effects of the strippent on the extraction of Cr^{VI} . The experiments were carried out in sodium hydroxide, ethylenediamine and diphenylcarbazide to evaluate the stripping ability of these reagents. As indicated in Figure S1 it is clear that aqueous diphenylcarbazide shows relatively higher extraction percentage as compared to other reagents.

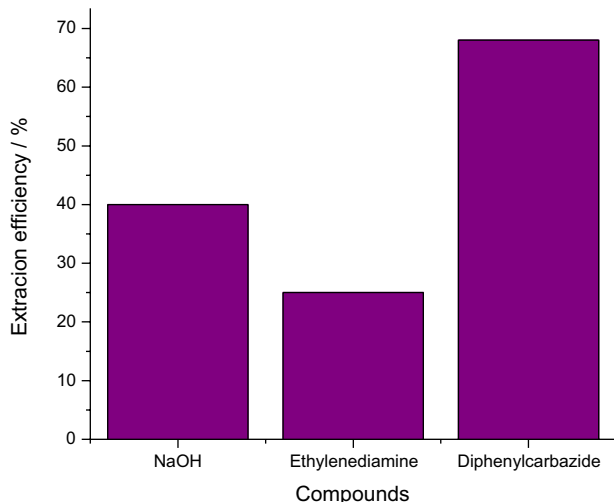


Figure S1. Effect of various stripping reagents on extraction of Cr^{VI} .

Effect of H_2O_2 concentration on extraction of Cr^{VI}

H_2O_2 was used to convert chromate ions into the Cr^{VI} oxide species, which reacts with TOPO at the feed-membrane interface and form an unstable complex. This complex immediately decomposes at the strip-membrane

interface in the presence of H_2SO_4 , which releases the chromium in the strip solution. Figures S2 and S3 indicate the effect of H_2O_2 concentration on extraction of chromium ions in the feed and strip phases. The extraction of chromium ion increased with the increase in the concentration of H_2O_2 , with maximum at 1.5 mol L^{-1} and decreased afterwards. The flux was maximum at the same concentration (Figure S4). The flux increases gradually at relatively lower concentration of H_2O_2 and it reaches maximum at 1.5 mol L^{-1} beyond which it abruptly drops off. This decrease in the flux after the maximum value may be attributed to the accumulation of Cr^{VI} oxide species at the feed-membrane interface, which hampers the extraction of chromium.

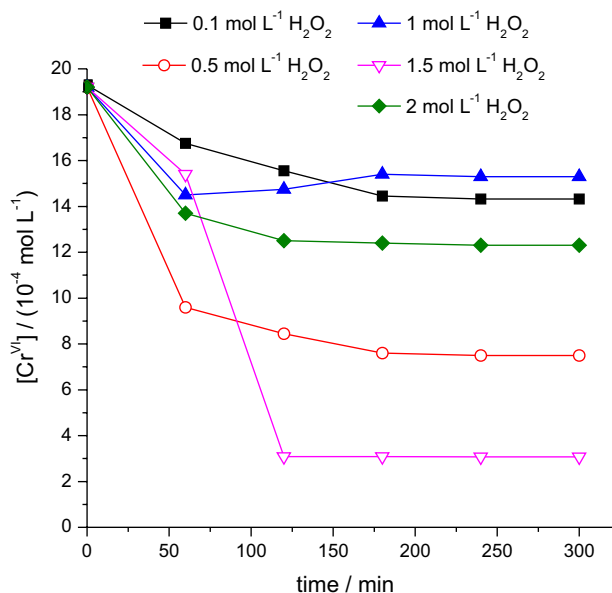


Figure S2. Variation in Cr ion concentration with time in the feed solution at various concentrations of H_2O_2 (initial $[\text{Cr}^{\text{VI}}] = 19.2 \times 10^{-4} \text{ mol L}^{-1}$, $[\text{H}_2\text{O}_2] = 0.5\text{-}2 \text{ mol L}^{-1}$, $[\text{DPC}] = 0.001 \text{ mol L}^{-1}$, $[\text{H}_2\text{SO}_4] = 1.5 \text{ mol L}^{-1}$, $[\text{TOPO}] = 0.1 \text{ mol L}^{-1}$).

*e-mail: robila29@yahoo.com

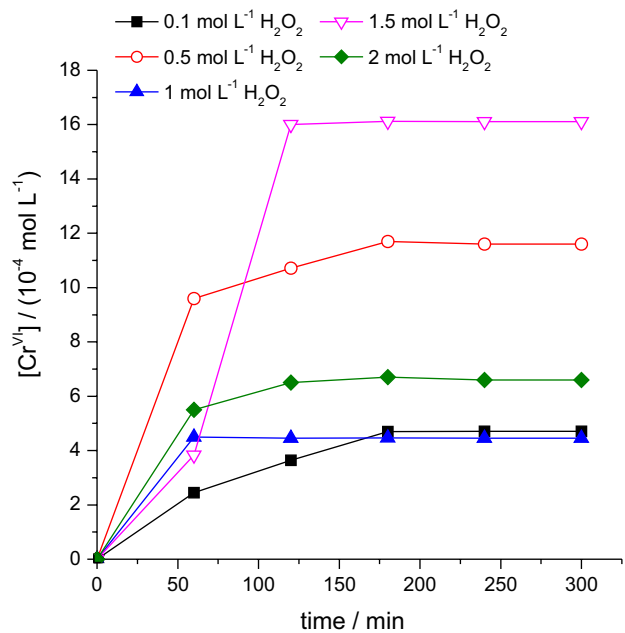


Figure S3. Variation in Cr ion concentration with time in the strip solution at various concentrations of H₂O₂ (initial [Cr^{VI}] = 19.2 × 10⁻⁴ mol L⁻¹, [H₂O₂] = 0.5-2 mol L⁻¹, [DPC] = 0.001 mol L⁻¹, [H₂SO₄] = 1.5 mol L⁻¹, [TOPO] = 0.1 mol L⁻¹).

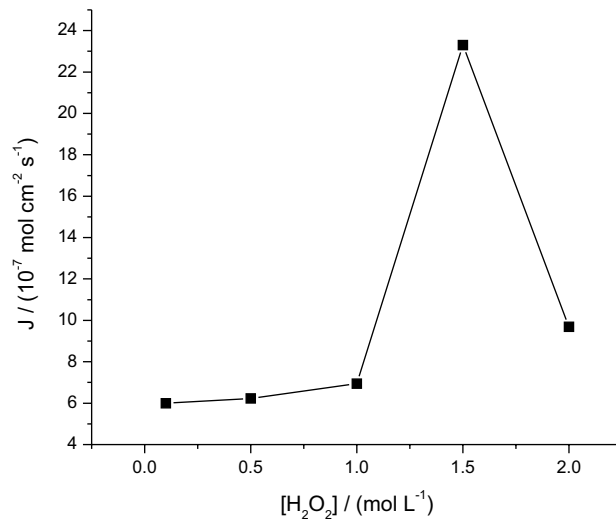


Figure S4. Effect of H₂O₂ concentration on flux (initial [Cr^{VI}] = 19.2 × 10⁻⁴ mol L⁻¹, [H₂O₂] = 0.5-2 mol L⁻¹, [DPC] = 0.001 mol L⁻¹, [H₂SO₄] = 1.5 mol L⁻¹, [TOPO] = 0.1 mol L⁻¹).