Extraction of Cr(VI) from Acidic Solutions by Supported Liquid Membrane using Alamina 336 as Carrier

Volkan Eyupoğlu¹, Ahmet Surucu², and Osman Tutkun¹

¹The University of Sakarya, Faculty of Science & Arts, Chemistry Department, 54187 Sakarya, Turkey. chemist49@gmail.com, tutkun@sakarya.edu.tr
²The University of Pamukkale, Faculty of Education, Science Education Department, P.O. 20100, Denizli, Turkey. ahmetbey61@gmail.com

The extensive use of chromium in leather tanning, metallurgy, electroplating spraying anticorrosion coatings, dying in textile, welding and cutting stainless steel, and other industries has resulted in the release of aqueous chromium to the subsurface at different sites. While chromium oxidation states range from +2 to +6 [1], the +3 and +6 states are most prevalent in the environment. The hexavalent chromium anions chromate (CrO₄²⁻), bichromate (HCrO₄⁻) and dichromate (Cr₂O₇²⁻) are not strongly sorbed in many soils under alkaline to slightly acidic conditions [1,2].

Cr(VI) is recognised to be much more toxic than Cr(III), and is found to be toxic to bacteria, plants, animals and people. Human toxicity includes lung cancer, as well as kidney, liver and gastric damage. This is a reason why World Health Organization (WHO) recommends the toxic limit of Cr(VI) in waste water at level of 0.005 ppm. Many countries have regulations of the maximum permissible concentration of Cr(VI) in natural drinking water. The permissible concentration of total chromium in drinking water is 0.05 ppm, for Cr(VI), however, this level is 0.003 ppm [3].

In present work, the extraction of Cr(VI) was carried out by supported liquid membranes using Alamine 336 as carrier. The effect of various parameters such as the feed phase pH, diluent type, extractant type and concentration, support type i.e. parameters have been studied and the optimum conditions were found for the flat sheet supported liquid membrane (FSSLM). Membrane permeabilities were determined by monitoring Co and Ni concentration using AAS (Shimadzu AA-6701GF spectrophotometer) in the feed and stripping phase as a function of time. Permeation coefficient (P) and initial mass fluxes (J₀) were calculated from obtained extraction data.

References