

APPLICATION OF LIQUID-PHASE POLYMER-BASED RETENTION TECHNIQUE TO REMOVE MOLYBDENUM (VI) AND VANADIUM (V) FROM AQUEOUS SOLUTION

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This research is focused on molybdate and vanadate removal from aqueous solutions by the liquid-phase polymer-based retention (LPR) technique [1]. A cationic water-soluble polymer based on the ammonium quaternary group (poly(diallyldimethylammonium chloride), PDDA) was used as polymeric sorbent and regenerated cellulose ultrafiltration membrane as filter. The removal of molybdenum and vanadium was analyzed using the LPR technique with both the washing and enrichment methods. The removal experiments using the washing method were conducted by varying the pH, polymer:metal molar ratio and the presence of interfering ions. The enrichment method was used to determine the maximum retention capacity of PDDA.

The results showed highest retention capacity of molybdate (100% at $Z=5$ using 30 mg/L in the feed) for PDDA independent of the pH. The optimum molar ratio was 10:1 polymer:Mo(VI). On the other hand, it was observed that the efficient vanadate retention was obtained at pH 3 with 10:1 polymer:V(V) molar ratio and it was about 100% at $Z=5$.

The enrichment method shows the maximum retention capacities of 138 mg Mo(VI)/g polymer and 60 mg V(V)/g polymer. These results showed that the combination of PDDA with ultrafiltration membranes could be a potential alternative for the removal of molybdate and vanadate from water.

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[1] Rivas, B.L.; Pereira, E.D.; Palencia, M.; Sánchez, J. Prog. Polym. Sci. 2011, 36, 294-322.