

# Sintesis karakterisasi dan aplikasi poli{(4-vinil piridin) KO (asam metakrilat)} sebagai adsorben selektif ion Pb<sup>2+</sup> menggunakan teknik ion imprinted polymer = Synthesis characterization and application of poly{(4-vinyl pyridine)-co-(methacrylic acid)} as selective adsorbent for Pb<sup>2+</sup> ion using ion imprinted polymer technique

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## Abstrak

Imprinted polymer untuk ion Pb<sup>2+</sup> (Pb-IIP) disintesis melalui proses self assembly antara monomer fungsional 4-vinil piridin dan asam metakrilat serta ion Pb<sup>2+</sup> sebagai template. Kompleks template/monomer yang terbentuk dipolimerisasi menggunakan metode polimerisasi suspensi dengan pengikat silang etilen glikol dimetakrilat (EGDMA) dan inisiator 2,2'-azobis isobutyronitril (AIBN). Proses leaching menggunakan HNO<sub>3</sub> 0,5 M dilakukan pada Pb-IIP hasil sintesis untuk mengelusi ion Pb<sup>2+</sup>, sehingga didapatkan rongga spesifik yang berfungsi sebagai situs pengenalan. Keberhasilan sintesis polimer dianalisis menggunakan FTIR. Puncak gugus C=C ulur vinil pada panjang gelombang 1630 cm<sup>-1</sup> tidak muncul menandakan putusannya ikatan rangkap akibat adanya proses polimerisasi.

Hasil karakterisasi EDX menunjukkan bahwa pengompleksan dan pengelusian ion Pb<sup>2+</sup> berhasil dilakukan yang dikonfirmasi dengan munculnya intensitas Pb sebelum dilakukan elusi dan tidak munculnya intensitas Pb setelah dilakukan elusi. Hasil karakterisasi menggunakan PSA menunjukkan distribusi ukuran partikel Pb-IIP yaitu 34,5m. Adsorben Pb-IIP diuji sifat adsorpsi serta desorpsinya dan diperoleh persen adsorpsi di atas 99% dan persen desorpsi sebesar 92,45%. Sebagai pembandingan, pada non imprinted polymer (NIP) diperoleh persen adsorpsi sebesar 21,63% dan persen desorpsi sebesar 52,57%. Pb-IIP memiliki persen adsorpsi yang lebih besar terhadap Pb<sup>2+</sup> dibandingkan dengan ion logam lainnya yaitu Ni<sup>2+</sup>, Co<sup>2+</sup>, Cu<sup>2+</sup>, dan Fe<sup>3+</sup>. Kemampuan adsorpsi maksimum pada Pb-IIP dapat dicapai saat pH 7 dan waktu kontak 60 menit. Pb-IIP dapat diaplikasikan pada sampel air di lingkungan dengan % recovery sebesar 110%.

An imprinted polymer for Pb<sup>2+</sup> ion (Pb-IIP) was synthesized by self-assembly method using 4-vinyl pyridine, methacrylic acid as functional monomer and Pb<sup>2+</sup> ion as template. Template/monomer complex was polymerized using a suspension polymerization method with crosslinker ethylene glycol dimethacrylate (EGDMA) and initiator 2,2'-azobis isobutyronitrile (AIBN). Pb-IIP was leached using 0.5 M HNO<sub>3</sub> to remove Pb<sup>2+</sup> ion that would produce the specific cavity as a recognition site. The success of synthesis was analyzed using FTIR resulting the absence of peak for C=C stretching at 1630 cm<sup>-1</sup> indicated the bond rupture due to the polymerization process.

EDX characterization indicated that complexing and leaching of Pb<sup>2+</sup> ion were successfully confirmed by the appearance of Pb elements prior to elution and disappearance of Pb elements after elution. PSA characterization showed the particle size distribution of Pb-IIP was 34.5 m. Adsorption and desorption process were performed on Pb-IIP adsorbent obtained > 99% for adsorption and 92.45% for desorption. NIP adsorbent used for comparison with Pb-IIP resulting 21.63% for adsorption and 52.57% for desorption. Pb-IIP had a better adsorption towards Pb<sup>2+</sup> compared with other metal ions such as Ni<sup>2+</sup>, Co<sup>2+</sup>, Cu<sup>2+</sup>, and Fe<sup>3+</sup>. The maximum adsorption capacity of Pb-IIP could be achieved when the pH was 7 and contact times was 60 minutes. Pb-IIP could be applied to environmental water samples resulting % recovery 110%.