

## ABSTRAK

### ***ION IMPRINTED POLYMERS (IIPs) UNTUK EKSTRAKSI FASA PADAT DAN PRAKONSENTRASI ION TIMBAL(II)***

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Perairan sering kali tercemar oleh logam berat seperti kadmium, merkuri dan timbal. Walaupun kandungan timbal di perairan rendah akan tetapi timbal diketahui dapat terakumulasi di dalam tubuh dan tetap tinggal dalam jangka waktu yang lama sehingga bersifat sebagai racun. Metode untuk analisis Pb(II) sudah banyak dikembangkan seperti Spektrofotometri Serapan Atom (SSA). Analisis SSA cukup sederhana dan sensitif pada tingkat konsentrasi ppm, akan tetapi masih kurangnya selektivitas untuk ion Pb(II). Oleh karena itu, untuk meningkatkan selektivitas dilakukan pengembangan metode ekstraksi fasa padat menggunakan polimer pengkhelat dengan fungsionalisasi polimer yaitu *ion imprinted polymers (IIPs)*. Pada penelitian ini, Pb(II)-*imprinted polymer (Pb-IP)* berhasil disintesis melalui polimerisasi termal asam antranilat, asam salisilat dan formaldehida dengan adanya kompleks logam Pb(II)-4-(2-pyridylazo) resorcinol yaitu dengan pemanasan selama 6 jam, pada temperatur  $140 \pm 10^\circ\text{C}$  dan asam asetat glasial sebagai katalis. Perbandingan stoikiometri untuk kompleks biner Pb dan 4-(2-pyridylazo) resorcinol melalui metode job diperoleh perbandingan maksimum untuk Pb(II) : PAR 1 : 1. Pada tahapan sintesis dianalisis menggunakan FTIR. Ion Pb(II) pada Pb(II)-*imprinted polymer* dapat dilepaskan dengan larutan EDTA 0,05 M. Kapasitas adsorpsi maksimum untuk Pb(II) adalah 12,5 ppm pada pH 6 dengan waktu kontak 80 menit. *Ion imprinted polymer (IIP)* ini digunakan secara berulang untuk adsorpsi dan desorpsi hingga 3 kali dengan persen perolehan > 97 %. Selain itu, IIP digunakan untuk prakonsentrasi dan penentuan kadar Pb(II) dalam sampel air sungai. Faktor pengayaan yang diperoleh adalah 41 kali dan konsentrasi Pb(II) dalam sampel 0,96 ppm dengan persen perolehan kembali 96,77 %. Dengan hasil percobaan tersebut, Pb(II)-*imprinted polymer (Pb-IP)* terbukti sebagai material yang fungsional dengan memiliki kinerja, tingkat selektivitas, dan beregenerasi tinggi.

**Kata kunci :** timbal, prakonsentrasi, ekstraksi fasa padat, Pb(II)-ion imprinted polymer, PAR.

## ABSTRACT

### ION IMPRINTED POLYMERS (IIPs) FOR SOLID PHASE EXTRACTION AND PRECONCENTRATION OF LEAD(II)

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Waters are often contaminated by heavy metals such as cadmium, mercury and lead. Although a low lead content in water but the lead is known to accumulate in the body and remains in a long time so it is a poison. Methods for the analysis of Pb (II) has been developed such as Atomic Absorption spectrophotometry (AAS). Analysis of AAS is quite simple and sensitive at ppm concentration levels, but still a lack of ion selectivity for Pb (II). Therefore, to improve the selectivity made the development of solid phase extraction method using chelating polymers by functionalization of the polymer ion imprinted polymers (IIPs). In this research has been successfully synthesized Pb (II)-imprinted polymer (Pb-IP) through the polymerization of anthranilic acid, salicylic acid and formaldehyde in the presence of metal complexes of Pb (II)-4- (2-pyridylazo) resorcinol. Comparison of binary complex stoichiometry for Pb and 4- (2-pyridylazo) resorcinol determined using the job method and the maximum ratio for Pb (II): PAR obtained 1:1. Synthesis of Pb (II)-imprinted polymer was carried out with the thermal method, heating for 6 hours at a temperature of  $140 \pm 10$  °C and acetic glacial acid as catalyst. The results of synthesis were characterized by FTIR to determine if the polymer has been successfully synthesized or not successfully with analysis the different structure of polymers. Pb(II) on Pb(II)-imprinted polymer can be removed with a solution of EDTA 0.05 M. Polymers that have been printing for ions Pb(II) used to characterize the retention properties by batch method. The results of synthesis were characterized by AAS indicate the maximum adsorption capacity for Pb(II) was 3515  $\mu\text{g/g}$  at pH 6 with a contact time of 80 minutes. Ion imprinted polymer was used repeatedly for the adsorption and desorption up to 3 times with the percent of recovery not less than 97 %. Ion imprinted polymer that has been developed also used for preconcentration of Pb(II) in gutter water samples. The obtained preconcentration factor is 41 times and concentrations of Pb(II) in samples of 0,96 ppm with the percent recovery of 96,77%. The obtained value of preconcentration factor and the percent recovery showed that functional materials are well enough to use in the trace analysis of Pb(II).

**Keywords** : lead, preconcentration, solid phase extraction, Pb(II)-ion imprinted polymer, PAR.

