Studi elektrokimia printed circuit board (pcb) pada larutan asam klorida (hcl) dengan variasi konsentrasi asam klorida (hcl) dan waktu celup = Electrochemical study of printed circuit board (pcb) in chloride solution with variation of chloride solution concentration (hcl) and immersion time

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Abstrak

Perkembangan industri pengolahan limbah elektronik di Indonesia masih sangat minim dan masih menggunakan metode konvensional yang masih tergolong berbahaya bagi lingkungan dan manusia. Seiring dengan berjalannya waktu, dilakukan berbagai penelitian untuk mengatasi masalah tersebut, salah satunya adalah penggunaan larutan asam klorida. Pada penelitian kali ini digunakan sampel Printed Circuit Board untuk melihat perilaku elektrokimia dari logam Cu pada larutan asam klorida dengan konsentrasi 0.1 M, 0.2 M dan 0.5 M dengan menggunakan metode pengujian pelindian, pengujian polarisasi linear dan pengujian Electrochemical Impedance Spectroscopy EIS.
Hasil penelitan EIS menunjukan bahwa pengujian PCB-Cu pada larutan asam klorida 0.5 M memiliki diameter kurva semicircle paling kecil diantara larutan asam klorida yang lain. Berdasarkan hasil fitting kurva Nyquist dengan model sirkuit ekuivalen, didapatkan bahwa hasil nilai Rctpaling kecil diantara konsentrasi lain dan lama waktu celup dimiliki oleh larutan asam klorida 0.5 M dengan waktu celup 60 menit yaitu sebesar 0.33 x 103?. Kemudian hasil pengujian polarisasi menunjukan densitas arus dan laju korosi terbesar diantara konsentrasi lain dimiliki oleh larutan asam klorida 0.5 M yaitu sebesar 1.302 A/cm2dan 0.074 mm/year.
Hasil ini menunjukan bahwa peningkatan nilai konsentrasi dari larutan asam klorida akan membuat nilai transfer muatan Rct menjadi semakin berkurang, namun meningkatkan densitas arus dan laju korosi dimana hal tersebut menandakan bahwa laju pelindian dari logam Cu pada Printed Circuit Board PCB semakin meningkat seiring dengan peningkatan konsentrasi dari larutan asam klorida.
<hr><i>The development of electronic waste processing industry in Indonesia is still very minimum and still uses conventional methods that are still classified as dangerous for the environment and human. Over time, various studies were conducted to solve the problem, one of which was the use of hydrochloric acid solution. In this research, experiments are performed using Printed Circuit Board as the sample,to see the electrochemical behaviour of Copper in chloride solution with concentration of 0.1 M, 0.2 M and 0.5 M using leaching, linear polarization and Electrochemical Impedance Spectroscopy EIS method.
The result of EIS test shows that the experiment of PCB Cu in 0.5 M chloride solution has the smallest diameter of semicircle curve among other chloride solution.Based on fitting results of Nyquist curve with equivalent circuit model, shows that the smallest Rct value among other concentration and immersion time held by 0.5 M Chloride Solution with 60 minutes of immersion time which is 0.33 x 103, then based on linear polarization test shows that the biggest current density and corrosion rate value among other chloride solution held by 0.5 M Chloride Solution which are 1.302 A cm2and 0.074 mm year.
These results shows that with the increase of concentration of chloride solution will decrease the value of charge transfer resistance Rct , but on the other hand will increase the current density and corrosion rate, and

can be concluded that recovery rate of Copper from Printed Circuit Board PCB increases along with the increase of concentration of Chloride Soluton.