

**ANOLYTE SOLUTION GENERATED FROM ELECTROCHEMICAL
ACTIVATION PROCESS FOR THE TREATMENT OF PHENOL**

By

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Studies on the treatment of an aqueous solution of phenol using anolyte solution generated from electrochemical activation process were carried out. The aim of the studies is to investigate the effectiveness of anolyte solution in treating 100, 200, and 500 mg/l of phenol in water solution. Kinetic parameters, such as reaction rate constant (k) and order of reaction (n) should be studied to determine rate of degradation of phenol by anolyte solution. The treatment was carried out on batch experiment.

The experimental procedures consist of five series of experiments. The first series is to study the effects of voltage current on the production of anolyte solution. The aim of the studies is to determine an optimum condition of voltage current to produce anolyte solution. The second series is to study the characteristics of anolyte solution. The aim of studies is to determine the composition of anolyte solution. The third series is to investigate the effects of

the addition of anolyte solution in treating 100 mg/l of phenol. The fourth series is to investigate the effects of initial concentration of phenol. The aim of the experiment is to propose mechanisms and kinetic rate degradation of phenol by anolyte solution. The last series is to investigate the effects of initial pH of sample on degradation of phenol.

Based on decreasing concentration of phenol and the consumption of chlorine, chloride, and chlorine dioxide, as well as the production of carbon dioxide, the effects of anolyte solution in the treatment of phenol have been obtained. The mechanisms and kinetic rate degradation of phenol have been also proposed well. The kinetic rate constant degradation of phenol has been found at 0.017269 for initial concentration of phenol 100 mg/l. And the removal of phenol by anolyte solution is more likely achieved in acid condition. This is because chlorine is slight effective to react in acid.

**Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Master Sains**

**LARUTAN ANOLYTE YANG DIHASILKAN DARI PROSES
ELEKTROKIMIA AKTIF UNTUK RAWATAN PHENOL**

Oleh

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Kajian ke atas kaedah rawatan suatu larutan phenol menggunakan larutan anolyte yang dihasilkan dari pada proses elektrokimia aktif telah dijalankan. Tujuan kajian ini adalah untuk menyelidiki keberkesanan larutan anolyte dalam merawat larutan phenol dengan kepekatan 100, 200, dan 500 mg/l. Penguji-ukur kinetic, seperti tetapan laju tindak balas (k) dan derjat tindak balas (n) telah dikaji untuk menentukan laju penguraian phenol oleh larutan anolyte. Rawatan dijalankan secara *batch experiment*.

Tahapan uji kaji terdiri dari lima peringkat uji kaji. Peringkat pertama adalah untuk mengkaji kesan-kesan dari volatge current terhadap larutan anolyte yang dihasilkan. Tujuan dari uji kaji ini adalah untuk menunjukkan suatu tahapan yang optimum dari penggunaan voltage current untuk menghasilkan larutan anolyte. Peringkat kedua dari uji kaji adalah untuk mengkaji sifat-sifat

dari larutan anolyte. Tujuan dari uji kaji ini adalah untuk memperolehi kandungan larutan anolyte. Peringkat ketiga uji kaji adalah untuk menyelidiki kesan-kesan dari penambahan larutan anolyte dalam merawat phenol 100 mg/l. Peringkat uji kaji keempat adalah untuk menyelidiki kesan-kesan dari kepekatan awal larutan phenol. Tujuan dari uji kaji ini adalah untuk mencadangkan tahapan-tahapan dan laju kinetik penguraian phenol oleh larutan anolyte. Peringkat terakhir uji kaji adalah untuk menyelidiki kesan-kesan pH awal dari larutan phenol.

Berdasarkan kepada pengurangan kepekatan larutan phenol dan banyaknya khlorin, khloraid, khlorindioksida yang diperlukan dan banyaknya karbondioksida yang dihasilkan, kesan-kesan dari larutan anolyte dalam merawat larutan phenol telah diperolehi. Tahapan-tahapan dan laju kinetik penguraian phenol juga telah dicadangkan dalam kajian ini. Tetapan kinetik laju penguraian phenol telah diperolehi 0.017269 untuk kepekatan larutan phenol 100 mg/l. Penguraian phenol oleh larutan anolyte adalah sedikit lebih mudah diperolehi dalam keadaan asid. Ini kerana khlorin lebih efektif bertindak balas dalam keadaan asid.

DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

ZAULFIKAR

Date:

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