

**PENGARUH PENGGUNAAN ADSORBEN DARI MODIFIKASI PERLIT
DENGAN CANGKANG PENSI TERHADAP PERUBAHAN NILAI BOD,
COD, DAN pH AIR SUNGAI BATANG MUARO KASANG**

SKRIPSI SARJANA KIMIA



Dosen Pembimbing I : Prof. Rahmaiana Zein, Ph.D

Dosen Pembimbing II : Dr. Zilfa M.S

**JURUSAN KIMIA
FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM
UNIVERSITAS ANDALAS
PADANG
2020**

INTISARI

PENGARUH PENGGUNAAN ADSORBEN DARI MODIFIKASI PERLIT DENGAN CANGKANG PENSI TERHADAP PERUBAHAN NILAI BOD, COD, DAN pH AIR SUNGAI BATANG MUARO KASANG

Oleh :

Risa Oktaviani (BP : 1610411036)

Prof. Rahmiana Zein, Ph.D*, Dr. Zilfa, M.S*

*Pembimbing

Proses penjernihan air sungai Batang Muaro Kasang, Kota Padang telah dilakukan menggunakan metode adsorpsi *batch* dengan adsorben dari modifikasi perlit dan cangkang pensi. Perlit dan cangkang pensi sebelum proses modifikasi, dipanaskan terlebih dahulu pada suhu 900°C untuk menambah jumlah pori sehingga meningkatkan kemampuan penyerapannya. Kondisi air sungai yang tercemar menyebabkan tingginya nilai BOD, COD, dan pH pada air sungai tersebut. Analisis parameter *Biological Oxygen Demand* (BOD), *Chemical Oxygen Demand* (COD), dan pH dilakukan sebelum dan sesudah adsorpsi. Berdasarkan hasil analisis, diperoleh kondisi optimum dari massa campuran modifikasi yaitu (20:15) g. Kemudian, berdasarkan variasi volume air sungai, diperoleh volume optimum yaitu 50 mL pada analisis BOD dan 100 mL pada analisis COD. Waktu kontak optimum yang diperoleh dari proses adsorpsi adalah 120 menit. Metode adsorpsi pada penjernihan air sungai tersebut mampu menurunkan nilai BOD dan COD sebesar 97,45% dan 58,54%, namun pH air sungai mengalami kenaikan dari 9 menjadi 11. Karakterisasi adsorben sebelum dan sesudah adsorpsi dilakukan menggunakan FTIR dan XRF. Hasil karakterisasi menggunakan FTIR menunjukkan adanya gugus $-\text{NH}_2$ pada angka gelombang $3638,72\text{ cm}^{-1}$ tetapi sesudah adsorpsi, gugus tersebut tidak muncul lagi. Karakterisasi menggunakan XRF menunjukkan peningkatan kandungan SiO_2 dari 46,314% menjadi 56,317% dan Al_2O_3 dari 7,531% menjadi 9,672% serta menurunnya kandungan CaO dari 38,655% menjadi 27,947%. Berdasarkan perubahan gugus fungsi dan komposisi kimia adsorben sebelum dan sesudah adsorpsi, menunjukkan bahwa telah terjadinya proses adsorpsi pada penjernihan air sungai.

Kata kunci : Adsorpsi, perlit, cangkang pensi, BOD, COD

ABSTRACT

THE EFFECT OF THE USE OF ADSORBENTS FROM MODIFICATION OF PERLITE WITH PENSI SHELL ON CHANGES IN BOD, COD, AND pH WATER VALUE OF BATANG MUARO KASANG RIVER

By :

Risa Oktaviani (BP : 1610411036)

Prof. Rahmiana Zein, Ph.D*, Dr. Zilfa, M.S*

*Supervisor

The process of purifying the water in the Batang Muaro Kasang river, Padang City has been carried out using the batch adsorption method with adsorbent from modified perlite and pensi shells. Perlite and pensi shell before the modification process, first heated at a temperature of 900°C to increase the number of pores so as to increase their absorption ability. The polluted river water condition causes high BOD, COD, and pH values in the river water. Analysis of the parameters of Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), and pH was performed before and after adsorption. Based on the results of the analysis, the optimum conditions for the mass of the modified mixture were (20:15) g. Then, based on variations in the volume of river water, the optimum volume was obtained, namely 50 mL for BOD analysis and 100 mL for COD analysis. The optimum contact time obtained from the adsorption process is 120 minutes. The adsorption method in river water purification was able to reduce the BOD and COD values by 97.45% and 58.54%, but the pH of river water increased from 9 to 11. Characterization of the adsorbent before and after adsorption was carried out using FTIR and XRF. The results of characterization using FTIR showed the presence of the -NH₂ group at the wave number 3638.72 cm⁻¹ but after adsorption, the group did not appear again. Characterization using XRF showed an increase in SiO₂ content from 46.314% to 56.317% and Al₂O₃ from 7.531% to 9.672% and a decrease in CaO content from 38.655% to 27.947%. Based on changes in the functional groups and chemical composition of the adsorbent before and after adsorption, it shows that the adsorption process has occurred in river water purification.

Keywords: Adsorption, perlite, pensi shell, BOD, COD