

**PROGRAM STUDI S1 KESEHATAN MASYARAKAT FAKULTAS
KESEHATAN DAN INFORMATIKA
INSTITUT KESEHATAN PAYUNG NEGERI PEKANBARU**

Penelitian, 03 Agustus 2026 Randi.M

**Efektivitas Karbon Aktif Tempurung Kelapa Dengan Variasi Massa
Absorben Terhadap Penurunan Kadar (*Chemical Oxygen Demand*) COD
Pada Air Limbah Domestik Rumah Tangga di RW 20 Kelurahan Sekupang
Kota Batam Tahun 2026**

xii + 44 Halaman + 7 Tabel + 9 Lampiran

ABSTRAK

Air limbah domestik rumah tangga, khususnya *greywater*, mengandung bahan organik yang dapat meningkatkan kadar *Chemical Oxygen Demand* (COD) dan berpotensi mencemari lingkungan apabila tidak dilakukan pengolahan. Salah satu metode yang dapat digunakan untuk menurunkan kadar COD adalah adsorpsi menggunakan karbon aktif tempurung kelapa. Penelitian ini bertujuan untuk mengetahui efektivitas karbon aktif tempurung kelapa sebanyak 20 gram dalam menurunkan kadar COD pada air limbah domestik rumah tangga di RW 20 Kelurahan Sekupang Kota Batam. Penelitian ini menggunakan desain eksperimen **pretest-posttest** pada satu kelompok. Sampel penelitian berjumlah 10 sampel air limbah domestik (*greywater*) yang diambil menggunakan teknik *grab sampling*. Masing-masing sampel memiliki volume 500 mL dan diberi perlakuan menggunakan karbon aktif tempurung kelapa sebanyak 20 gram dengan ukuran partikel 80 mesh dan waktu kontak 60 menit. Proses adsorpsi dilakukan dengan kecepatan pengadukan 400 rpm. Kadar COD diukur sebelum dan sesudah perlakuan menggunakan metode refluks tertutup secara spektrofotometri sesuai SNI 6989.2:2019. Hasil penelitian menunjukkan bahwa rata-rata kadar COD sebelum perlakuan sebesar **71,60 mg/L**, dengan nilai minimum 49 mg/L dan maksimum 91 mg/L. Setelah perlakuan menggunakan karbon aktif tempurung kelapa 20 gram, rata-rata kadar COD menurun menjadi **27,70 mg/L**, dengan nilai minimum 21 mg/L dan maksimum 45 mg/L. Rata-rata penurunan kadar COD sebesar **43,90 mg/L** dengan efisiensi penurunan sebesar **60,55%**. Hasil uji *Paired Sample t-test* menunjukkan nilai **t hitung = 9,386**, $df = 9$, dan nilai signifikansi **p = 0,000** ($p < 0,05$).

Kesimpulan: karbon aktif tempurung kelapa sebanyak 20 gram efektif menurunkan kadar COD pada air limbah domestik rumah tangga di RW 20 Kelurahan Sekupang Kota Batam.

Kata Kunci: karbon aktif tempurung kelapa, adsorpsi, COD, air limbah domestik, *greywater*.

UNDERGRADUATE PROGRAM OF PUBLIC HEALTH FACULTY OF
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Effectiveness of Coconut Shell Activated Carbon with Variations in Adsorbent Mass on the Reduction of Chemical Oxygen Demand (COD) Levels in Domestic Household Wastewater in RW 20, Sekupang Subdistrict, Batam City, 2026

xii + 44 Pages + 7 Tables + 9 Appendices

ABSTRACT

Domestic household wastewater, particularly *greywater*, contains organic matter that can increase *Chemical Oxygen Demand* (COD) levels and potentially cause environmental pollution if left untreated. One method that can be used to reduce COD levels is adsorption using coconut shell activated carbon. This study aimed to determine the effectiveness of 20 grams of coconut shell activated carbon in reducing COD levels in domestic household wastewater in RW 20, Sekupang Subdistrict, Batam City. This study used a **pretest-posttest experimental design** involving a single group. The study samples consisted of 10 domestic wastewater (*greywater*) samples collected using the *grab sampling* technique. Each sample had a volume of 500 mL and was treated with 20 grams of coconut shell activated carbon with a particle size of 80 mesh and a contact time of 60 minutes. The adsorption process was conducted at a stirring speed of 400 rpm. COD levels were measured before and after treatment using the closed reflux spectrophotometric method in accordance with SNI 6989.2:2019. The results showed that the average COD level before treatment was **71.60 mg/L**, with a minimum value of 49 mg/L and a maximum value of 91 mg/L. After treatment with 20 grams of coconut shell activated carbon, the average COD level decreased to **27.70 mg/L**, with a minimum value of 21 mg/L and a maximum value of 45 mg/L. The average reduction in COD level was **43.90 mg/L**, with a reduction efficiency of **60.55%**. The results of the *Paired Sample t-test* showed a **t-value of 9.386**, $df = 9$, and a significance value of **$p = 0.000$ ($p < 0.05$)**.

Conclusion: The use of 20 grams of coconut shell activated carbon was effective in reducing COD levels in domestic household wastewater in RW 20, Sekupang Subdistrict, Batam City.

Keywords: coconut shell activated carbon, adsorption, COD, domestic wastewater, *greywater*