

ABSTRAK

PENURUNAN KADAR BESI DAN MANGAN PADA AIR SUMUR GALI MENGGUNAKAN PASIR SILIKA DAN SABUT KELAPA SEBAGAI KARBON AKTIF

Nabilla Viesta Ningsih: Dibimbing oleh Drs. Guntar Marolop Saragih, M. Si dan Ir. Siti Umi Kalsum, S.T., M.Eng.

xiv + 65 halaman, 6 tabel, 10 gambar, 5 lampiran

ABSTRAK

Air sumur gali di beberapa wilayah sering mengandung kadar besi (Fe) dan mangan (Mn) yang melebihi ambang batas baku mutu menurut Peraturan Menteri Kesehatan RI Nomor 2 Tahun 2023, yakni $\text{Fe} \leq 0,2 \text{ mg/L}$ dan $\text{Mn} \leq 0,1 \text{ mg/L}$. Kandungan logam ini dapat menimbulkan perubahan warna, bau, rasa, serta menimbulkan endapan yang merusak peralatan rumah tangga. Penelitian ini bertujuan untuk menganalisis efektivitas media pasir silika serta karbon aktif dari sabut kelapa, baik aktivasi maupun non-aktivasi, dalam menurunkan kadar Fe dan Mn pada air sumur gali. Metode yang digunakan adalah eksperimen laboratorium dengan sistem filtrasi sederhana. Variasi media filtrasi terdiri dari pasir silika, karbon aktif sabut kelapa aktivasi menggunakan NaOH 3%, dan karbon aktif sabut kelapa non-aktivasi. Variasi waktu kontak yang diuji adalah 5, 15, dan 30 menit, masing-masing dilakukan tiga kali pengulangan. Sampel air uji berasal dari sumur gali di Perumahan Puri Masurai 5 Kota Jambi dengan kadar awal Fe 1,65 mg/L dan Mn 1,12 mg/L. Hasil penelitian menunjukkan bahwa karbon aktif sabut kelapa aktivasi mampu menurunkan kadar Fe dengan efektivitas 86,6–88,48% sehingga memenuhi baku mutu, tetapi efektivitas penurunan Mn hanya 43,75–54,46% dan belum memenuhi standar. Karbon aktif non-aktivasi memiliki efektivitas lebih rendah, yakni Fe sebesar 47,87–56,36% dan Mn sebesar 31,25–34,82%. Pasir silika terbukti paling efektif dengan efektivitas 98,18–99,39% untuk Fe dan 94,64–97,32% untuk Mn, sehingga kadar logam turun jauh di bawah baku mutu yang ditetapkan. Kesimpulannya, pasir silika merupakan media filtrasi paling efektif dalam menurunkan kadar besi dan mangan pada air sumur gali, sedangkan karbon aktif sabut kelapa aktivasi efektif hanya untuk Fe. Pemanfaatan sabut kelapa sebagai karbon aktif tetap potensial, namun perlu peningkatan kualitas melalui optimasi proses aktivasi.

Kata Kunci: Filtrasi, Pasir silika, Karbon aktif sabut kelapa, Besi (Fe), Mangan (Mn), Air sumur gali.

ABSTRACT

REDUCTION OF IRON AND MANGANESE LEVELS IN WELL WATER USING SILICA SAND AND COCONUT FIBER AS ACTIVATED CARBON

Nabilla Viesta Ningsih: Supervised by Drs. Guntar Marolop Saragih, M. Si and Ir. Siti Umi Kalsum, S.T., M.Eng.

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ABSTRAK

Dug wells water in several areas often contain iron (Fe) and manganese (Mn) levels that exceed the quality standard threshold according to the Regulation of the Minister of Health of the Republic of Indonesia Number 2 of 2023, namely $\text{Fe} \leq 0.2 \text{ mg/L}$ and $\text{Mn} \leq 0.1 \text{ mg/L}$. These metal contents can cause changes in color, odor, taste, and cause sediment that damages household appliances. This study aims to determine the effectiveness of silica sand media and activated carbon from coconut fiber, both activated and non-activated, in reducing Fe and Mn levels in dug well water. The method used is a laboratory experiment with a simple filtration system. The filtration media variations consist of silica sand, activated coconut fiber activated carbon using 3% NaOH, and non-activated coconut fiber activated carbon. The contact time variations tested were 5, 15, and 30 minutes, each repeated three times. The test water samples came from dug wells in the Puri Masurai 5 Housing Complex, Jambi City, with initial Fe levels of 1.65 mg/L and Mn of 1.12 mg/L. The results showed that coconut fiber activated carbon was able to reduce Fe levels with an effectiveness of 86.6–88.48%, thus meeting the quality standards. However, the effectiveness of reducing Mn was only 43.75–54.46% and did not meet the standards. Non-activated activated carbon had lower effectiveness, namely Fe of 47.87–56.36% and Mn of 31.25–34.82%. Silica sand proved to be the most effective with an effectiveness of 98.18–99.39% for Fe and 94.64–97.32% for Mn, so that metal levels fell far below the established quality standards. In conclusion, silica sand is the most effective filtration media in reducing iron and manganese levels in dug well water, while activated coconut fiber activated carbon is effective only for Fe. The use of coconut fiber as activated carbon remains potential, but quality improvement is needed through optimization of the activation process.

Keywords : *Filtration, Silica sand, Coconut fiber activated carbon, Iron (Fe), Manganese (Mn), Dug well water.*