

UTILIZATION OF CLAY, CASSAVA PEEL, AND TEA DREGS AS ADSORBENT MEDIA ON HARDNESS LEVELS OF DUG WELL WATER IN PANJANGAN HAMLET, SENDANGSARI, PAJANGAN, BANTUL

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ABSTRACT

Background of study : According to the National Standardization Agency of Indonesia (BSN), water hardness is one of the essential quality parameters of water. Based on the World Health Organization (WHO) standards (2009), water with a hardness level exceeding 180 mg/L is classified as very hard. A preliminary study conducted in Panjangan, Bantul, revealed that the hardness level of groundwater from dug wells reached 250.25 mg/L, indicating need for treatment. Clay possesses a high surface area and cation exchange capacity, cassava peels are rich in carbon, and used tea leaves contain cellulose and lignin—compounds that contribute to the reduction of water hardness. Local residents reported a sore throat after drinking from the well water, and several elderly residents also experienced kidney stones after consuming well water that had high hardness levels over an extended period.

Aim of study : To determine the potential of clay, cassava peel, and tea waste as granular adsorbent media for reducing the hardness of dug well water in Panjangan, Sendangsari, Pajangan, Bantul.

Research method : This study employed a quasi-experimental design, using a pre-test–post-test design with a control group.

Results : Through descriptive analysis based on the comparison of average reductions, Filters A and C demonstrated better performance, with the highest decreases in hardness levels recorded at 195.585 mg/L and 164.59 mg/L, respectively. However, analytical testing showed that none of the three filters were statistically effective ($p\text{-value} = 0.171 > 0.05$), indicating no significant difference among the three filter types. Nevertheless, when compared to the WHO standard, the treated water from all three filtration systems met the quality threshold of 180 mg/L.

Conclusion : While Filters A and C performed better in the descriptive analysis, the analytical results indicated no statistically significant differences among Filters A, B, and C.

Keywords : cassava peel, water filtration, water hardness, tea waste

PEMANFAATAN TANAH LIAT, KULIT SINGKONG, DAN AMPAS TEH
SEBAGAI MEDIA ADSORBEN TERHADAP KADAR KESADAHAN AIR
SUMUR GALI DI PADUKUHAN PANJANGAN, SENDANGSARI,
PAJANGAN, BANTUL

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INTISARI

Latar Belakang : Menurut BSN (2002), Salah satu parameter air bersih penting ialah kesadahan. Berdasarkan WHO (2009), air dengan kesadahan > 180 mg/L tergolong sangat sadah. Studi pendahuluan di Padukuhan Panjangan, Bantul, menunjukkan kesadahan air sumur gali mencapai 250,25 mg/L maka perlu pengolahan. Tanah liat memiliki luas permukaan dan kapasitas tukar kation tinggi, kulit singkong kaya karbon, dan ampas teh mengandung selulosa serta lignin yang mendukung penurunan kadar kesadahan. Warga sekitar mengeluhkan sakit tenggorokan setelah meminum air sumur gali, beberapa warga yang sudah lanjut usia juga mengalami sakit batu ginjal setelah mengonsumsi air dari sumur gali yang mengandung kadar kesadahan yang tinggi dalam jangka waktu yang panjang.

Tujuan : Mengetahui tanah liat, kulit singkong, dan ampas teh dapat dimanfaatkan sebagai media adsorben granul untuk menurunkan kadar kesadahan air sumur gali di Padukuhan Panjangan, Sendangsari, Pajangan, Bantul.

Metode : Penelitian ini menggunakan jenis penelitian *quasi experiment*, desain penelitian menggunakan *pre test – post test design with control group*.

Hasil : Melalui uji deskriptif dari perbandingan rata-rata pengukuran melalui selisih penurunan, didapatkan hasil filter yang lebih baik ialah filter A dan C, dengan penurunan terbanyak sejumlah 195,585 mg/L dan 164,59 mg/L. Sedangkan uji analitik menunjukkan dari ketiga jenis filter tidak terdapat filter yang efektif ($p \text{ value} = 0,171 > 0,05$) maka tidak terdapat perbedaan yang signifikan dari ketiga jenis filter. Meski demikian jika dibandingkan dengan WHO maka hasil pengolahan dari ketiga filtrasi sudah memenuhi baku mutu sebesar 180 mg/L.

Kesimpulan : Filter A dan C teruji lebih baik secara deskriptif, namun secara analitik baik dari filter A, B, dan C tidak terdapat perbedaan yang signifikan.

Kata Kunci : ampas teh, filtrasi air, kesadahan air, kulit singkong, tanah liat