

**PENGGUNAAN ZEOLIT ALAM SEBAGAI MATERIAL FILTER UNTUK  
PENGOLAHAN AIR TANAH SEBAGAI SUMBER AIR BERSIH DI  
LAPANGAN PERTAMBANGAN TRADISIONAL MINYAK BUMI SUMUR  
TUA WONOCOLO, KECAMATAN KEDEWAN, KABUPATEN  
BOJONEGORO JAWA TIMUR**

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**INTISARI**

Eksplorasi dan eksploitasi minyak bumi masih terus dilakukan baik secara modern maupun secara tradisional, salah satunya di pertambangan minyak bumi tradisional sumur tua yang terletak di desa Wonocolo, Kecamatan Kedewan, Kabupaten Bojonegoro. Secara kasat mata, kegiatan eksploitasi minyak bumi di sumur tua Wonocolo nampak mencemari airtanah. Tetapi airtanah di daerah penelitian masih dapat digunakan warga, terlihat segar, dan tidak mengandung minyak. Hal tersebut dapat dikaitkan dengan daerah terdapatnya cekungan minyak dan gas bumi yang umumnya berasosiasi dengan batuan sedimen sebagai *caprock* daerah tersebut. Sehingga airtanah belum tentu tercemar kegiatan eksploitasi minyak bumi melainkan dapat terjadi karena pelarutan penyusun alami daerah tersebut. Sehingga penting untuk dilakukan pengujian kualitas air sekaligus pengolahan filter sederhana memanfaatkan efektifitas zeolit alam sebagai material untuk penyaringan airtanah karena diketahui zeolit alam merupakan adsorben yang sangat baik.

Pengambilan data airtanah menggunakan metode Purposive Sampling. untuk dilakukan uji pengamatan fisik berupa warna Bau, Kekeruhan, TDS dan rasa. Sedangkan analisis unsur kimia yang diuji berupa DHL, kesadahan, minyak lemak, Mg, Cl, dan Na Hasil uji laboratorium menunjukkan bahwa beberapa sumur airtanah memiliki nilai TDS, DHL dan Kesadahan yang tinggi. Untuk itu airtanah tersebut diberikan arahan pengelolaan menggunakan metode water filter treatment dengan melakukan percobaan melihat seberapa besar efektifitas zeolit alam sebagai adsorben mampu menurunkan kadar dari parameter-parameter tersebut hingga sesuai dengan kadar yang diperbolehkan. Filter dibuat dengan 3 ukuran zeolit yang berbeda yaitu 0,1 cm, 0,3 cm, dan 0,5 cm dengan waktu tinggal 90 menit.

Hasil penelitian menunjukkan tingginya nilai TDS, DHL dan Kesadahan tersebut dikarenakan airtanah yang muncul ke permukaan berasal dari celah-celah batuan induknya yaitu napal sedangkan kandungan minyak lemak dan fenol berada pada standar baku mutu yang telah ditetapkan. Pengolahan airtanah dengan filter zeolit alam mampu menurunkan kadar TDS dengan efektifitas sebesar 79,76%, DHL sebesar 67,68% dan kesadahan sebesar 74,84% yang dihasilkan oleh filter zeolit dengan ukuran 0,1 cm. hal tersebut terjadi karena luas permukaannya yang besar sehingga layak untuk dijadikan material pengolahan air bersih siap pakai di daerah penelitian.

**Kata Kunci: Pertambangan Minyak Bumi, Air Limbah, Adasorben, Zeolit Alam, Water Filter Treatmet**

**THE USE OF NATURAL ZEOLITE AS FILTER MATERIAL  
FOR GROUND WATER AS FRESH WATER TREATMENT  
IN TRADITIONAL PETROLEUM MINING FIELD OF WONOCOLO OLD  
WELLS, KEDEWAN SUB-DISTRICT, BOJONEGORO REGENCY, EAST  
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**ABSTRACT**

The exploration and exploitation of petroleum is still being done both in modern and traditional ways, one of which is in traditional petroleum mining of old wells located in Wonocolo village, Kedewan sub-district, Bojonegoro regency. Visually, the petroleum exploitation activities in the old wells Wonocolo appears to pollute the environment, especially the groundwater. However, it simply cannot be inferred because the groundwater in this area still can be used, fresh, and contain no oil. It can be associated with multiple areas of oil and gas basins that are generally associated with sedimentary rocks as caprock. So the groundwater are not necessarily contaminated by the petroleum exploitation activities but because of the dissolving of the natural rocks of this area. Therefore, it is important to do water quality testing and simple filter processing at once using the effectiveness of natural zeolite as the material for groundwater filtration since natural zeolite is known as a very good adsorbent.

The data collection of groundwater used Purposive Sampling method. The physical observation tests are in the form of color, odor, turbidity, TDS, and taste, while the analyses of chemical elements are in the form of electrical conductivity, hardness, fat oil, Mg, Cl, and Na. The results of laboratory tests showed that some groundwater wells have high TDS, electrical conductivity, and hardness values. Therefore, that groundwater was given management directives using water filter treatment method by conducting an experiment to see how much the effectiveness of natural zeolite as the adsorbent is able to reduce the level of these parameters until it is in accordance with the allowable level. Filters were made with three different zeolite sizes which are 0.1 cm, 0.3 cm, and 0.5 cm with 90 minute residence time.

The results show that high TDS, electrical conductivity, and hardness values are due to groundwater emerging to the surface comes from the crevices of the parent rock which is marlstone, while fat and phenol oil content is in the quality standard that has been set. Groundwater treatment with natural zeolite filter is able to decrease TDS level with effectiveness of 79.76%, electrical conductivity of 67.68% and hardness of 74.84% by using zeolite filter with the size of 0.1 cm. It occurs because of its large surface area so it is feasible to be used as a ready-to-use water treatment material in the research area.

**Keywords: Petroleum Mining, Waste Water, Adsorbent, Natural Zeolite, Water Filter Treatment**