

Zeolite, Resin, and Silica Sand Filter Models in Reducing Iron (Fe) Levels in Well Water in Plumbon Hamlet, Sindumartani, Ngemplak, Sleman

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ABSTRACT

Background: Clean water is one of the essential needs that affects public health. Poor water quality can cause various diseases to emerge. Well water in Plumbon Hamlet, Sindumartani, Ngemplak, Sleman is known to contain iron (Fe) levels exceeding the quality standard, causing various problems such as turbidity, iron odor, and being inadequate for daily use. The results of a preliminary study conducted in December 2025 showed that the iron (Fe) content in the well water reached 2 mg/l, exceeding the quality standard set by the Indonesian Minister of Health Regulation Number 2 of 2023, which is 0.2 mg/l. Filtration using Zeolite, Resin, and Silica Sand media can be a solution for reducing iron levels in water. Therefore, a proper filtration device is needed.

Objective: To determine the effectiveness of zeolite, resin, and silica sand filter models in reducing iron (Fe) levels in well water in Plumbon Hamlet, Sindumartani, Ngemplak, Sleman.

Method: This research uses a quasi-experimental method with a pretest-posttest without control research design. The research sample consists of 3 treatments for each use of resin, zeolite, and silica sand filter media. The flow rate used is 500 ml/minute. The object of this research is dug well water in Plumbon hamlet, Sindumartani, Ngemplak.

Results: The filtration results using zeolite media demonstrated a reduction in iron (Fe) levels from an average of 3.44 mg/l to 1.54 mg/l, yielding a decrease of 1.90 mg/l with a reduction percentage of 55.2%. In the resin filter media, iron levels decreased from 1.84 mg/l to 1.10 mg/l, resulting in an average difference of 0.74 mg/l and a reduction percentage of 40.2%. Meanwhile, the use of silica sand media reduced iron levels from an average pre-test value of 2.26 mg/l to 1.48 mg/l, producing a difference of 0.78 mg/l and a reduction percentage of 34.5%.

Conclusion: The zeolite filter demonstrated the highest effectiveness in reducing iron (Fe) levels with the largest percentage of 55.2%. However, the filtration results from all three media still exceeded the threshold value in accordance with the Minister of Health Regulation Number 2 of 2023.

Keywords: Water quality, iron (Fe), filtration, zeolite, resin, silica sand

MODEL FILTER ZEOLIT, RESIN, DAN PASIR SILIKA DALAM MENURUNKAN KADAR BESI (Fe) AIR SUMUR DI DUSUN PLUMBON SINDUMARTANI NGEMPLAK SLEMAN

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ABSTRAK

Latar Belakang: Air bersih adalah salah satu kebutuhan yang berpengaruh terhadap kesehatan masyarakat. Kualitas air yang buruk dapat menyebabkan berbagai penyakit muncul. Air sumur di Dusun Plumbon, Sindumartani Ngemplak, Sleman diketahui memiliki kandungan besi (Fe) melebihi baku mutu sehingga menimbulkan berbagai masalah seperti keruh, bau besi, dan kurang layak digunakan untuk kebutuhan sehari-hari. Hasil dari studi pendahuluan pada Desember 2025 menunjukkan kadar besi (Fe) pada air sumur mencapai 2 mg/l, melebihi baku mutu Permenkes RI Nomor 2 tahun 2023 yaitu 0,2 mg/l. Filtrasi menggunakan media Zeolit, Resin, dan pasir silika dapat menjadi Solusi pengurangan kadar besi pada air. oleh karena itu dibutuhkan alat filtrasi yang baik.

Tujuan : Mengetahui model filter zeolite, resin dan pasir silika dalam menurunkan kadar besi (Fe) air Sumur di dusun Plumbon, Sindumartani, Ngemplak, Sleman

Metode: Jenis penelitian ini menggunakan metode *quasi eksperiment* dengan desain penelitian pretest-posttest *without control*. Sampel penelitian ini adalah dengan 3 perlakuan pada setiap penggunaan media filter resin, zeolit, dan pasir silika. Debit aliran yang digunakan adalah 500 ml/menit. Obyek penelitian ini adalah air sumur gali di dusun Plumbon, Sindumartani, Ngemplak.

Hasil: Dari hasil filtrasi menggunakan media zeolite mampu menurunkan kadar besi dari rata-rata 3,44 mg/l menjadi 1,54 mg/l. sehingga selisih penurunannya 1,90 mg/l, dan presentase penurunan kadar besi (Fe) sebesar 55,2%. Pada media resin, kadar besi menurun dari 1,84 mg/l menjadi 1,10 mg/l, sehingga rata-rata selisih sebesar 0,74 mg/l dan presentase penurunan yang dihasilkan 40,4%. Untuk penggunaa media pasir silika menurunka kadar besi rata-rata pre-test sebesar 2,26 mg/l, menjadi 1,48 mg/l. sehingga selisih sebesar 0,78 dan presentase penurunan sebesar 34,4%.

Kesimpulan: Filter zeolit mampu menurunkan kadar besi (Fe) paling banyak dengan presentase terbesar yaitu 55,2%. Namun hasil filtrasi masih di atas nilai ambang batas sesuai dengan Peraturan Menteri Kesehatan Nomor 2 Tahun 2023.

Kata kunci : Kualitas air, besi (Fe), Filtrasi, Zeolit, Resin, dan Pasir silika.