ABSTRAK
PENGARUH TEKANAN OPERASI PADA UNIT PENGOLAHAN AIR MINUM KAPASITAS 100 GALLON PER HARI BERBASIS *DOUBLE MEMBRAN SILVERTEC*

(Febriyanti, 2025: 38 halaman, 6 Tabel, 16 Gambar)

Air merupakan elemen esensial dalam berbagai sektor industri. Air yang digunakan manusia untuk memenuhi kebutuhan sehari-hari wajib memenuhi standar baku mutu yang telah ditetapkan, Ketentuan mengenai air minum isi ulang yang layak untuk dikonsumsi telah diatur dalam Peraturan Menteri Kesehatan No.2 Tahun 2023 tentang Persyaratan Kualitas Air Minum. Persyaratan air minum aman bagi kesehatan apabila memenuhi persyaratan fisika, mikrobiologis, kimiawi dan radioaktif. Penelitian ini bertujuan untuk menganalisis kualitas air hasil olahan sistem *reverse osmosis* (RO) berbasis *double membran Silvertec* ULP serta mengevaluasi pengaruh variasi tekanan operasi terhadap fluks permeate dan efisiensi rejeksi zat. Parameter yang diuji meliputi TDS, Fe^{2+}, Mn^{2+}, Cl^{-}, dan NO_2^{-}, dengan acuan standar baku mutu air minum menurut Permenkes No. 2 Tahun 2023. Penelitian dilakukan di Laboratorium Teknik Energi Politeknik Negeri Sriwijaya dengan metode eksperimen menggunakan air PDAM sebagai air baku. Pengujian dilakukan pada variasi tekanan 3–8 bar. Hasil penelitian menunjukkan bahwa sistem RO mampu menghasilkan air olahan dengan kualitas yang memenuhi standar, dengan nilai TDS sebesar 23 mg/L, Fe^{2+} 0,0054 mg/L, dan Mn^{2+} 0,0018 mg/L pada tekanan optimal 6 bar. Fluks permeate meningkat seiring waktu, mencapai maksimum 23,8 L/m²·menit pada tekanan 8 bar. Efisiensi rejeksi terbaik tercapai pada tekanan 6 bar: Fe^{2+} sebesar 97,2%, Cl^{-} 92%, Mn^{2+} 92%, NO_2^{-} 98,4%, dan TDS 92,3%. Sistem *reverse osmosis* (RO) terbukti efektif dalam memproduksi air minum siap konsumsi.

Kata Kunci : *Reverse osmosis*, Tekanan Operasi, Air Minum, Membran.

ABSTRACT

DRINKING WATER PROCESSING CAPACITY OF 100 GALLONS PER DAY BASED ON DOUBLE MEMBRANE SILVERTEC

(Febriyanti, 2025: 38 Pages, 6 Tables, 9 Figures)

Water is an essential element in various industrial sectors. Water used by humans to meet daily needs must meet the established quality standards. The provisions regarding safe drinking water for consumption are outlined in the Minister of Health Regulation No. 3 of 2023 concerning the Quality Requirements for Drinking Water. Safe drinking water for health must meet physical, microbiological, chemical, and radioactive requirements. This study aims to analyze the quality of water processed through a double membrane Silvertec ULP reverse osmosis (RO) system and evaluate the effect of working pressure variation on permeate flux and rejection efficiency. The parameters tested include TDS, Fe^{2+}, Mn^{2+}, Cl^{-}, and NO_2^{-}, referencing the drinking water quality standards according to the Minister of Health Regulation No. 2 of 2023. The research was conducted at the Energy Engineering Laboratory of Sriwijaya State Polytechnic using experimental methods with PDAM water as the raw water source. The testing was conducted at pressure variations of 3–8 bar. The research results showed that the RO system was able to produce treated water of a quality that meets standards, with a TDS value of 23 mg/L, Fe^{2+} 0.0054 mg/L, and Mn^{2+} 0.0018 mg/L at an optimal pressure of 6 bar. The permeate flux increased over time, reaching a maximum of 23.8 L/m²·minute at 8 bar. The best rejection efficiency was achieved at 6 bar: Fe^{2+} 97.2%, Cl^{-} 92%, Mn^{2+} 92%, NO_2^{-} 98.4%, and TDS 92.3%. The RO system has proven effective in producing clean water ready for consumption.

Keywords: Reverse osmosis, Operating Pressure, Drinking Water, Membrane.