

RINGKASAN

Analisa Pengaruh Fermentasi dan Penambahan MgSO_4 terhadap Karakteristik Elektrolit dan Kinerja BioBaterai Berbasis Sari Jeruk Nipis (*Citrus Auantiifolia*).

(Devi Anggraini, 2026, 73 Halaman, 12 Tabel, 9 Gambar)

Peningkatan kebutuhan energi mendorong pengembangan bio-baterai berbasis bahan alami sebagai sumber energi alternatif yang ramah lingkungan. Penelitian ini bertujuan menganalisis pengaruh fermentasi dan penambahan magnesium sulfat (MgSO_4) terhadap karakteristik elektrolit dan kinerja bio-baterai berbasis sari jeruk nipis (*Citrus aurantiifolia*). Penelitian dilakukan secara eksperimen menggunakan variasi waktu fermentasi dan volume MgSO_4 dengan elektroda seng (Zn) dan tembaga (Cu). Parameter yang diamati meliputi pH, konduktivitas, tegangan, arus, daya, dan durasi nyala LED biru.

Hasil penelitian menunjukkan bahwa fermentasi menurunkan pH sari jeruk nipis dari 3 menjadi 2, sedangkan setelah penambahan MgSO_4 pH larutan menjadi 3. Kinerja terbaik diperoleh pada fermentasi hari ke-6 dengan penambahan MgSO_4 sebanyak 75 mL yang menghasilkan konduktivitas 12,28 mS/cm, tegangan 12,17 V, arus 20,17 mA, daya 245,67 mW, serta mampu menyalakan LED biru selama 410 menit. Hasil tersebut menunjukkan bahwa fermentasi dan penambahan MgSO_4 meningkatkan karakteristik elektrolit serta kinerja bio-baterai berbasis sari jeruk nipis.

Kata Kunci: Bio-baterai, jeruk nipis, fermentasi, magnesium sulfat, konduktivitas.

ABSTRACT

Analysis of the Effect of Fermentation and Magnesium Sulfate (MgSO₄) Addition on Electrolyte Characteristics and Bio-battery Performance Based on Lime Juice (*Citrus aurantiifolia*)

(Devi Anggraini, 2026, 73 Pages, 12 Tables , 9 Figures)

The increasing demand for energy has encouraged the development of bio-batteries using natural materials as environmentally friendly alternative energy sources. This study aimed to analyze the effect of fermentation and magnesium sulfate (MgSO₄) addition on the electrolyte characteristics and performance of a lime juice (*Citrus aurantiifolia*) bio-battery. An experimental method was conducted using different fermentation periods and MgSO₄ volumes with zinc (Zn) and copper (Cu) electrodes. The observed parameters included pH, conductivity, voltage, current, power, and blue LED illumination duration.

The results showed that fermentation decreased the pH of lime juice from 3 to 2, while the addition of MgSO₄ increased the pH to 3. The best performance was obtained after 6 days of fermentation with 75 mL MgSO₄, producing a conductivity of 12.28 mS/cm, voltage of 12.17 V, current of 20.17 mA, power of 245.67 mW, and a blue LED illumination duration of 410 minutes. These findings indicate that fermentation and MgSO₄ addition improved the electrolyte characteristics and enhanced the performance of the lime juice-based bio-battery.

Keywords: Bio-battery, *Citrus aurantiifolia*, fermentation, magnesium sulfate (MgSO₄), conductivity.