ABSTRAK

PEMANFAATAN JERUK (*CITRUS SINENSIS)* DENGAN PENAMBAHAN NATRIUM KARBONAT (Na_2CO_3) DALAM PEMBUATAN BIO-BATERAI UNTUK SUMBER ENERGI ALTERNATIF

(Iqbal Bramantio, 2025, 9 Tabel, 21 Gambar, 4 Lampiran)

Krisis energi global mendorong perlunya pengembangan sumber energi alternatif yang ramah lingkungan dan berkelanjutan. Penelitian ini bertujuan untuk memanfaatkan sari jeruk (*Citrus Sinensis*) sebagai larutan elektrolit dalam pembuatan bio-baterai serta menganalisis pengaruh penambahan natrium karbonat (Na_2CO_3) dengan variasi konsentrasi terhadap performa bio-baterai. Parameter yang diamati meliputi tegangan, arus, daya, pH, dan konduktivitas larutan. Penelitian dilakukan secara eksperimen laboratorium menggunakan *BioChamber* dengan elektroda tembaga (Cu) sebagai katoda dan aluminium (Al) sebagai anoda. Hasil penelitian menunjukkan bahwa kondisi optimum diperoleh pada konsentrasi Na_2CO_3 0,5 M dan volume sari jeruk 200 ml, dengan pH 5, tegangan 6,45 V, arus 30,89 mA, daya 199,24 mW, dan waktu nyala LED ±356 menit. Konsentrasi Na_2CO_3 yang terlalu tinggi 1 dan 2 M menurunkan performa akibat pH larutan yang terlalu basa, sehingga menghambat reaksi elektrokimia. Bio-baterai jeruk dan Na_2CO_3 berpotensi sebagai sumber energi alternatif yang ekonomis dan ramah lingkungan.

Kata Kunci: Energi Alternatif, Bio-baterai, Jeruk, Natrium Karbonat

ABSTRACT

UTILIZATION OF ORANGE (CITRUS SINENSIS) WITH THE ADDITION OF SODIUM CARBONATE (Na_2CO_3) IN THE FABRICATION OF BIO-BATTERIES AS AN ALTERNATIVE ENERGY SOURCE

(Iqbal Bramantio, 2025, 9 Tables, 21 Figures, 4 Appendixs)

The global energy crisis has prompted the need to develop environmentally friendly and sustainable alternative energy sources. This study aims to utilize orange juice (Citrus Sinensis) as an electrolyte solution in the manufacture of bio-batteries and to analyze the effect of adding sodium carbonate (Na_2CO_3) at varying concentrations on the performance of bio-batteries. The parameters observed include voltage, current, power, pH, and solution conductivity. The study was conducted experimentally in a laboratory using a BioChamber with copper (Cu) electrodes as the cathode and aluminum (Al) as the anode. The results showed that optimal conditions were achieved at a Na_2CO_3 concentration of 0.5 M and an orange juice volume of 200 ml, with a pH of 5, voltage of 6.45 V, current of 30.89 mA, power of 199.24 mW, and LED runtime of ±356 minutes. Concentrations of Na_2CO_3 that are too high (1 and 2 M) reduce performance due to the solution's overly basic pH, thereby inhibiting electrochemical reactions. Orange bio-batteries and Na_2CO_3 have the potential to serve as an economical and environmentally friendly alternative energy source.

Keywords: *Alternative Energy, Bio-battery, Orange, Sodium Carbonate*