

ABSTRAK

PEMANFAATAN SILIKA BERBASIS LIMBAH SEKAM PADI DAN JERAMI PADI SEBAGAI ADSORBEN ZAT WARNA *METHYLENE BLUE*

(Eci Septiani, 2026, 55 Halaman, 7 Tabel, 11 Gambar, 3 Lampiran)

Limbah pertanian berupa sekam padi dan jerami padi memiliki kandungan silika yang tinggi sehingga berpotensi dimanfaatkan sebagai bahan baku silika gel. Penelitian ini bertujuan memanfaatkan silika dari sekam padi dan jerami padi sebagai adsorben zat warna *methylene blue*. Silika gel dibuat menggunakan metode sol-gel melalui ekstraksi dengan larutan NaOH 2,5 M dan pengasaman menggunakan H₂SO₄. Karakterisasi dilakukan menggunakan *Fourier Transform Infrared Spectroscopy* (FTIR) dan *X-Ray Diffraction* (XRD). Hasil FTIR menunjukkan adanya gugus siloksan (Si–O–Si) dan silanol (Si–OH), sedangkan hasil XRD menunjukkan bahwa silika gel yang dihasilkan memiliki struktur amorf. Silika gel kemudian diaplikasikan sebagai adsorben *methylene blue* dengan variasi massa adsorben dan waktu kontak. Hasil penelitian menunjukkan bahwa semakin lama waktu kontak, persen adsorpsi cenderung meningkat hingga mencapai kondisi optimum. Analisis isoterm adsorpsi menunjukkan bahwa proses adsorpsi *methylene blue* lebih sesuai mengikuti model isoterm Freundlich.

Kata Kunci: Sekam Padi, Jerami Padi, Silika Gel, Adsorpsi, *Methylene Blue*.

ABSTRACT

UTILIZATION OF SILICA DERIVED FROM RICE HUSK AND RICE STRAW WASTE AS AN ADSORBENT FOR METHYLENE BLUE DYE

(Eci Septiani, 2026, 55 Pages, 7 Tables, 11 Figures, 3 Appendices)

Agricultural wastes such as rice husk and rice straw contain high silica content and therefore have the potential to be utilized as raw materials for silica gel production. This study aimed to utilize silica derived from rice husk and rice straw as an adsorbent for methylene blue dye. Silica gel was prepared using the sol-gel method through extraction with 2.5 M NaOH solution followed by acidification using H₂SO₄. Characterization was carried out using Fourier Transform Infrared Spectroscopy (FTIR) and X-Ray Diffraction (XRD). The FTIR results indicated the presence of siloxane (Si–O–Si) and silanol (Si–OH) functional groups, while the XRD analysis showed that the produced silica gel had an amorphous structure. The silica gel was subsequently applied as an adsorbent for methylene blue with variations in adsorbent mass and contact time. The results showed that increasing the contact time tended to increase the adsorption percentage until optimum conditions were achieved. Adsorption isotherm analysis revealed that the adsorption process of methylene blue was better described by the Freundlich isotherm model.

Keywords: Rice Husk, Rice Straw, Silica Gel, Adsorption, Methylene Blue.