

**ISOLASI LIGNIN DARI SERAT SABUT KELAPA
DENGAN MASERASI MENGGUNAKAN NaOH DAN APLIKASINYA
SEBAGAI ANTIOKSIDAN PADA KOMPON KARET ALAM**

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INTISARI

Isolasi lignin dari serat sabut kelapa dengan maserasi alkali dan aplikasinya sebagai antioksidan pada kompon karet alam telah dilakukan. Maserasi lignin dilakukan menggunakan larutan NaOH yang divariasi konsentrasinya (2, 4, 6, dan 8%), kemudian dipresipitasi dengan larutan H₂SO₄. Lignin hasil isolasi dikarakterisasi gugus fungsi, stabilitas termal, dan morfologinya, serta diuji aktivitas antioksidan dengan 2,2-difenil-1-pikrihidrazil (DPPH). Bahan kompon karet dicampur menggunakan *two roll mixing mill*. Kompon karet diuji dengan rheometer, kemudian divulkanisasi. Vulkanisat karet diuji sifat mekanik meliputi kekerasan, kuat tarik, kuat sobek, serta perpanjangan putus sebelum dan setelah pengusangan selama 24, 48, 72, 96, 120, 144, dan 168 jam pada temperatur 100 °C.

Dari hasil penelitian, diperoleh padatan lignin berwarna coklat. Rendemen lignin meningkat dengan peningkatan konsentrasi NaOH dan mencapai maksimum pada NaOH 6% (18,30%). Aktivitas antioksidan lignin lebih tinggi dari 2,2,4-trimetil-1,2-*H*-dihidrokuinolin (TMQ) dan lignin NaOH 6% memiliki aktivitas antioksidan tertinggi (1.225,81 mg g⁻¹ ionol ekuivalen). Penambahan lignin ke karet alam (NR) meningkatkan waktu pematangan, namun masih memberikan kerapatan ikatan silang yang sebanding. Retensi kuat tarik dan kuat sobek lignin-NR lebih tinggi dari TMQ-NR, sedangkan perpanjangan putus menunjukkan nilai retensi yang lebih rendah. Lignin tidak memberikan efek negatif terhadap kekerasan. Temuan ini menunjukkan bahwa lignin berpotensi menggantikan TMQ dalam matriks NR.

Kata kunci: antioksidan, karet alam, lignin, maserasi, serat sabut kelapa.

***ISOLATION OF LIGNIN FROM COCONUT COIR
BY MACERATION USING NaOH AND ITS APPLICATION
AS ANTIOXIDANT IN NATURAL RUBBER COMPOUND***

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ABSTRACT

Isolation of lignin from coconut coir through soda maceration and its application as antioxidant in natural rubber compound has been carried out. Maceration of lignin was performed using NaOH solution with various concentration (2, 4, 6, and 8%), then precipitated using H₂SO₄ solution. The functional group, thermal stability, and morphology of lignin were characterized, and the antioxidant activity was investigated using DPPH method. The materials of the rubber compound were mixed with two roll mixing mill. The rubber compound was tested with a rheometer, then vulcanized. Mechanical properties of rubber vulcanizate samples such as hardness, tensile strength, tear strength, and elongation at break, were tested before aging and after aging for 24, 48, 72, 96, 120, 144, and 168 hours at 100 °C.

The results showed that the lignin had brown colour. The yield of lignin increasing by increasing of NaOH solution concentration and reach maximum at 6% NaOH (18.30%). The isolated lignin showed higher activity in comparison to TMQ. The highest antioxidant activity was provided by lignin of 6% NaOH (1,225.81 mg g⁻¹ equivalent ionol). Incorporation of lignin into NR had slightly increased the curing time, however it gave comparable crosslink density. The tensile strength and tear strength retention of lignin-NR compound was higher than TMQ-NR compound, while elongation at break exhibited lower retention value. Lignin did not have a negative effect on hardness. These results indicated that the isolated lignin was possible to substitute the TMQ in NR matrix.

Key words: antioxidant, coconut coir, lignin, maceration, natural rubber.