

**PENGARUH TEMPERATUR PIROLISIS TERHADAP KARAKTERISTIK
ARANG DARI LIMBAH FILTER ROKOK SERTA APLIKASINYA
SEBAGAI ADSORBEN KROMIUM(VI) DAN BIRU METILEN**

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INTISARI

Pengaruh temperatur pirolisis terhadap karakteristik arang dari limbah filter rokok serta aplikasinya sebagai adsorben kromium(VI) dan biru metilen telah berhasil diteliti. Tujuan dari penelitian ini adalah mengetahui pengaruh temperatur pirolisis pada limbah filter rokok terhadap karakteristik arang yang dihasilkan dan kemampuannya sebagai adsorben kromium(VI) dan biru metilen.

Pembuatan arang dari limbah filter rokok dilakukan menggunakan metode pirolisis dengan variasi temperatur 400, 500 dan 600 °C. Arang yang dihasilkan (A400, A500, dan A600) dikarakterisasi menggunakan *Fourier Transform Infra Red* (FTIR) dan *Surface Area Analyzer* (SAA). Adsorpsi kromium(VI) dan biru metilen oleh arang ditentukan dengan melakukan variasi pH, konsentrasi adsorbat, konsentrasi adsorben, dan waktu kontak serta pengujian isoterm adsorpsi dan kinetika adsorpsi.

Hasil penelitian menunjukkan bahwa terdapat gugus fungsi karboksil pada A400 dan gugus fungsi hidroksil pada semua jenis arang. Luas permukaan A400, A500, dan A600 berturut-turut sebesar 76,687; 173,870; dan 238,918 m² g⁻¹. Adsorpsi kromium(VI) oleh arang terukur optimum pada pH 3, konsentrasi adsorbat 50 mg L⁻¹, konsentrasi adsorben 1,5 g L⁻¹, dan waktu kontak 3 hari. Adsorpsi biru metilen oleh arang terukur optimum pada pH 4, konsentrasi adsorbat 150 mg L⁻¹, konsentrasi adsorben 2,5 g L⁻¹, dan waktu kontak 6 hari. Adsorpsi kromium(VI) dan biru metilen mengikuti isoterm Langmuir dan kinetika pseudo orde kedua.

Kata kunci: pirolisis, limbah filter rokok, adsorpsi, kromium(VI), biru metilen.

**EFFECT OF PYROLYSIS TEMPERATURE
ON THE CHARACTERISTICS OF CHAR FROM
CIGARETTE FILTER WASTE AND ITS APPLICATION
AS ADSORBENT FOR CHROMIUM(VI) AND METHYLENE BLUE**

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ABSTRACT

The effect of pyrolysis temperature on the characteristics of char from cigarette filter waste and its application as adsorbent for chromium(VI) and methylene blue has been studied. The purpose of this research is to determine the effect of pyrolysis temperature of cigarette filter waste on the characteristics of char and the capability as adsorbent for chromium(VI) and methylene blue.

Char from cigarette filter waste was produced by pyrolysis method at various temperature of 400, 500, and 600 °C. The chars (A400, A500, and A600) were characterized by Fourier Transform Infra Red (FTIR) and Surface Area Analyzer (SAA). Adsorption of chromium (VI) and methylene blue by chars were studied at various pH, concentration of adsorbate, concentration of adsorbent, and contact time. The adsorption isotherms and kinetics were also determined.

The results showed the existance of carboxyl functional groups on the A400 and hydroxyl functional groups on all chars. Surface areas A400, A500, and A600 were 76.687, 173.870, and 238.918 m² g⁻¹, respectively. Adsorption of chromium(VI) by chars were measured optimum at pH 3, adsorbate concentration of 50 mg L⁻¹, adsorbent concentration of 1.5 g L⁻¹, and contact time of 3 days. Adsorption of methylene blue by chars were measured optimum at pH 4, adsorbate concentration of 150 mg L⁻¹, adsorbent concentration of 2.5 g L⁻¹, and contact time of 6 days. Adsorption of chromium (VI) and methylene blue followed Langmuir isotherm and pseudo second-order kinetics.

Key words: pyrolysis, cigarette filter waste, adsorption, chromium(VI), methylene blue