ABSTRAK

Tujuan dari penelitian ini ialah untuk sintesis dan karakterisasi karbon nanopartikel (CNPs) dari *liquefied petroleum gas* (LPG) dengan metode pembakaran. Dalam prosedur penelitian, hidrokarbon alkana direaksikan dengan O_2 untuk menghasilkan CNPs. Hidrokarbon alkana yang digunakan berasal dari LPG sebagai sumber karbon. Karakterisasi sampel menggunakan *Fourier Transform Infrared* (FTIR), *X-ray diffraction analysis* (XRD), *Gas Chromatography Mass Spectrometry* (GCMS), dan *Transform Electron Microscope* (TEM). Variasi rasio mol LPG dan O_2 yang digunakan pada 0,80; 2,40; 4,80; dan 7,20. Hasil GCMS menunjukkan komposisi LPG terdiri dari propana (58,90%), isobutana (18,35%), butana (22,26%), dan butana, 2-metil (0,48%). Hasil TEM menunjukkan ukuran partikel yang merata pada setiap variasi rasio mol yang memiliki diameter partikel rata-rata yaitu 25-35 nm dengan morfologi bulat. Ukuran partikel dikontrol berdasarkan rasio mol. Hasil XRD menunjukkan rasio mol LPG dan oksigen pada 0,80 dan 2,40 terbentuk grafit, sedangkan pada rasio mol 4,80 dan 7,20 terbentuk heksagonal grafit. Hasil FTIR menunjukkan CNPs memiliki serapan pada bilangan gelombang (i) 752 (C-H tekuk sp^2); (ii) 835 (C=C); (iii) 1274 (C-O-C vibrasi); (iv) 1400 dan 1600 (C-C regang aromatik); (v) 2800 (C-H sp^2); (vi) 2900 (CH sp^3); (vii) 3100 (C-H aromatik); dan (viii) 3400 cm^{-1} (O-H). Dari hasil FTIR, produk CNPs beralotrof grafit yang terlihat pada bilangan gelombang 1400 dan 1600 cm^{-1} (C-C regang aromatik) dan 3100 cm^{-1} (C-H aromatik).

Kata kunci : karbon nanopartikel, *LPG*, metode pembakaran

ABSTRACT

The aim of this study was to synthesize carbon nanoparticles (CNPs) from commercially available liquefied petroleum gas (LPG). In the research procedure, we reacted LPG with oxygen to construct CNPs. To confirm the successful synthesis of CNPs, we conducted several sample analyses: a Gas Chromatography Mass Spectrometry (GCMS), a Transmission Electron Microscope (TEM), an X-ray Diffraction (XRD), and an Infrared Spectra (FT-IR). We also varied LPG and oxygen mole ratios at 0.80; 2.40; 4.80; and 7.20. The GCMS results indicated the composition of LPG was propane (58.90%), isobutane (18.35%), butane (22.26%), and butane, 2-methyl (0.48%). The TEM results showed that the particles were spheres with sizes of between 25 and 35 nm. The sizes of particles were controlled, depending on the mole ratio. The XRD results showed mole ratios of LPG and oxygen of 0.80 and 2.40 were natural graphite, whereas the mole ratios of 4.80 and 7.20 were hexagonal graphite. FTIR results showed CNPs have absorption peaks at wave number (i) 752 (C-H bend sp^2); (ii) 835 (C=C); (iii) 1274 (C-O-C vibration); (iv) 1400 and 1600 (C-C stretch aromatic); (v) 2800 (C-H sp^2); (vi) 2900 (CH sp^3); (vii) 3100 (C-H aromatic); and (viii) 3400 cm^{-1} (O-H). From FTIR analys results, the sample contained allotrope graphite due to detection of peaks at 1400 and 1600 cm^{-1} (C-C stretch aromatic) and 3100 cm^{-1} (C-H aromatic).

Keywords : *carbon nanoparticle, LPG, flame method*