

INTISARI

OPTIMASI DAYA LASER PADA SPEKTROMETER FOTOAKUSTIK LASER CO₂ KONFIGURASI INTRAKAVITAS DAN APLIKASINYA DALAM PENGUKURAN KONSENTRASI GAS ETILEN PADA GAS HEMBUS RELAWAN PEMAKAN GORENGAN

Oleh

Mamila Ziyiyit Tuqo
13/351237/PPA/04147

Telah dilakukan optimasi daya laser pada spektrometer fotoakustik laser CO₂ konfigurasi intrakavitas. Diperoleh 4 grup garis laser dengan daya tertinggi sebesar 37 W pada komposisi gas medium aktif He:N₂:CO₂ adalah 30:70:55. Diperoleh garis serapan laser tertinggi untuk gas etilen standar adalah 10P14 dan didapatkan batas deteksi terendah (BDT) gas etilen sebesar $57,1 \pm 0,4$ ppb (*part per billion*). Selanjutnya spektrometer fotoakustik laser CO₂ diaplikasikan dalam pengukuran konsentrasi gas etilen (C₂H₄) pada gas hembus relawan pemakan gorengan. Sampel divariasikan terhadap usia dan gender. Berdasarkan penelitian, untuk relawan berusia <15 tahun, konsentrasi gas etilen tertinggi adalah sebesar $5,570 \pm 0,002$ ppm pada saat 30 menit setelah memakan gorengan. Untuk relawan berusia 15-30 tahun, konsentrasi gas etilen tertinggi sebesar $5,644 \pm 0,002$ ppm pada saat 120 menit setelah memakan gorengan. Sedangkan untuk relawan berusia >30 tahun, konsentrasi gas etilen tertinggi sebesar $6,866 \pm 0,002$ ppm pada saat 120 menit setelah memakan gorengan. Hasil penelitian menunjukkan bahwa memakan gorengan mempengaruhi peningkatan konsentrasi etilen di dalam tubuh serta terdapat perbedaan konsentrasi gas etilen terhadap variasi usia karena adanya perbedaan sistem metabolisme di dalam tubuh manusia.

Key words : Spektrometer fotoakustik laser CO₂, pemakan gorengan, gas etilen.

ABSTRACT

LASER POWER OPTIMIZATION OF CO₂ LASER PHOTOACOUSTIC SPECTROMETER INTRACAVITY CONFIGURATION AND ITS APPLICATION IN MEASURING ETHYLENE GAS CONCENTRATION OF FRIED FOODS CONSUMER'S BREATH

by

Mamila Ziyiyit Tuqo
13/351237/PPA/04147

The laser power optimization of CO₂ laser photoacoustic spectrometer intracavity configuration has been conducted. It was generated 4 laser group and highest power was obtained at 37 W with medium active gas composition He:N₂:CO₂ was 30:70:55. The highest laser absorption line of standard ethylene gas was acquired at 10P14 and lowest detection limit was obtained at $57,1 \pm 0,4$ ppb (*part per billion*). Furthermore, CO₂ laser photoacoustic spectroscopy applied to the measuring of ethylene gas (C₂H₄) in fried foods consumer breath. Samples were varied for ages and genders. Based on research, for <15 years volunteers, the highest concentration of ethylene gas was $5,570 \pm 0,002$ ppm during 30 minutes after eating fried foods. For volunteers aged 15-30 years, the highest concentration of ethylene gas was $5,644 \pm 0,002$ ppm during 120 minutes after eating fried foods. For volunteers aged > 30 years, the highest concentration of ethylene was $6,866 \pm 0,002$ ppm during 120 minutes after eating fried foods. The result showed that eating fried food influenced the increase of ethylene concentration in body then there was difference of ethylene gas concentration to the age variation due to the difference metabolism in human body.

Key words: *CO₂ laser photoacoustic spectrometer, fried food consumer, ethylene gas.*