

## INTISARI

### **KINERJA SPEKTROMETER FOTOAKUSTIK LASER CO<sub>2</sub> DALAM PENDETEKSIAN KONSENTRASI GAS ASETON SEBAGAI *BIOMARKER* DIABETES MELITUS TIPE 2**

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Telah dilakukan uji kinerja spektrometer fotoakustik (SFA) dengan konfigurasi intrakavitas. Dalam penelitian ini diperoleh daya intrakavitas tertinggi ( $49,96 \pm 0,02$ ) W dengan komposisi gas medium aktif He:N<sub>2</sub>:CO<sub>2</sub> sebesar 30:50:50. Ditentukan garis serapan laser tertinggi untuk gas aseton standar adalah 10P20 dan batas deteksi terendah (BDT) untuk gas aseton sebesar ( $30 \pm 4$ ) ppb. Selanjutnya SFA diaplikasikan untuk mengukur konsentrasi gas aseton pada gas hembus pasien diabetes melitus tipe 2 dan relawan sehat yang masing – masing berjumlah 31 orang.

Metode pengambilan gas hembus dilakukan secara manual (sampel ditampung ke dalam *sampel bag* sebelum diuji di laboratorium) dan hasil pengukuran diolah menggunakan analisis multikomponen. Diperoleh hasil konsentrasi gas aseton tertinggi pada pasien diabetes melitus tipe 2 adalah ( $162 \pm 3$ )  $\times 10$  ppb dan terendah adalah ( $101 \pm 3$ )  $\times 10$  ppb. Sedangkan pada relawan normal konsentrasi tertingginya adalah ( $85 \pm 3$ )  $\times 10$  ppb dan terendahnya adalah ( $15 \pm 3$ )  $\times 10$  ppb.

**Kata kunci :** Spektrometer fotoakustik laser CO<sub>2</sub> , aseton, diabetes mellitus, analisis multikomponen

## ABSTRACT

### **THE PERFORMANCE OF CO<sub>2</sub> LASER PHOTOACOUSTIC SPECTROMETER IN CONCENTRATION ACETONE DETECTION AS BIOMARKER FOR DIABETES MELLITUS TYPE 2**

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The performance of photoacoustic spectrometer (PAS) had been examined with intracavity configuration. In this research, the highest intracavity power was at  $(49,96 \pm 0,02)$  W for the composition of medium active gas He:N<sub>2</sub>:CO<sub>2</sub> at 30:50:50. The highest laser absorption line for standard acetone gas was at 10P20 and the lowest detection limit for acetone gas was at  $(30 \pm 4)$  ppb. For application purposes, the photoacoustic spectrometer was used to measure concentration of acetone gas in exhaled gases from a group of patients with type 2 diabetes mellitus and a group of healthy volunteers. Each of volunteer group is about 31 people.

Exhaled gas sampling method was taken manually (the samples were collected in the sample bags before being examined in the laboratory) and the measurement result was examined by using multicomponent analysis. The measurement showed that the highest acetone gas concentration for diabetes mellitus type 2 patients was  $(162 \pm 3) \times 10$  ppb and the lowest one was  $(101 \pm 3) \times 10$  ppb. Furthermore, for healthy volunteers, the highest acetone gas concentration was  $(85 \pm 3) \times 10$  ppb and the lowest one was  $(15 \pm 3) \times 10$  ppb.

**Keyword :** CO<sub>2</sub> laser photoacoustic spectrometer, acetone, diabetes mellitus, multicomponent analysis