

## INTISARI

Enkapsulasi antibodi anti okratoksin A (Ab-OTA) dan anti aflatoksin B<sub>1</sub> (Ab-AFB<sub>1</sub>) pada silika gel untuk *clean up* pada analisis OTA dan AFB<sub>1</sub> dalam *Palm Kernel Cake* (PKC) dengan HPLC-FLD telah dilakukan. Antibodi dijebak di dalam kerangka silika gel dengan bahan dasar dari TMOS (SiTMOS), Na<sub>2</sub>SiO<sub>3</sub> komersial (SiKom) dan Na<sub>2</sub>SiO<sub>3</sub> hasil ekstraksi abu sekam padi (SiASP) dengan teknik sol gel. Silika gel termodifikasi antibodi digunakan sebagai matriks pada *Immunoaffinity Chromatography Column* (IAC). IAC kemudian diaplikasikan untuk *clean up* pada analisis OTA dan AFB<sub>1</sub> dalam PKC.

Matriks kolom untuk *clean up* OTA (IAC-SG OTA) dibuat dengan mengenkapsulasi 1 mg Ab-OTA dalam 0,5 g silika gel dari TMOS. Matriks kolom untuk *clean up* AFB<sub>1</sub> (IAC-SG AFB<sub>1</sub> SiTMOS, IAC-SG AFB<sub>1</sub> SiKom, dan IAC-SG AFB<sub>1</sub> SiASP) dibuat dengan mengenkapsulasi 13,6 mg Ab-AFB<sub>1</sub> masing-masing dalam 0,5 g silika gel dari SiTMOS, SiKom, dan SiASP. Setelah matriks digerus dan dikemas ke dalam kolom selanjutnya dilakukan uji *recovery* dan penggunaan ulang, sebelum diaplikasikan.

IAC-SG OTA memiliki *recovery* 95,71 ± 6,18% dan dapat digunakan berulang sampai delapan kali pada *recovery* di atas 80%. Hasil *clean up* OTA dalam PKC dengan IAC-SG OTA diketahui 12 dari 20 sampel terkontaminasi dengan kadar tertinggi 1,47 µg/kg dan rerata 0,19 µg/kg, sedangkan dengan IAC komersial ditemukan 13 sampel terkontaminasi dengan kadar tertinggi 1,56 µg/kg dengan rerata 0,21 µg/kg. Kedua hasil analisis berkorelasi linier dan tidak berbeda signifikan.

*Recovery* kolom IAC-SG AFB<sub>1</sub> SiTMOS, IAC-SG AFB<sub>1</sub> SiKom, dan IAC-SG AFB<sub>1</sub> SiASP terhadap AFB<sub>1</sub> masing-masing adalah 92,12 ± 7,86; 93,75 ± 6,57; dan 91,78 ± 9,50%. Kapasitas ikat kolom IAC-SG AFB<sub>1</sub> SiTMOS sebesar 40 ng sedangkan IAC-SG AFB<sub>1</sub> SiKom dan IAC-SG AFB<sub>1</sub> SiASP sebesar 50 ng. Ketiga kolom dapat digunakan ulang sampai lima kali dengan *recovery* di atas 80%. Hasil analisis dengan empat kolom IAC yang berbeda diketahui 9 dari 10 sampel PKC terkontaminasi AFB<sub>1</sub>. Hasil *clean up* menggunakan IAC-SG AFB<sub>1</sub> SiTMOS ditemukan kadar tertinggi AFB<sub>1</sub> 6,83 µg/kg dan rerata 1,14 µg/kg, menggunakan IAC-SG AFB<sub>1</sub> SiKom kadar tertinggi 7,59 µg/kg dan rerata 1,56 µg/kg, dan menggunakan IAC-SG AFB<sub>1</sub> SiASP kadar tertinggi 8,03 µg/kg dan rerata 1,73 µg/kg, sedangkan hasil *clean up* dengan IAC komersial diperoleh kadar tertinggi 9,49 µg/kg dan rerata 1,62 µg/kg. *Recovery* rata-rata hasil *clean up* menggunakan ketiga kolom IAC-SG lebih rendah dibanding menggunakan IAC komersial namun semuanya memiliki korelasi linier.

**Kata kunci:** enkapsulasi, IAC, okratoksin, aflatoksin, *palm kernel cake*, sol gel

## ABSTRACT

*Encapsulation of anti-OTA and anti-AFB<sub>1</sub> antibodies on silica gel has been done in order to perform clean up OTA and AFB<sub>1</sub> analysis in Palm Kernel Cake (PKC) with HPLC-FLD. For this purpose, the antibodies were trapped in pore of silica gel, made of the TMOS (SiTMOS), commercial Na<sub>2</sub>SiO<sub>3</sub> (SiKom) and Na<sub>2</sub>SiO<sub>3</sub> extracted from rice husk ash (SiASP) as raw materials using sol gel technique. The modified silica gel with antibodies were then used as Immunoaffinity Chromatography Column (IAC) matrix and applied for OTA and AFB<sub>1</sub> clean up performed in PKC.*

*Matrix of IAC-SG OTA column was prepared by encapsulating of 1 mg Ab-OTA in 0.5 g silica gel of TMOS. While, for matrices of IAC-SG AFB<sub>1</sub> SiTMOS, IAC-SG AFB<sub>1</sub> SiKom, and IAC-SG AFB<sub>1</sub> SiASP columns were prepared by encapsulating of 13.6 mg Ab-AFB<sub>1</sub> in 0.5 g silica gel from SiTMOS, SiKom, and SiASP, respectively. In addition, the matrices were packed into the columns, followed by recovering and re-using tests prior being applied to the real samples.*

*The recovery result of IAC-SG OTA was  $95.71 \pm 6.18\%$ , the column could be used for eight times repetition with the recovery result reached more than 80%. Furthermore, the OTA in PKC using IAC-SG OTA clean up found 12 of 20 contaminated samples with the highest level of 1.47  $\mu\text{g}/\text{kg}$  and the average of 0.19  $\mu\text{g}/\text{kg}$ , while for using commercial IAC, found 13 of 20 contaminated samples with the highest level of 1.56  $\mu\text{g}/\text{kg}$  and the average of 0.21  $\mu\text{g}/\text{kg}$ . Both analytical results were linear correlated and not significantly different.*

*The recovery results of IAC-SG AFB<sub>1</sub> SiTMOS, IAC-SG AFB<sub>1</sub> SiKom, and IAC-SG AFB<sub>1</sub> SiASP columns of AFB<sub>1</sub> were  $92.12 \pm 7.86$ ,  $93.75 \pm 6.57$ , and  $91.78 \pm 9.50\%$ , respectively. The binding capacity of the IAC-SG AFB<sub>1</sub> SiTMOS columns was 40 ng, and for IAC-SG AFB<sub>1</sub> SiKom and IAC-SG AFB<sub>1</sub> SiASP columns were 50 ng. All the columns could be re-used up to five times repetitions with recovery more than 80%. In addition, based on PKC analysis, 9 of 10 AFB<sub>1</sub> contaminated samples were found. The highest level of AFB<sub>1</sub> found after clean up using IAC-SG AFB<sub>1</sub> SiTMOS was 6.83  $\mu\text{g}/\text{kg}$  with average of 1.14  $\mu\text{g}/\text{kg}$ , while for IAC-SG AFB<sub>1</sub> SiKom and IAC-SG AFB<sub>1</sub> SiASP samples were 7.59  $\mu\text{g}/\text{kg}$  with average of 1.56  $\mu\text{g}/\text{kg}$ , and 8.03  $\mu\text{g}/\text{kg}$  with average of 1.73  $\mu\text{g}/\text{kg}$ , respectively. Whereas for the commercial IAC, the highest level of clean up was reached 9.49  $\mu\text{g}/\text{kg}$  and the average was 1.62  $\mu\text{g}/\text{kg}$ . The clean up recovery result using IAC commercial is higher in comparison with the other columns, however they were linear correlated.*

**Keyword :** *encapsulation, IAC, ochratoxin, aflatoxin, palm kernel cake, sol gel*