INTISARI

Molecularly Imprinted Polymer-Chitosan (MIP-Chitosan) Berbasis *Quartz Crystal Microbalance* (QCM) untuk Deteksi Alpha-Pinene

Oleh

Fadlunisa
15/383169/PA/16829

Deteksi α-Pinene penting untuk dilakukan karena α-Pinene dapat menjadi indikator kesegaran tanaman dan kematangan buah. Paparan α-Pinene dengan konsentrasi 450 mg/m^3 dapat mengganggu kesehatan. Oleh karena itu, fokus penelitian ini adalah pengembangan sensor α-Pinene menggunakan *Quartz Crystal Microbalance* (QCM) berlapis *Molecularly Imprinted Polymer-Chitosan* (MIP-Chitosan). MIP-Chitosan (chitosan 5%+α-Pinene 1%) dan Non-MIP-Chitosan (chitosan saja) dilapiskan menggunakan metode *spin coating* dengan kecepatan pertama dan kedua berturut-turut sebesar 700 rpm selama 10 detik dan 1500 rpm selama 50 detik. Terbentuknya lapisan di atas QCM terbukti dengan selisih frekuensi lebih dari 1000 Hz sebelum dan sesudah pelapisan. Keberadaan *template* α-Pinene terkonfirmasi dari munculnya ikatan –CH_3 pada lapisan MIP-Chitosan sebelum pelepasan *template. Template* dilepas dengan dipanaskan pada suhu 130 °C selama 1 jam. Kenaikan frekuensi setelah pemanasan mengonfirmasi keberhasilan pelepasan *template.* Respon QCM MIP-Chitosan lebih besar dibanding Non-MIP-Chitosan. Sensitivitas QCM MIP-Chitosan sebesar (394±10) $\times 10^{-4}$ Hz/ppm dengan linearitas 0,999. LoD dan LoQ QCM-MIP-Chitosan lebih kecil dibanding QCM Non-MIP-Chitosan. QCM MIP-Chitosan memiliki selektivitas tinggi karena responnya terhadap senyawa γ-Terpinene, etanol, aseton dan benzene kecil. Selektivitas ini menunjukkan terjadinya efek *imprinting* yang menyebabkan terjadinya mekanisme penangkapan molekul α-Pinene secara spesifik oleh rongga matriks polimer serta adanya interaksi hidrogen antara keduanya.

Kata kunci: alpha-Pinene, chitosan, MIP-Chitosan, Non-MIP-Chitosan, QCM.

ABSTRACT

Molecularly Imprinted Polymer-Chitosan (MIP-Chitosan) Based Quartz Crystal Microbalance (QCM) for Detection Alpha-Pinene

Oleh

Fadlunisa
15/383169/PA/16829

Detection of Alpha-Pinene is necessary because α-Pinene is the indicator of herb freshness and fruit ripeness. Alpha-Pinene exposure with 450 mg/m^3 can also affect body health. So, in this experiment, we developed α-Pinene sensor based Quartz Crystal Microbalance (QCM) coated by Molecularly Imprinted Polymer-Chitosan (MIP-Chitosan). MIP-Chitosan (chitosan 5%+α-Pinene 1%) and Non-MIP-Chitosan (chitosan) were coated on QCM using spin coating method with the first and second speed is 700 rpm for 10 s and 1500 rpm for 50 s respectively. Forming of thin film on QCM was confirmed by getting frequency difference more than 1000 Hz before and after coating process. The existence of α-Pinene was confirmed by the appearance of $–CH_3$ bond in MIP-Chitosan spectrum before removing template. Template was removed by heating at 130 °C for 1 hour. Frequency increasing after heating confirmed that template was successfully removed. QCM-MIP-Chitosan response was higher than QCM-Non-MIP-Chitosan. Sensitivity of QCM-MIP-Chitosan is $(394\pm10) \times10^{-4}$ Hz/ppm with linearity 0,999. LoD and LoQ of QCM-MIP-Chitosan is smaller than QCM-Non-MIP-Chitosan. QCM-MIP-Chitosan has high selectivity cause its respon to γ-Terpinene, etanol, aseton and benzene compound is small. This selectivity shows that imprinting effect causes specific recognition mechanism of α-Pinene molecule by cavity of matrix polymer and hydrogen interaction between them.

Keywords: alpha-Pinene, chitosan, MIP-Chitosan, Non-MIP-Chitosan, QCM.