

## **Selective adsorption of vitamin E from palm fatty acid distillate on silica-packed fixed-bed columns**

### **ABSTRACT**

Understanding the behavior of vitamin E adsorption during chromatographic separation was useful for a better control of the process. In this study, a pre-concentrated vitamin E fraction from palm fatty acid distillate (PFAD) was subjected to a normal phase silica-packed fixed-bed column for further purification. The effect of various operational parameters i.e. column bed height, vitamin E inlet concentration, column temperature and flow rate on column performance were detailed. It appeared that the breakthrough curves of all systems showed a typical S-shaped profile. The service time of the column increased when increasing the column bed height, or reducing the inlet concentration, column temperature and flow rate. It was found that column efficiency in terms of adsorbent usage rate could be improved by decreasing the inlet concentration and flow rate. Decreasing the column temperature resulted in higher column capacity, suggesting that the adsorption of vitamin E on silica was an exothermic process. The Bed Depth Service Time (BDST) model described the adsorption process well, with coefficient of determination ranging from 0.92 to 0.99 and low residual sum of square ( $< 0.28$ ) and standard error ( $< 0.35$ ). The model could explain the characteristic operational parameters well except for the effect of flow rate in this study.

**Keyword:** Adsorption; Breakthrough curve; Fixed-bed column; Silica gel; Vitamin E.