

## Assisted Supercritical Carbon Dioxide Extraction of Tocotrienols from Palm Fatty Acid Distillate

**Authors :** Najwa Othman, Norhidayah Suleiman, Gun Hean Chong

**Abstract :** Palm fatty acid distillate (PFAD) is a by-product of palm oil refineries which contains valuable compounds such as phytosterols, squalene, polycosanol, co-enzyme Q10 and vitamin E (tocopherols and tocotrienols). Approximately 0.7-1.0% of vitamin E accumulates in PFAD, and it functions as antioxidants and anti-inflammatory. The objective of this research is to evaluate the effect of manipulated variables in supercritical carbon dioxide towards the recovery of tocotrienols in PFAD. The vitamin E concentrate isolated varies depending on the pre-treatment of sample and extraction techniques. In this research, tocotrienols in PFAD was concentrated by removing the extraneous matters, especially free fatty acid (FFA) and acylglycerols. Pre-treatment method such as enzymatic hydrolysis by using lipase from *Candida rugosa* as an enzyme was used to remove FFA and improve recovery of vitamin E. After that, treated PFAD was extracted by using supercritical fluid extraction in co-current glass beads packed column (22 cm x 75 cm i.d) at different temperatures (40-60°C) and pressures (100-300 bar) for 5 hours. After the extraction, the sample was analyzed by using high-pressure liquid chromatography (HPLC) system to quantify the tocotrienols. The results indicated that a combined pressure (200 bar) and temperature (60°C) was predicted to provide highest tocotrienols yield and the extraction yield obtained was 106.45%.

**Keywords :** enzymatic hydrolysis, palm fatty acid distillate, supercritical fluid extraction, tocotrienols

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