

**P**alm-based fatty acids are derivatives from crude palm oil (CPO) and crude palm kernel oil (CPKO). Among them are caprylic-capric (C8-C10) acids mixture and oleic acid (C18:1), used in the production of food and non-food products. The use of pesticides in oil palm plantations has resulted in a growing concern for the presence and danger of its residue in palm oil products, such as C8-10 and C18:1.

Organophosphorus (OP) compounds namely trichlorfon, dimethoate, chlorpyrifos and triazophos (Figure 1) are among the insecticides registered for usage in oil palm plantations.

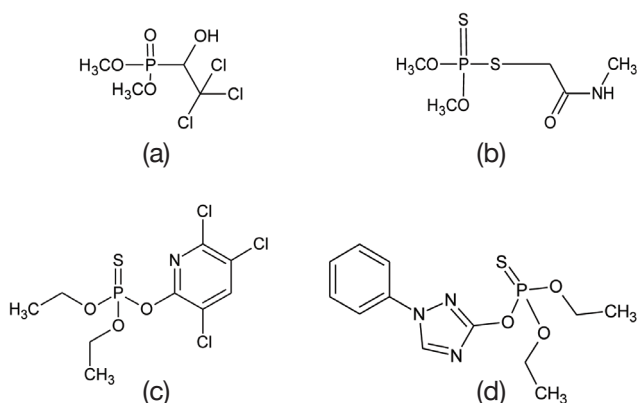


Figure 1. Chemical structures of (a) trichlorfon, (b) dimethoate, (c) chlorpyrifos and (d) triazophos.

### OBJECTIVE

To detect and quantify residual trichlorfon, dimethoate, chlorpyrifos and triazophos in C8-10 and C18:1 palm-based fatty acids.

### METHODOLOGY

The method involves the extraction of trichlorfon, dimethoate, chlorpyrifos and triazophos using low temperature precipitation technique (Zainudin *et al.*, 2009; Muhamad *et al.*, 2012). The detection and quantification of these OP compounds is done by Gas Chromatography with a Flame Photometric Detector (GC-FPD) (Figure 2).



Figure 2. Gas Chromatography with Flame Photometric Detector (GC-FPD).

### RECOVERY STUDIES

#### C8-10

Figure 3 is the GC-FPD chromatograms of (A) blank C8-C10, (B) OP standards,  $1.0 \mu\text{g g}^{-1}$  and (C) C8-C10 sample spiked with  $1.0 \mu\text{g g}^{-1}$  OP standards. Recoveries of OP compounds from C8-C10 samples spiked with  $0.08 - 1.0 \mu\text{g g}^{-1}$  standard OP ranged from 72% – 105%. The limit of detection of dimethoate, chlorpyrifos and triazophos in C8-10 using GC-FPD is  $0.08 \mu\text{g g}^{-1}$ .

#### C18:1

Figure 4 is the GC-FPD chromatograms of (A) blank C18:1, (B) OP standards,  $1.0 \mu\text{g g}^{-1}$  and (C) C18:1 sample spiked with  $1.0 \mu\text{g g}^{-1}$  OP standards. Recoveries of OP compounds from C18:1 samples spiked with  $0.08 - 1.0 \mu\text{g g}^{-1}$  standard OP ranged from 74% – 106%. The limit of detection of trichlorfon, dimethoate, chlorpyrifos and triazophos in C18:1 using GC-FPD is  $0.08 \mu\text{g g}^{-1}$ .

### BENEFITS

- A precise and reliable method for the detection and quantification of trichlorfon, dimethoate, chlorpyrifos and triazophos residue in C8-10 and C18:1 fatty acids.

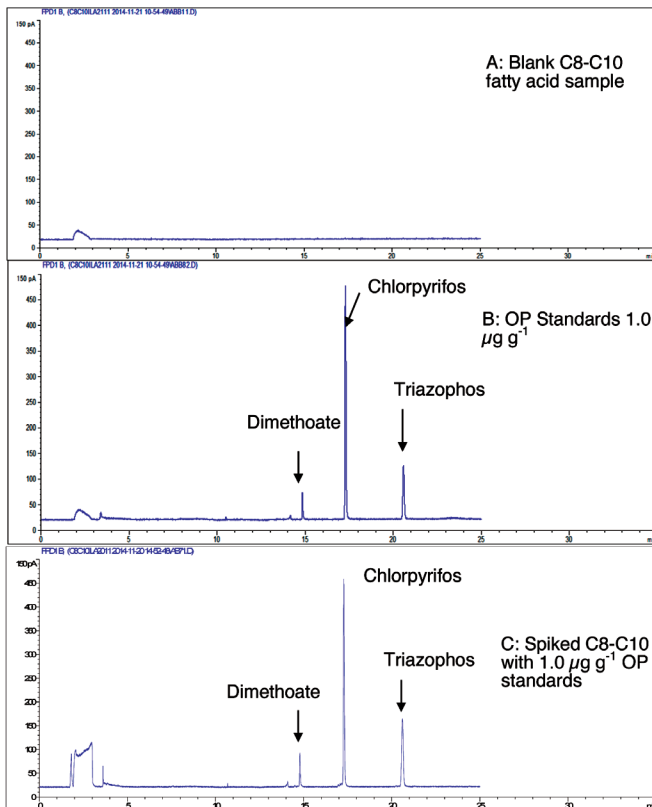


Figure 3. GC-FPD chromatograms of (A) blank C8-C10, (B) OP standards,  $1.0 \mu\text{g g}^{-1}$  and (C) C8-C10 sample spiked with  $1.0 \mu\text{g g}^{-1}$  OP standards.

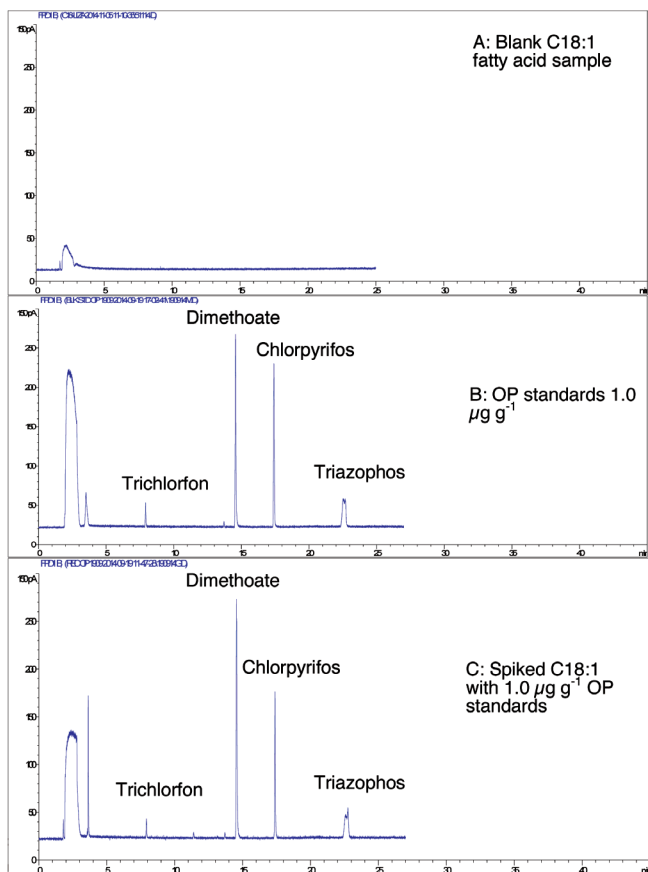


Figure 4. GC-FPD chromatograms of (A) blank C18:1, (B) OP standards,  $1.0 \mu\text{g g}^{-1}$  and (C) C18:1 sample spiked with  $1.0 \mu\text{g g}^{-1}$  OP standards.

- Time and cost-saving analysis of multiresidual OP compounds in C8-10 and C18:1 fatty acids.

### TYPE OF SERVICE

- Detection and quantification of trichlorfon, dimethoate, chlorpyrifos and triazophos in C8-10 and C18:1 samples.

### INDICATIVE COST

The cost for this analysis in 2016 is approximately RM 300 per sample and is subject to change.

### REFERENCES

MUHAMAD, H; ZAINUDIN, B H and BAKAR, N K A (2012). Determination of  $\lambda$ -cyhalothrin in palm and palm kernel oils using tandem solid-phase extraction cartridges. *J. Oil Palm Res. Vol. 24:* 1303-1309.

ZAINUDIN, B H; BAKAR, N K A and MUHAMAD, H (2009). Determination of cypermethrin in palm oil matrices. *European J. Lipid Science and Technology, 111:* 1014-1019.

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