APPLICATION NOTE

FAME ANALYSIS WITH BPX90- A HIGHLY POLAR COLUMN

INTRODUCTION

The analysis of fatty acids in foods and biological samples are commonly achieved by gas chromatography of their fatty acid methyl esters (FAMEs). Capillary columns commonly used for FAME analysis consist of stationary phases with varying polarity. Non-polar phases e.g. BPX5 provides separation for the saturated FAMEs from the unsaturated FAMEs, and the order of elution is the reversal of the polar columns. A Polyethylene Glycol column e.g. BP20 will separate FAMEs according to carbon number followed by degree of unsaturation. Thus a column of higher polarity such as the BPX70 (poly(biscyanopropylsiloxane) type phase) is usually utilized to provide further separation for the polyunsaturated FAMEs. The polarity of the stationary phase affects the retention times especially those of polyunsaturated FAMEs. The choice of column depends on the sample to be analyzed as well as the maximum operating temperature of the column. Therefore a gas chromatography phase that has dominant polar (π-π) chemistry and a negligible non-polar chemistry is highly sought after for the resolution of complex polyunsaturated FAME mixtures.

RESULTS

Figure 1 illustrates the chromatogram of a 37 Supleco FAME standard analyzed with the same conditions using BPX70 (Figure 2a) and BPX90 (Figure 2b). While BPX90 is designed to give separation of unsaturated and saturated FAME, BPX90 provides even more separation capability for polyunsaturates. Figure 2b shows some polyunsaturated FAMEs eluting after the next highest even-carbon saturated FAME (e.g. C18:3n3 after C20:0 and C20:3n3 after C22:0) demonstrating the selectivity of BPX90 towards unsaturated FAME as compared with BPX70.

The very polar phase enables faster elution of high molecular weight FAMEs without loss of resolution. BPX90 shows low selectivity for nonpolar analytes and saturated FAMEs, enhanced selectivity for polyunsaturated FAME and this selectivity can be tuned with film thickness.

The highly polar BPX90 is effective for increased resolution among highly complex polyunsaturated FAME mixtures. It also provides separation of cis and trans isomers and positional isomers of FAME analytes. Other possible applications for BPX90 include perfumery, petrochemical, pesticide, PCBs, PBDEs, aromatic analysis and multi-dimensional / comprehensive gas chromatography.

REFERENCE

J. Harynuk, P.J. Marriott and P. Wynne. Chromatographia, 2006; 63: S61-S66.

CHROMATOGRAPHIC CONDITIONS

Phase:	90 % Cyanopropyl Polysilphenylsiloxane
Column Dimensions:	15 m x 0.25 mm x 0.25 µm
Injector Temperature:	250 °C
Injection Volume:	1.0 µL
Injector Type:	Split
Split Ratio:	100:1
Liner Type:	FocusLiner™
Carrier Gas:	He
Constant Flow:	ON
Pressure:	4.02 psi
Column Flowrate:	1.3 ml/min
Linear Velocity:	59 cm/sec
Initial Temp.:	70 °C hold for 1 minute
Rate:	20 °C/min to 150 °C
Rate:	10 °C/min to 250 °C
Final Temp.:	250 °C hold for 5 minutes
Detector Type:	MSD

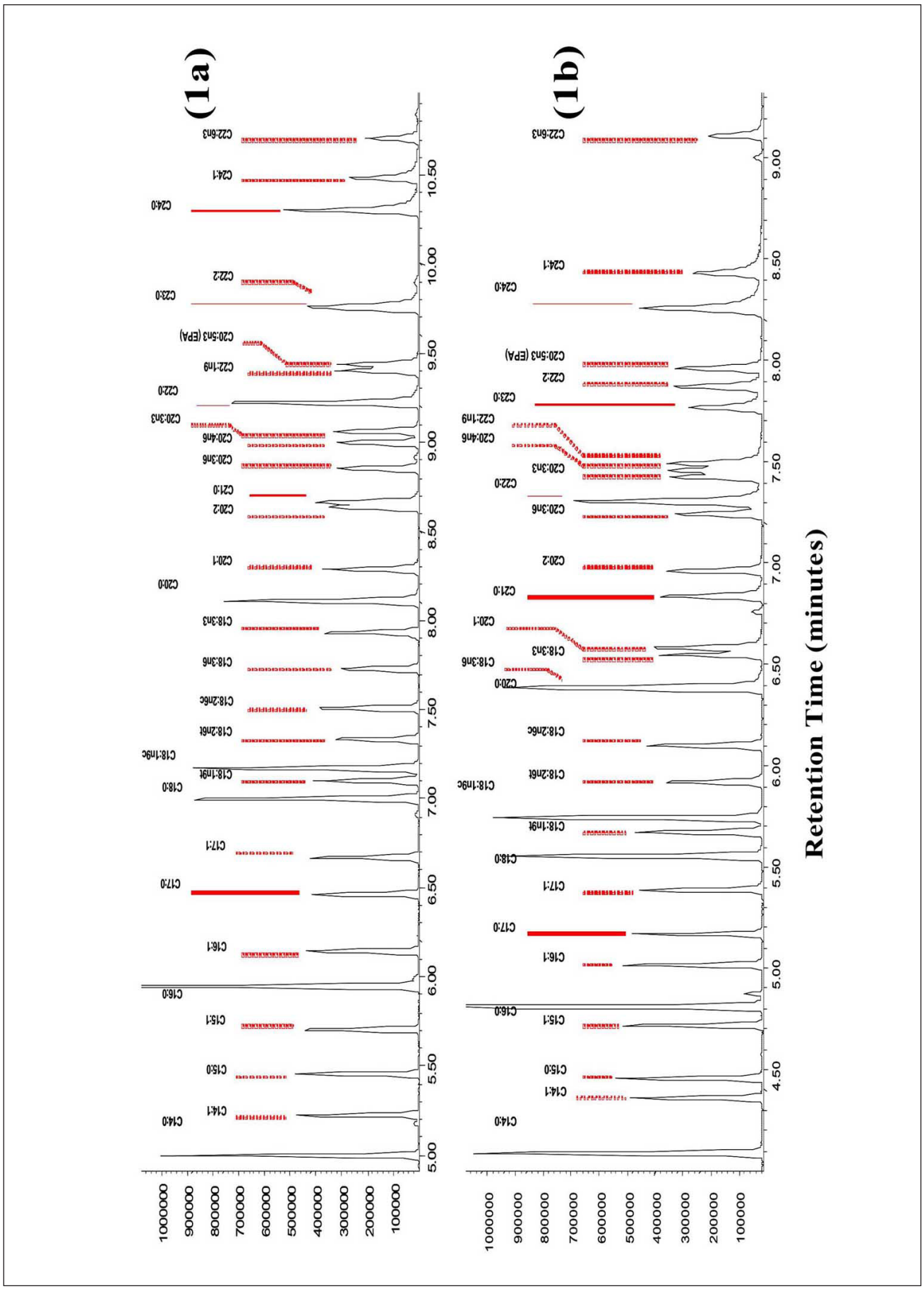

Figure 1. Supelco 37 FAME standard analysed with (a) BPX70 and (b) BPX90