Determination of Chloropropanols Esters on GsBP-5 Column

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Introduction

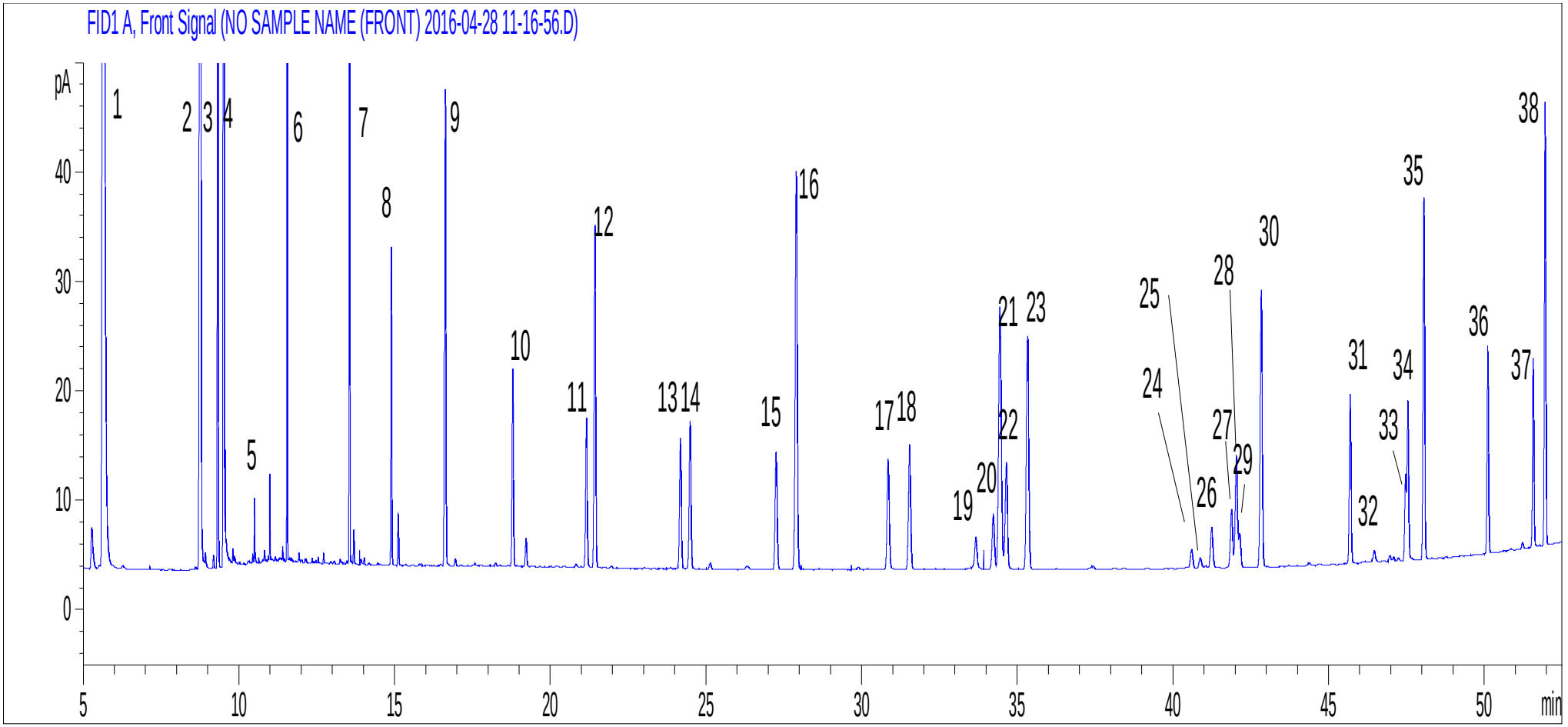
In recent years, more attention has been paid to chloropropanols due to their presence in food and concerns about their toxic potential as carcinogens. Chloropropanols esters is also a group of food contamination because they undergo hydrolysis by enzymes in the gastrointestinal tract. It is necessary to establish a method for determination of fatty acid esters of chloropropanols, and to evaluate the dietary exposure risk of chloropropanols esters in food .

A new method was established for the simultaneous determination of total fatty acid esters of 3 chloropropanols including fatty acid esters of 1,3-Dichloro-2-propanol, 3-Chloro-1,2-propanediol and 3-chloro-1-propanol in edible oils. Through the ester cleavage reaction, chloropropanols esters were transformed into fatty acid methyl ester (FAMEs) and chloropropanols. After extraction and special treatment, the products were analyzed by gas chromatography.

Instrumentation Conditions

- GC: Agilent 7890 w/ FID
- Cat no: *0525-3010 GsBP-5 30m x 0.25mm x 1.0um*
- Oven: 80℃ 8min 35 ℃ /min to 180℃ 2 ℃ /min to 240℃ 5℃ /min to 300 ℃ 10min
- Carrier: Hydrogen, column flow 1.2ml/min
- Inlet: Split, 275 ℃, split flow 60ml/min
- Detector: FID 325 ℃
- Sample: Food Industry FAME Mix and chloropropanols sample

Chromatography



Peak Identifications and Resolutions:

Peak#	Compound	Retention Time	Resolution
1	3-Chloro-1-propanol	5.661	
2	1,3-Dichloro-2-propanol	8.769	
3	C4:0 Methyl butyrate	9.325	
4	3-Chloro-1,2-propanediol	9.528	6.93
5	C6:0 Methyl hexanoate	10.998	
6	C8:0 Methyl octanoate	11.554	
7	C10:0 Methyl decanoate	13.560	
8	C11:0 Methyl undecanoate	14.905	
9	C12:0 Methyl laurate	16.623	
10	C13:0 Methyl tridecanoate	18.790	
11	C14:1 Methyl myristoleate (cis-9)	21.160	
12	C14:0 Methyl myristate	21.428	6.21
13	C15:1 Methyl pentadecanoate (cis-10)	24.174	
14	C15:0 Methyl pentadecanoate	24.487	6.31
15	C16:1 Methyl palmitoleate (cis-9)	27.249	
16	C16:0 Methyl palmitate	27.896	
17	C17:1 Methyl heptadecenoate (cis-10)	30.848	
18	C17:0 Methyl heptadecanoate	31.535	
19	C18:3 Methyl linolenate (cis-6,9,12)	33.662	

Peak#	Compound	Retention Time	Resolution
20	C18:2 Methyl linoleaidate (cis,trans-9,12)	34.225	
21	C18:1 Methyl elaidate (cis. trans-9)	34.430	3.08
22	C18:3 Methyl linolenate (cis-9,12,15)	34.644	3.18
23	C18:0 Methyl stearate	35.332	
24	C20:5 Methyl eicosapentaenoate (cis-5,8,11,14,17)	40.592	
25	C20:4 Methyl arachidonate (cis-5,8,11,14)	40.876	
26	C20:3 Methyl eicosatrienoate (cis-8,11,14)	41.240	
27	C20:2 Methyl eicosadienoate (cis-11,14)	41.879	
28	C20:1 Methyl eicosenoate (cis-11)	42.032	2.52
29	C20:3 Methyl eicosatrienoate (cis-11,14,17)	42.136	1.82
30	C20:0 Methyl arachidate	42.833	
31	C21:0 Methyl heneicosanoate	45.688	
32	C22:6 Methyl docosahexaenoate (cis-4,7,10,13,16,19)	46.465	
33	C22:2 Methyl docosadienoate (cis-13,16)	47.470	
34	C22:1 Methyl erucate (cis-13)	47.538	1.59
35	C22:0 Methyl behenate	48.061	
36	C23:0 Methyl tricosanoate	50.107	
37	C24:1 Methyl nervonate (cis-15)	51.565	
38	C24:0 Methyl lignocerate	51.944	

Conclusion

Through the ester cleavage reaction, chloropropanols esters and methanol were transformed into fatty acid methyl ester and chloropropanols including 1,3-Dichloro-2-propanol, 3-Chloro-1,2-propanediol and 3-chloro-1-propanol. A GC separation of chloropropanols and FAMEs on a 30 m column with a 1mm i.d. can take 55 minutes or more of analysis time, depending on the mixture of analytes being separated. There are some parameters that can be adjusted in a GC method to improve the resolution for critical pairs, including decreasing the column temperature, decreasing the temperature ramp rate, or increasing the column length. However, these changes can be detrimental to increase the analysis time.