

***Trans* FAT LABELING**
an
Industry Perspective

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Trans FAT LABELING **an** ***Industry Perspective***

Christine Wold
QRO Product Labeling
General Mills Inc.

Jonathan W. DeVries, PhD
Technical Manager
Medallion Laboratories

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**“This simplifies things! Each serving contains
10 grams of ‘stuff that will kill you’ and
15 grams of ‘stuff that won’t kill you’.”**

Trans Fat Labeling Regulation Issued July 9, 2003 by FDA

- Made Trans Fat is a mandatory label nutrient
- Set a compliance date of **January 1, 2006**
- Did not include a Trans Fat Daily Value (DV)
- Does not permit Trans Fat Claims
- Does not require a 'Warning' Footnote
 - “Intake of trans fat should be as low as possible”

What Does This Mean For
General Mills?

GMI Must Provide Trans Fat Information for Every Product

- Over 5,000 retail and 850 foodservice product labels need to be changed
- Remaining (> 4000) foodservice products need to include Trans Fat in nutrient data shared with our customers

Thank Goodness for 2 Years (Really!!)

- July 10, 2003 Action Started
 - Inquiries from Consumers
 - Inquiries from Customers
 - Inquiries from Product Developers
- Identified need to develop a coordinated corporate plan to implement trans fat labeling
- Address FDA regulated products vs USDA regulated products

GMI Developed a Coordinated Corporate Timeline for Label Changes

- Prioritization given to:
 - Products with high consumer requests
 - Products with complete, accurate ingredient information and resource availability
 - Foodservice key accounts
- Leveraged Timing
 - Opportunistic planned label changes
 - Business reformulation plans

Labeling Plan Addressed Consumers, Shelf Life and Logistics

- Product Categories with Frequent Consumer Inquiries
 - Completed 5/03
- Canned Vegetables and Dry Goods
 - Targeted completion 1/05
 - Longer Shelf Life
 - Simpler distribution
- Refrigerated/Frozen Foods
 - Targeted completion September, 2005
 - Complex Distribution
 - Limited Shelf Life

Trans Fat Timeline Highlights

- Trans Fat labeling rolled out by product category.
- Cereals, Yogurts and Fruit Snacks were the first product categories to include trans fat on label.
- All Foodservice work will be completed by 1/1/05 to allow our customers to label their products by 1/1/06.
- Goal is to have all packages changed by 9/1/05.
- Totino's and Lloyd's – predominately USDA regulated products will change labels last.

How will trans fat labeling be implemented?

Trans Fat Labeling Implementation Requires Cross-Functional Resources

- **Analytical**

- Ingredients
- Finished Products

- **Logistics**

- Coordinate timing of label changes with business
- Assure all products shipped after 1/1/06 include trans fat values

Trans Fat Labeling Implementation Requires Cross-Functional Resources

- **Labeling**
 - Manage label change process
 - Assure every package is touched
- **Brand Design**
 - Manage package design process
- **Plant Quality**
 - Compare new packages coming into the plants with approved keylines

How will trans fat be labeled?

Trans Fat is a mandatory nutrient

Trans Fat must appear on every Nutrition Facts Panel

- As a separate line listing g/serving
- In the “Not a significant source” footnote if:
 - Trans Fat = <0.5g/serving
 - Total Fat = 0g/serving
 - No fat claims

CHEX SNACK MIX -- TRADITIONAL

Nutrition Facts

Serving Size 2/3 cup (30g)

Servings Per Container

Amount Per Serving

Calories		130
Calories from Fat		35
<hr/>		
		% Daily Value*
Total Fat	4g	6%
Saturated Fat	0.5g	3%
Trans Fat	0.5g	
Cholesterol	0mg	0%
Sodium	410mg	17%
Potassium	50mg	1%
Total Carbohydrate	22g	7%
Dietary Fiber	1g	4%
Sugars	2g	
Protein	2g	

Iron	2%	• Thiamin	4%
Riboflavin	2%	• Niacin	4%
Folic Acid	2%		

Not a significant source of vitamin A, vitamin C and calcium.

* Percent Daily Values (DV) are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Potassium		3,500mg	3,500mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Why is Trans fat labeling
a complex consumer issue?

Consumers Are Looking For
Trans Fat Information On The:

Ingredient Statement

VS

Nutrition Facts Panel

- Partially Hydrogenated Oil = Trans Fat
- Products with <0.5g trans fat/serving may label 0g trans fat

Consumers are Looking for
Trans Fat Information on the:

**Ingredient Statement
VS
Nutrition Facts Panel**

- Dairy fats
- Animal fats
- Processing/oxidation
- Low levels of hydrogenation (<0.5 g trans)

There will be more to come on Trans Fat...

- Trans fat claims – first round of comments to ANPR submitted early October.
- Trans fat footnote – comments submitted early October.
- Trans Fat DV – timing may be with other nutrient DV changes implemented 2008.



**Methods of Analysis
and
Related Issues
Discussion**

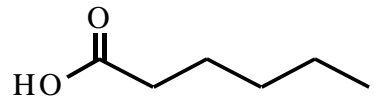
- **Structures and Properties of Fatty Acids**
 - **Methods of Analysis**
 - **Wrap Up Q & A**

Fat is a Chemical Compound

- Fat is made up of:
 - Glycerol
 - Fatty Acids
- There are 4 categories of fatty acids differentiated by the types of chemical bonds
- Fatty acid type determines functionality and health affect

Trans Fat is a Type of Fatty Acid with 1 or more Trans Double Bonds

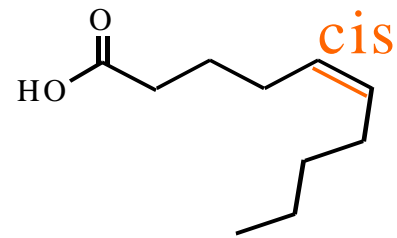
Saturated Fatty Acids (no double bonds)



Coconut, Palm kernel, Palm oil (tropical oils), Butter, Hydrogenated Oils and Shortenings

Raise LDL cholesterol, and increase risk of cardiovascular disease

Mono and Polyunsaturated Fatty Acids (≥ 1 *cis* double bond)



Liquid oils including Canola, Soybean, Olive, Sunflower and Corn oils.

Lower LDL cholesterol, associated with reduced risk of cardiovascular disease.

Trans Fatty Acids (≥ 1 *trans* double bond)



Partially Hydrogenated Oils, Shortenings, Margarines, Roll-ins, & Chips

Raise LDL cholesterol like saturated fat, may also lower HDL. Associated with increased risk of cardiovascular disease and possibly II diabetes.

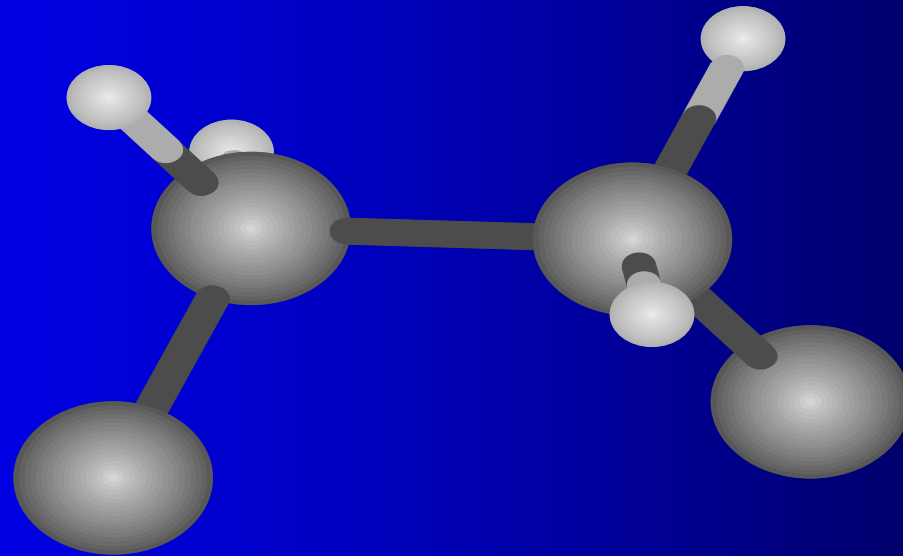
TYPES OF FATTY ACIDS

- Saturated Fats- **No** Double Bonds
- Monounsaturates- **One** Double Bond
 - *Cis* Configuration
 - *Trans* Configuration
- Polyunsaturates-**Multiple** Double Bonds
 - *Cis* -CH₂-*Cis* Configuration
 - Numerous *Cis* and *Trans* Configurations

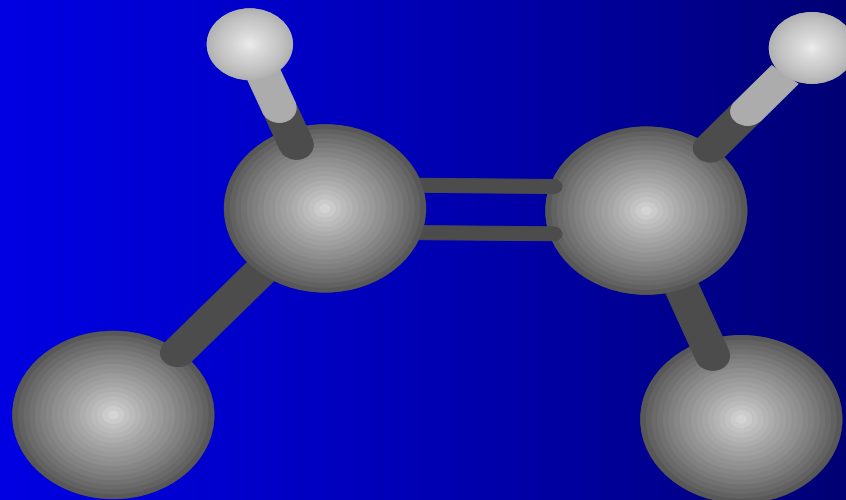
Defining *trans* Fatty Acids for Labeling Purposes

- *trans* fat defined as the sum of all unsaturated fatty acids that contain **one or more isolated (i.e., nonconjugated) double bonds** in a *trans* configuration

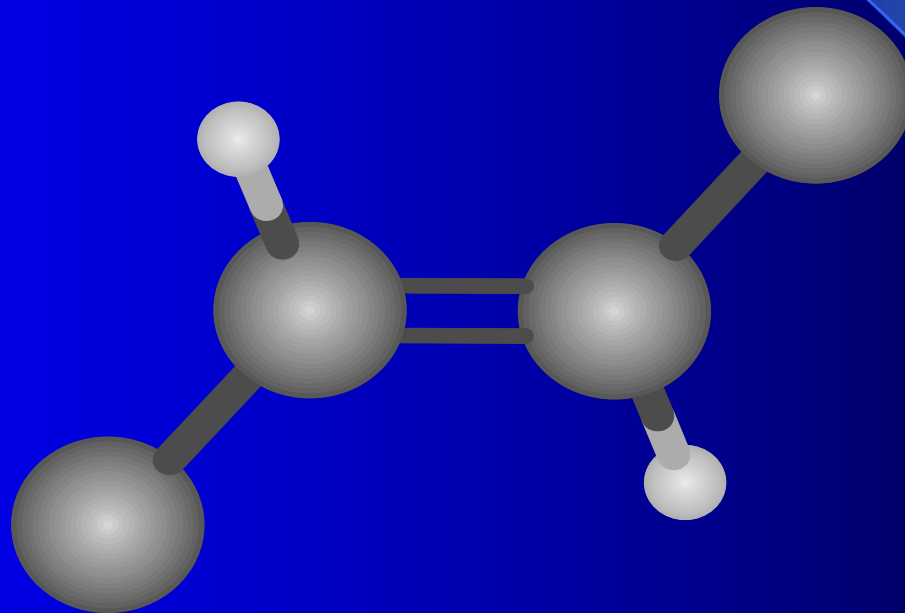
Saturated Chain



Cis Unsaturated Chain



Trans Unsaturated Chain

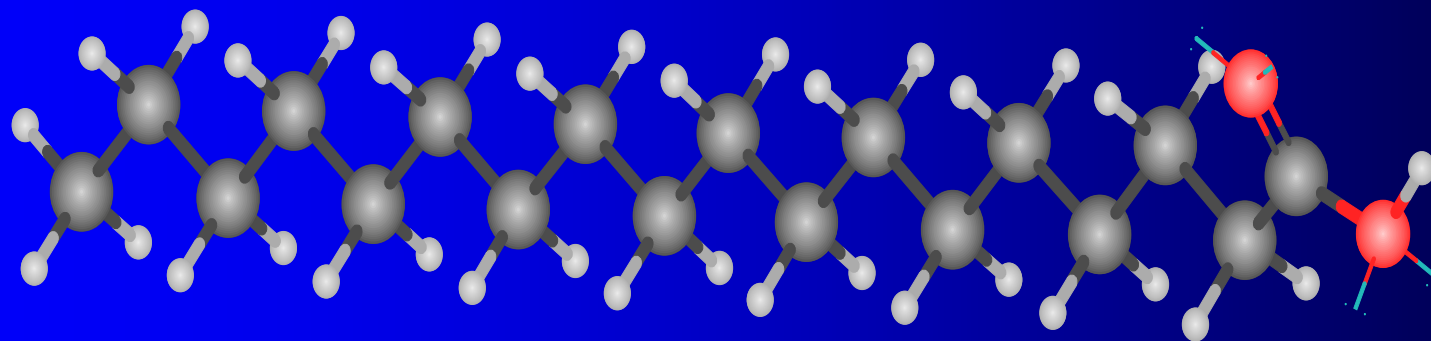


Saturated Fatty Acid-Stearic Acid

Melting Point: 69.6° C

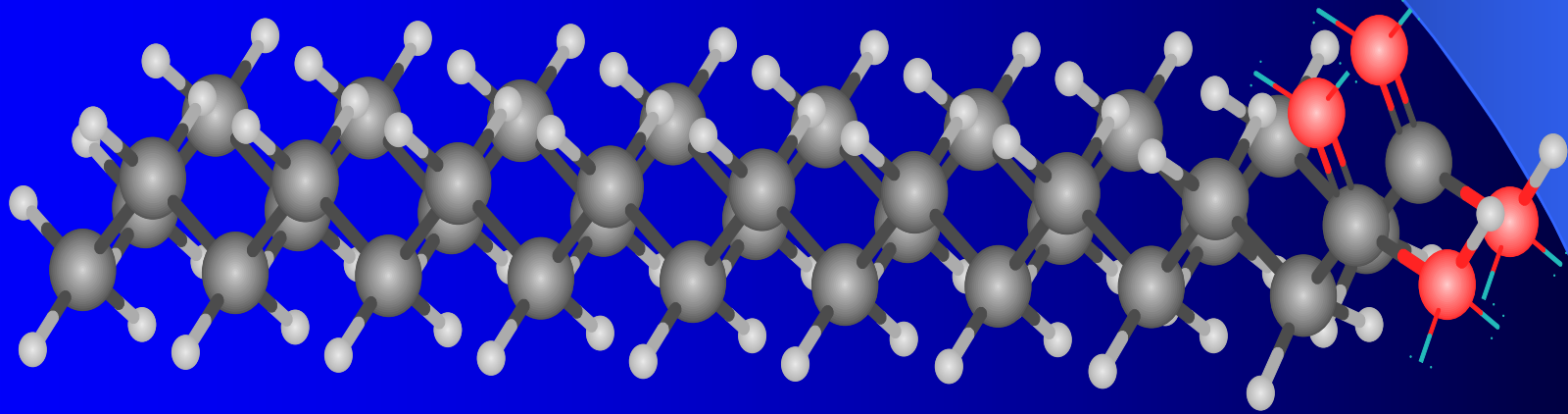
Boiling Point: 383° C

Sources: Animal Fats and Cocoa Butter



Coupling of Stearic Acid (Saturated Fat)

- High Melting Point
- Crystallizes

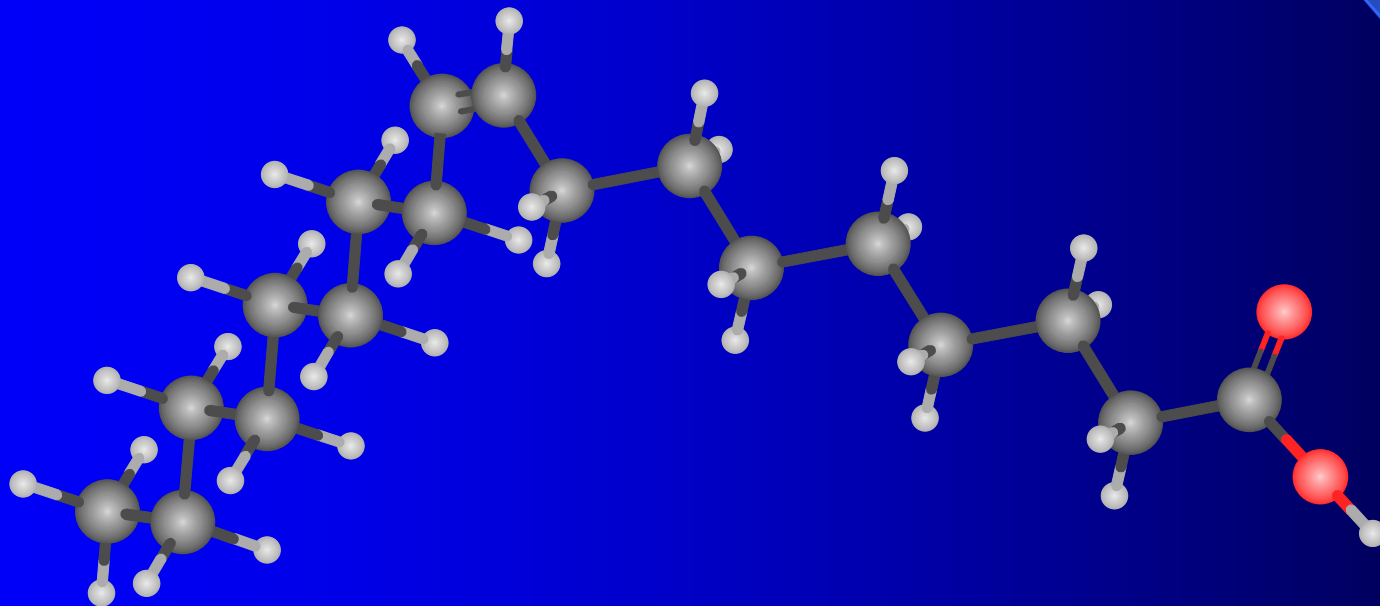


Cis Unsaturated Fatty Acid-Oleic

Melting Point: 13.6° C

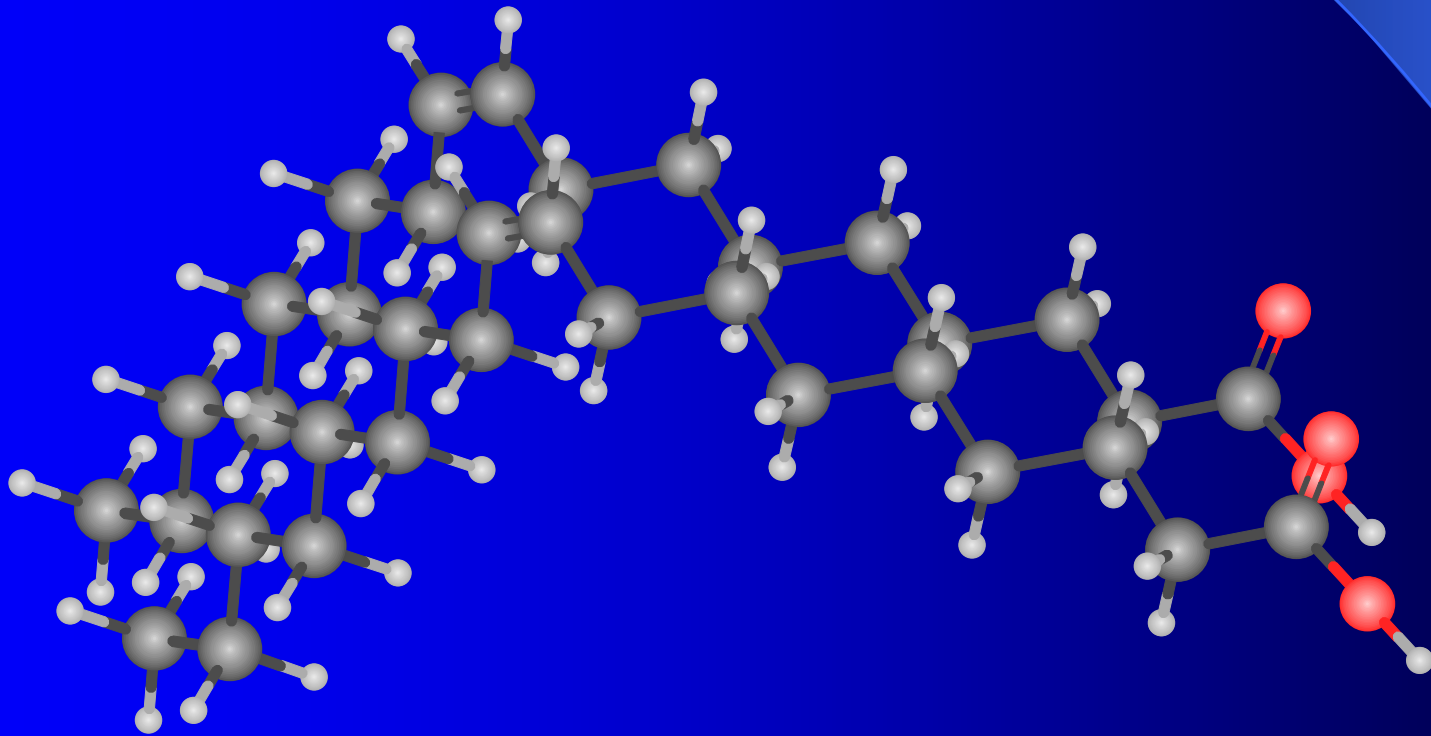
Boiling Point: 286° C

Sources: Animal & Vegetable Oils,
Cocoa Butter, Olive Oil



Coupling of Oleic Acid

Lower Melting Point
Less crystallization

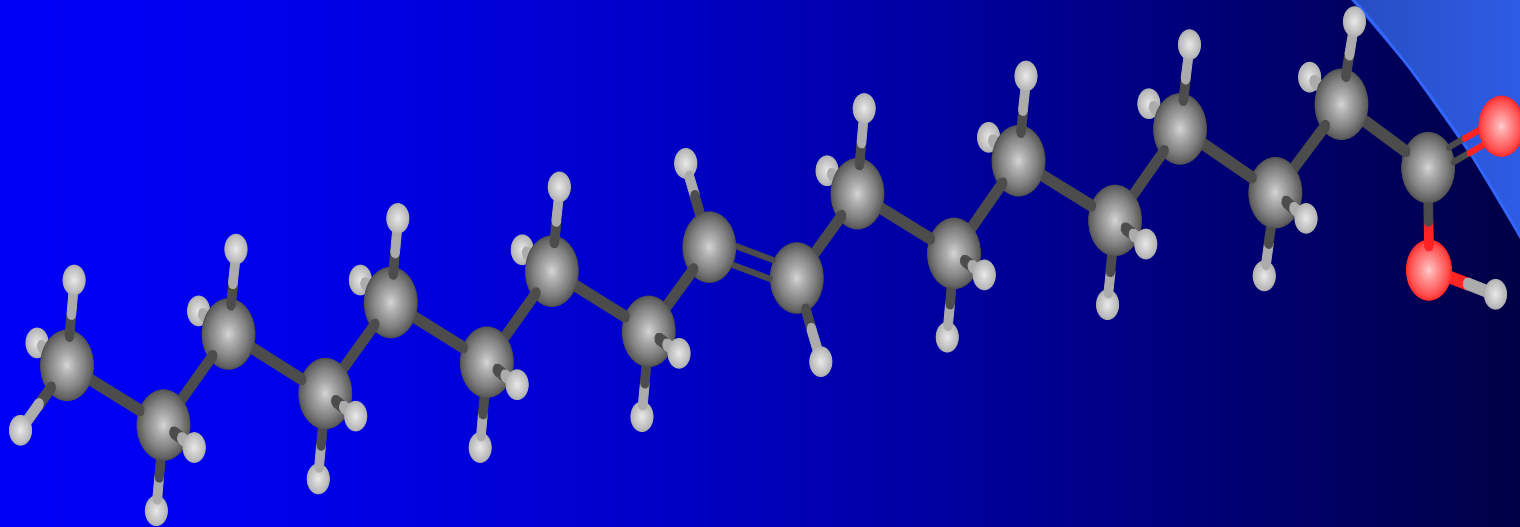


Trans Unsaturated Fatty Acid-Elaidic

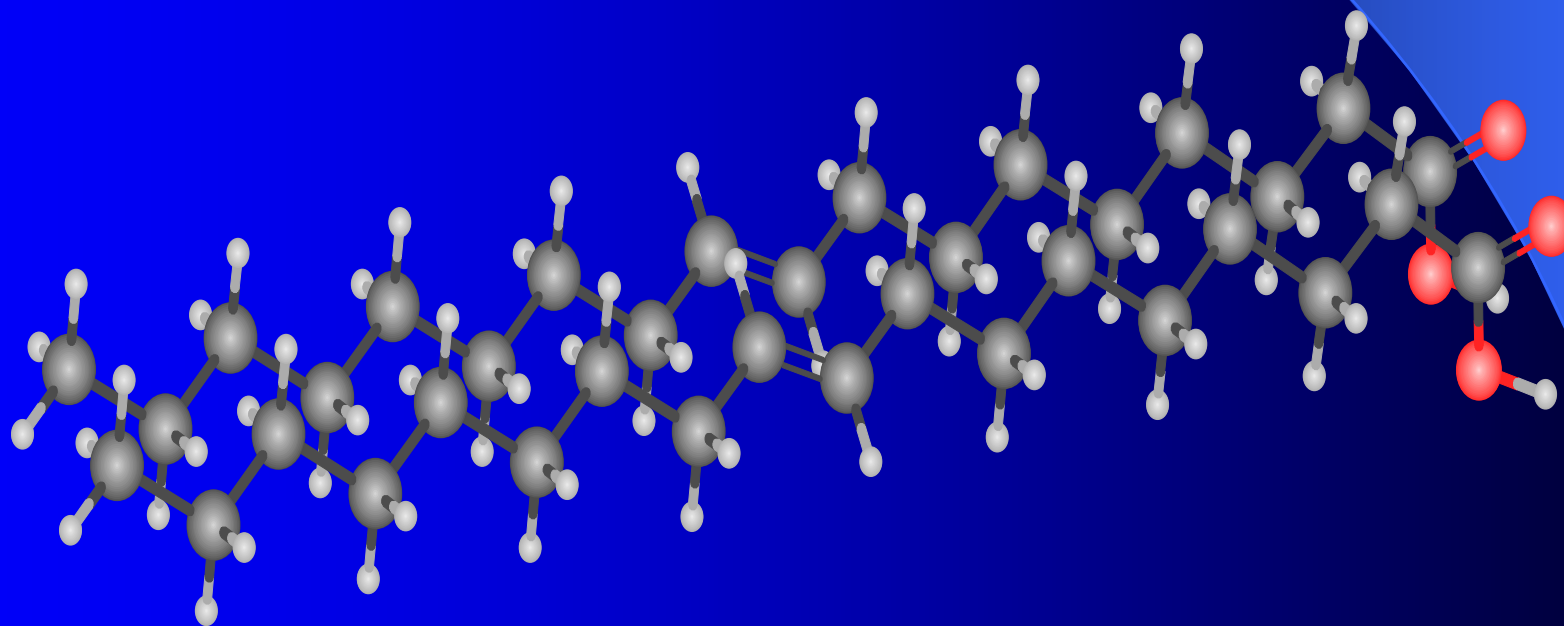
Melting Point: 43.7° C

Boiling Point: 288° C

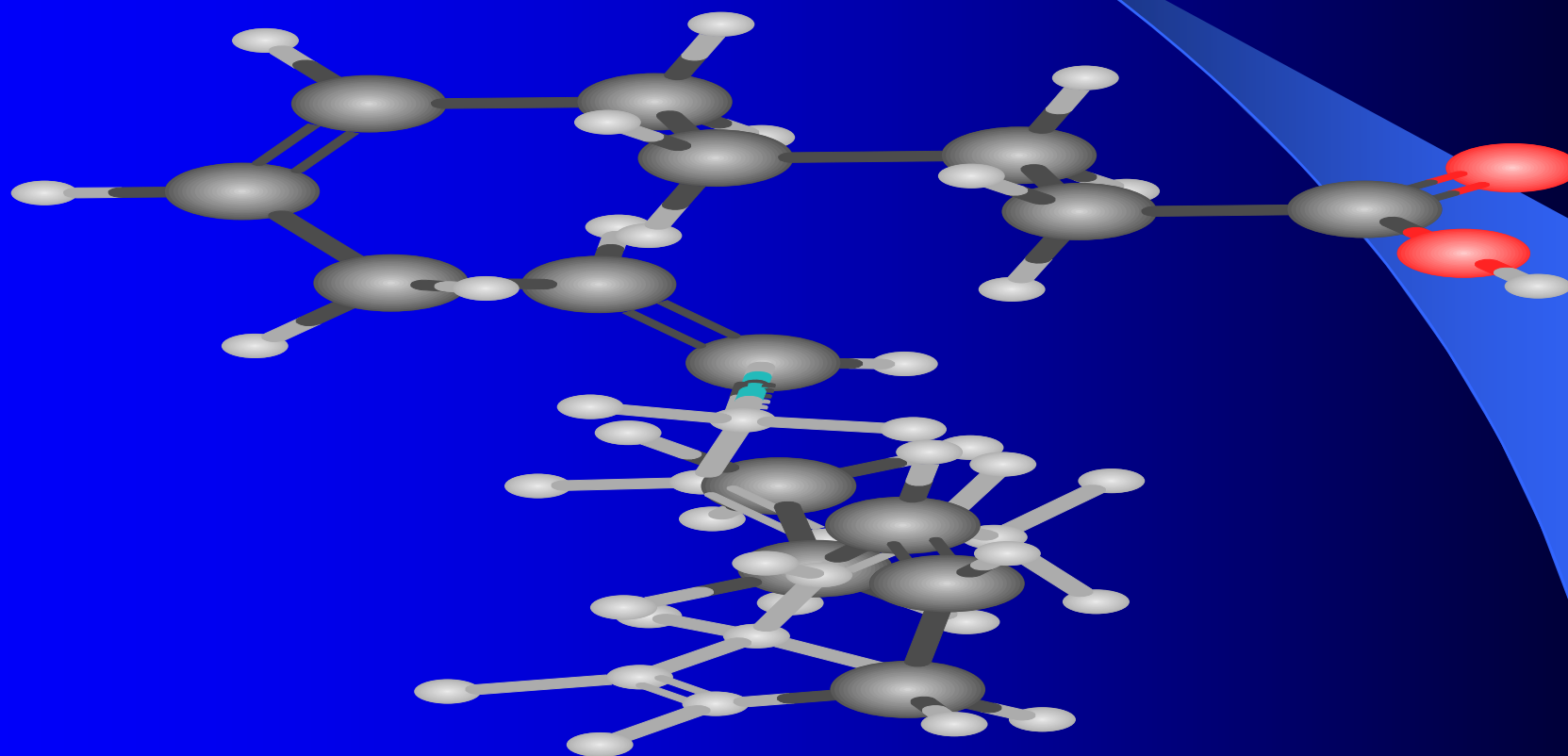
Sources: Hydrogenated Vegetable Oils
And Processed Food



Coupling of Elaidic Acid Crystallizes



C22:6 Acid



Functionality Impact

- Functionality in Food Formulation
 - Blending Effects
 - Oxidation Resistance
 - Leavening/Structure
- Melting Point Differences
 - Texture
 - Mouth Feel

SOURCES of *Trans* Fat

- Hydrogenated Vegetable Oils
- Animal Fats
- Dairy Products
- Result of Fat Oxidation

Analysis *Trans* Fats in Foods

- AOAC International 996.06
 - Total, Saturated and Unsaturated Fatty Acids
 - Add C-11 fatty acid as internal standard
 - Extraction-1 of 3 methods
(Pyrogalllic acid added-Eliminates oxidation and isomerization)
 - Foods except dairy and cheese-Acid hydrolysis
 - Dairy-Ammonium Hydroxide hydrolysis
 - Cheese-Combination of Ammonium Hydroxide hydrolysis followed by Acid hydrolysis

Analysis *Trans* Fats in Foods

- AOAC International 996.06 (cont)
 - Methylation with BF_3 -Methanol
 - GC
 - Capillary Column (SP2560, 100m x 0.25 mm, 0.2um coating)
 - Resolve doublet C18:3, C20:1
 - Resolve triplet C22:1, C20:3, and C20:4
 - 58 individual fatty acids quantitated
 - 9 trans fatty acids
 - Conjugated linoleic acid

Fatty Acids Included in AOAC 996.06

<u>FATTY ACID</u>	<u>RT</u>	<u>RRT (C11=1.0)</u>
● 4:0 Butyric	10.49	0.46
● 6:0 Caproic	12.36	0.54
● 8:0 Caprylic	15.69	0.68
● 10:0 Capric	20.39	0.89
● 11:0 Undecanoic	22.99	1.00
● 12:0 Lauric	25.58	1.11
● 13:0 Tridecanoic	28.15	1.22
● 14:0 Myristic	30.65	1.33

Fatty Acids Included in AOAC 996.06

<u>FATTY ACID</u>	<u>RT</u>	<u>RRT (C11=1.0)</u>
● 14:1 Myristoleic	32.63	1.42
● 14:1 <i>trans</i> -Myristelaidic	32.01	1.39
● 15:0 Pentadecanoic	33.04	1.44
● 15:1 Pentadecenoic	34.98	1.52
● 16:0 Palmitic	35.41	1.54
● 16:1 <i>trans</i> -Palmitelaidic	36.39	1.58
● 16:1 Palmitoleic	36.88	1.60
● 17:0 Margaric	37.54	1.63

Fatty Acids Included in AOAC 996.06

<u>FATTY ACID</u>	<u>RT</u>	<u>RRT (C11=1.0)</u>
● 17:1 Margaroleic	38.92	1.69
● 18:0 Stearic	39.78	1.73
● 18:1 <i>trans</i> 6-Petroselenic	40.50	1.76
● 18:1 <i>trans</i> -Elaidic	40.61	1.77
● 18:1 <i>trans</i> 11-Vaccenic	40.72	1.77
● 18:1 Petroselenic	40.90	1.78
● 18:1 Oleic	40.99	1.78

Fatty Acids Included in AOAC 996.06

<u>FATTY ACID</u>	<u>RT</u>	<u>RRT (C11=1.0)</u>
● 18:1 Oleic	40.99	1.78
● 18:1 Vaccenic	41.18	1.79
● 18:1 Octadecenoic	41.54	1.81
● 18:2 <i>trans</i> -Linolelaidic	41.69	1.81
● 18:2 <i>trans</i> 9-Linolelaidic	42.11	1.83
● 18:2 <i>trans</i> 12-Linolelaidic	42.53	1.85
● 18:2 Linoleic	42.87	1.86
● 20:0 Arachidic	43.75	1.90
● 18:3 γ -Linolenic	44.25	1.92

Fatty Acids Included in AOAC 996.06

<u>FATTY ACID</u>	<u>RT</u>	<u>RRT (C11=1.0)</u>
● 20:1 Eicosenic <i>cis</i> 5	44.42	1.93
● 20:1 Eicosenic <i>trans</i> 11	44.45	1.93
● 20:1 Eicosenic <i>cis</i> 8	44.67	1.94
● 20:1 Eicosenic <i>cis</i> 11	44.82	1.95
● 20:1 Eicosenic <i>cis</i> 13	44.99	1.96
● 18:3 Linolenic	45.02	1.96
● 18:2 Linoleic—conjugated	45.35	1.97
● 18:2 Linoleic—conjugated	45.40	1.97
● 21:0 Heneicosanoic	45.69	1.99

Fatty Acids Included in AOAC 996.06

<u>FATTY ACID</u>	<u>RT</u>	<u>RRT (C11=1.0)</u>
● 18:2 Linoleic—conjugated	46.18	2.01
● 18:4 Octadectetraenoic	46.39	2.02
● 20:2 Eicosadienoic	46.65	2.03
● 22:0 Behenic	47.46	2.06
● 20:3 g-Eicosatrienoic	47.94	2.09
● 22:1 Cetoleic	48.27	2.10
● 22:1 Erucic	48.50	2.11
● 20:3 Eicosatrienoic	48.68	2.12
● 20:4 Arachidonic	48.94	2.13

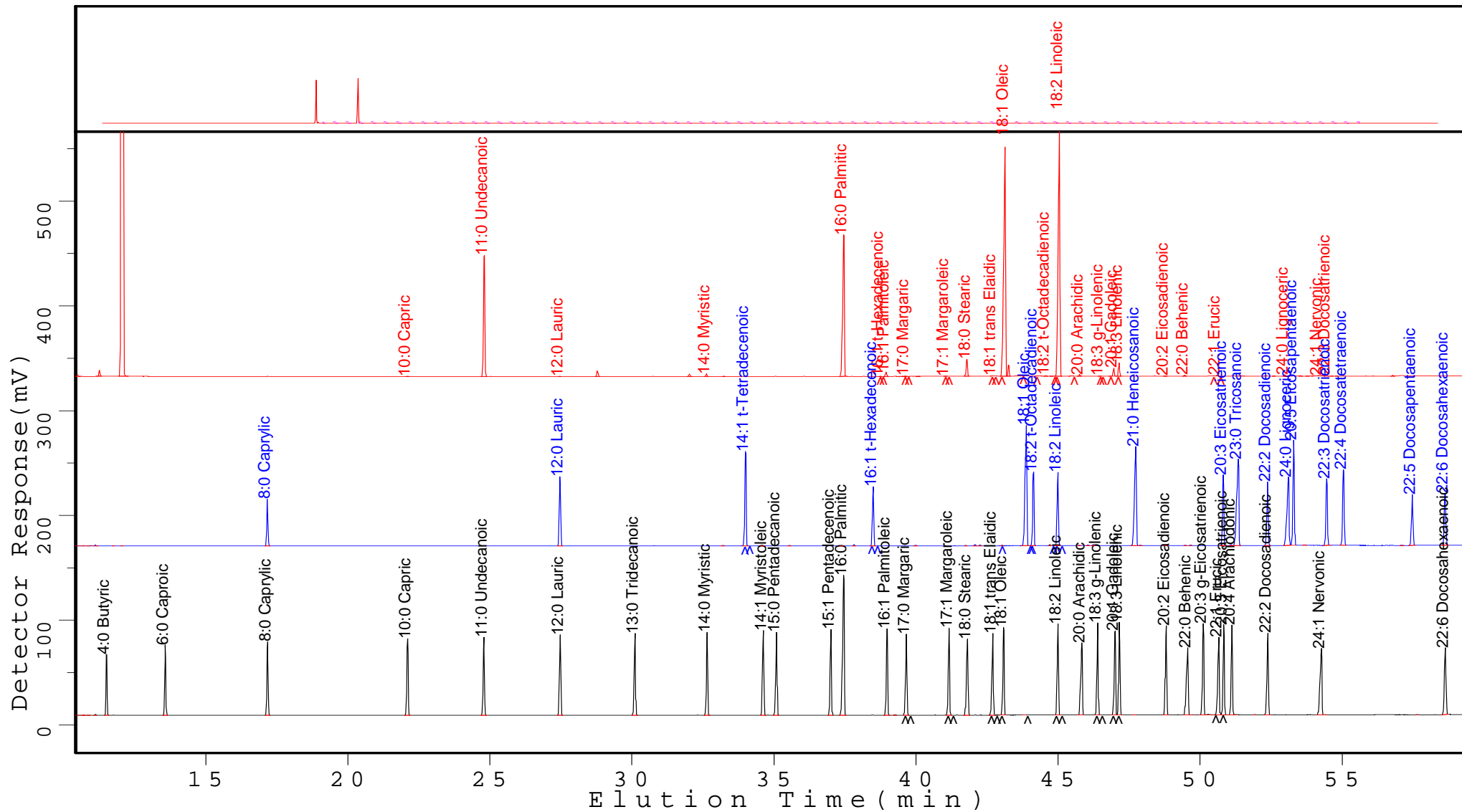
Fatty Acids Included in AOAC 996.06

<u>FATTY ACID</u>	<u>RT</u>	<u>RRT (C11=1.0)</u>
● 23:0 Tricosanoic	49.22	2.14
● 22:2 Docosadienoic	50.17	2.18
● 24:0 Lignoceric	50.79	2.21
● 20:5 Eicosapentaenoic	50.96	2.22
● 24:1 Nervonic	51.92	2.26
● 22:3 Docosatrienoic	51.98	2.26
● 22:4 Docosatetraenoic	52.28	2.27
● 22:5 Docosapentaenoic	54.75	2.38
● 22:6 Docosahexaenoic	55.82	2.43

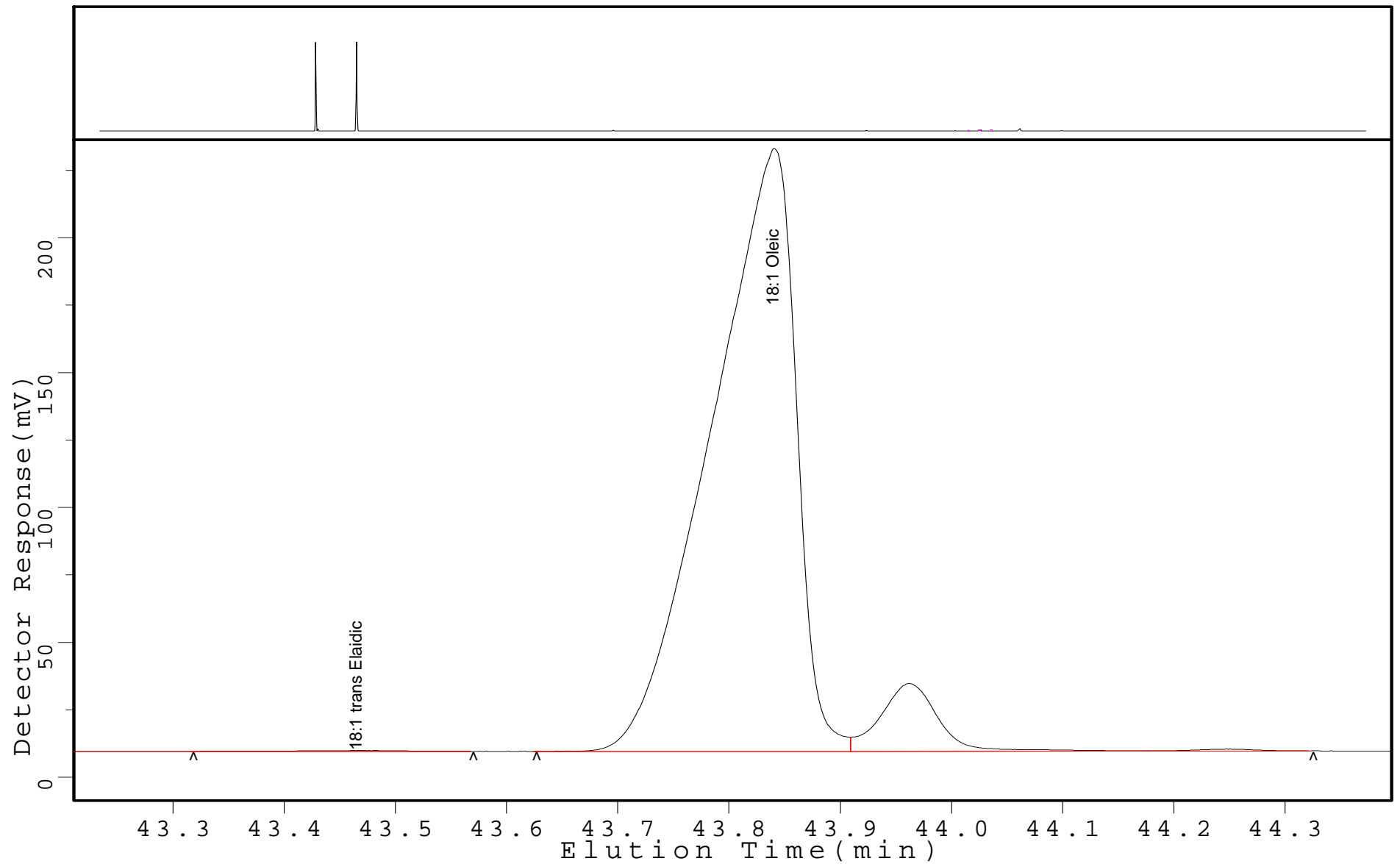
Fatty Acids Included in AOAC 996.06

- ✓ Performance Specifications
 - ✓ Separate Pairs- C20:1 and C18:3
(Rt's = 44.99 and 45.02 respectively)
 - ✓ Separate trio C22:1, C20:3, and C20:4
(Rt's = 48.50, 48.68 and 48.94 respectively)

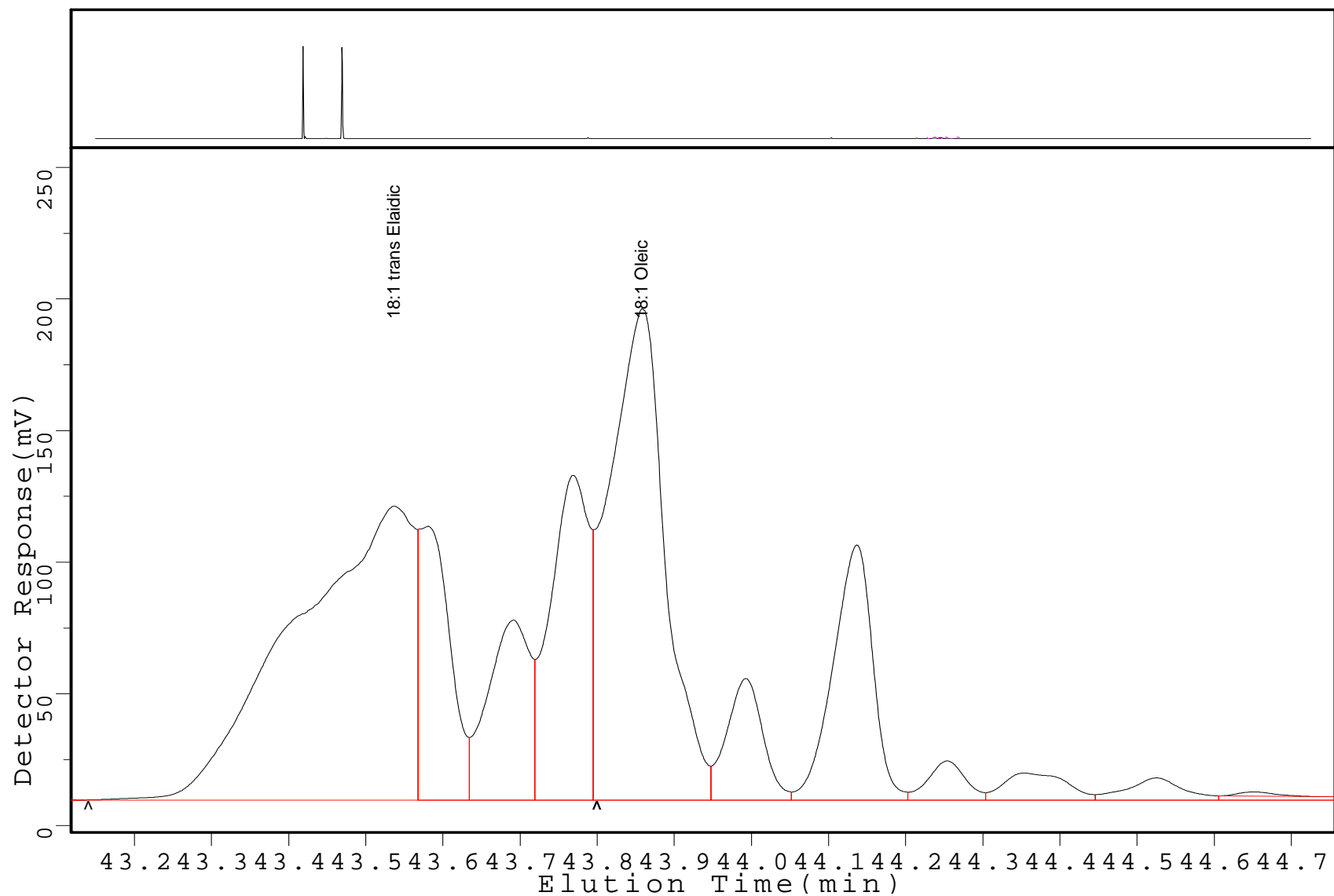
STANDARD FATTY ACID Methyl Esters



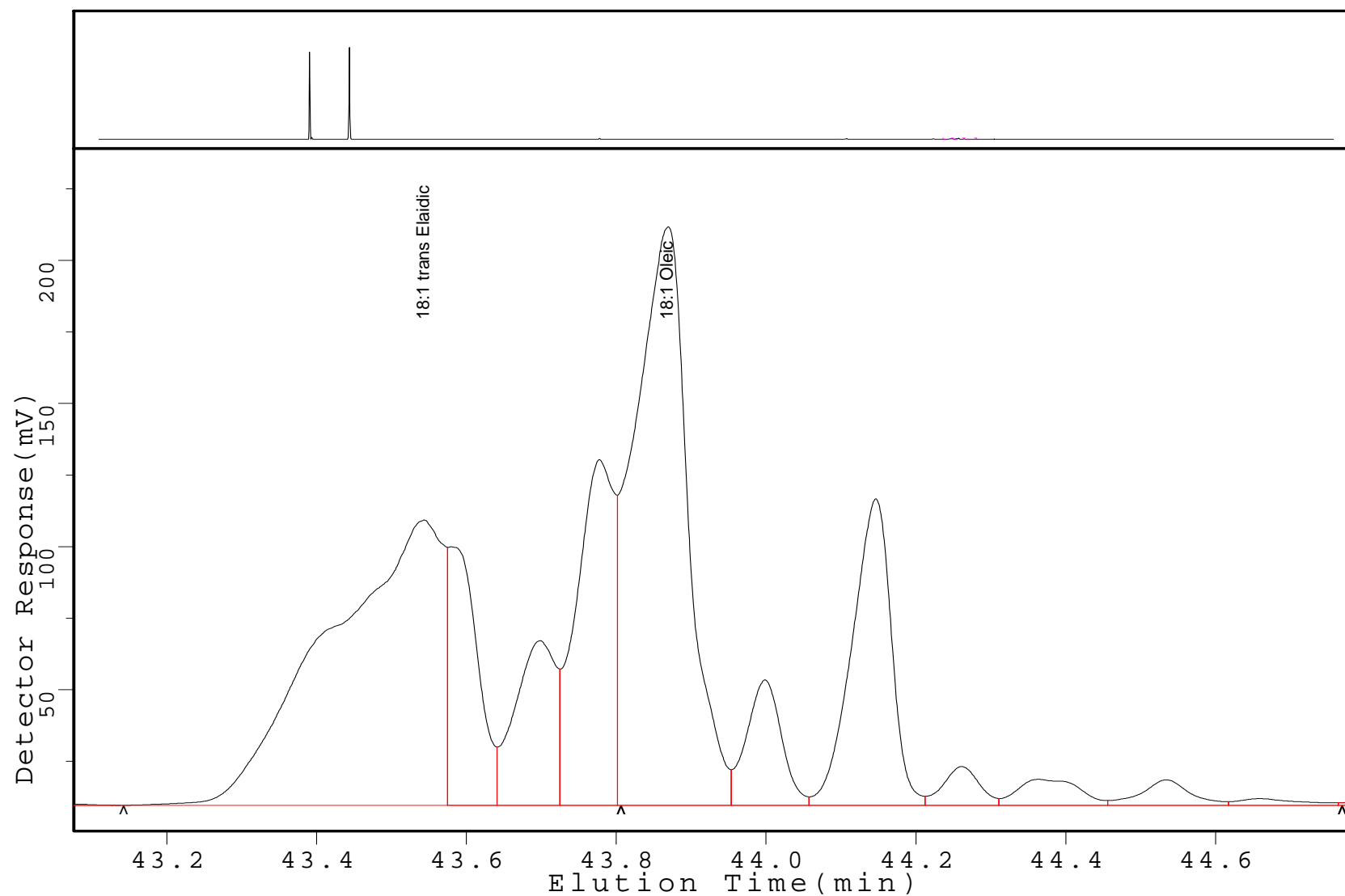
Soybean Oil



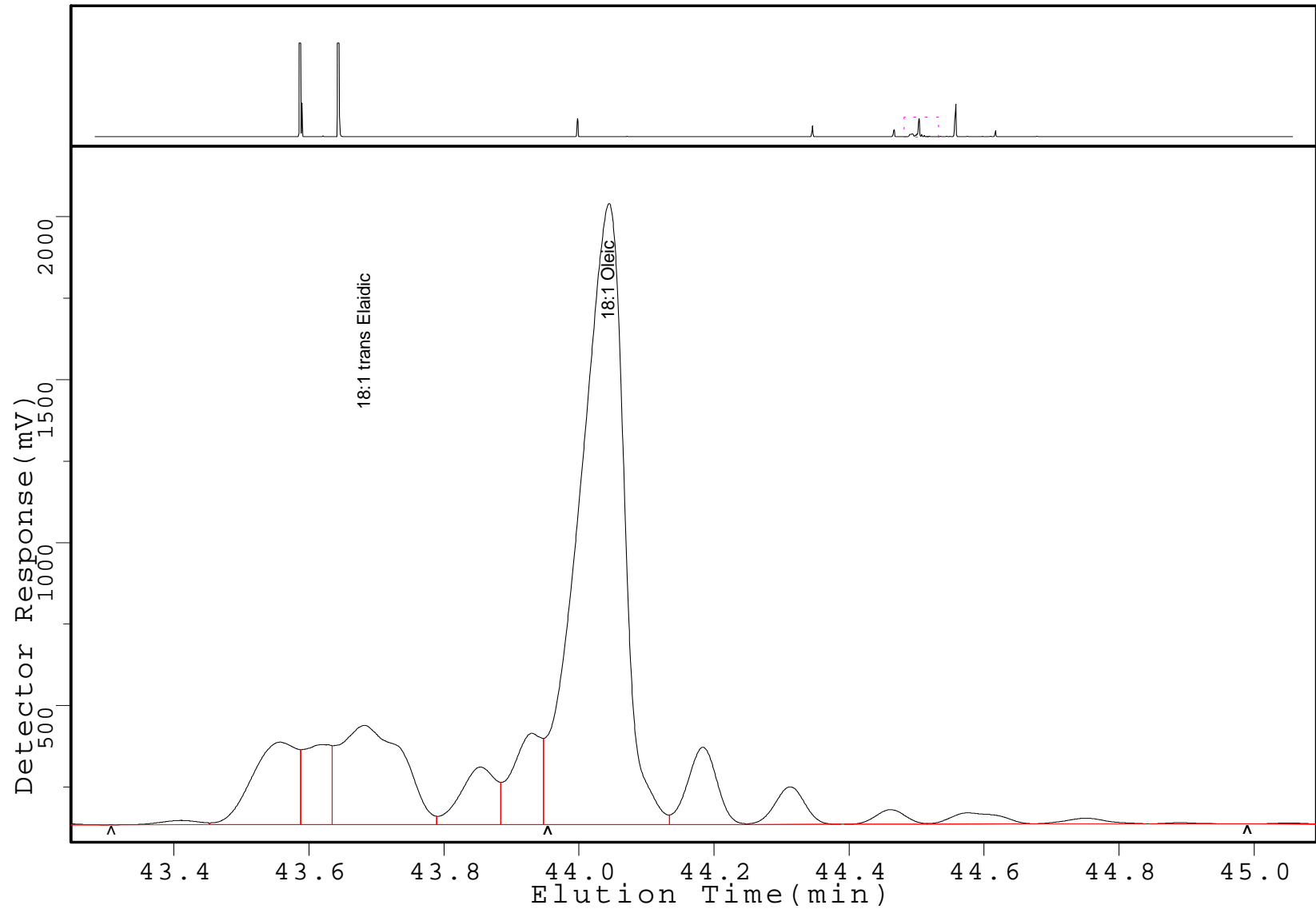
Hydrogenated Soy Oil



Commercial Vegetable Shortening



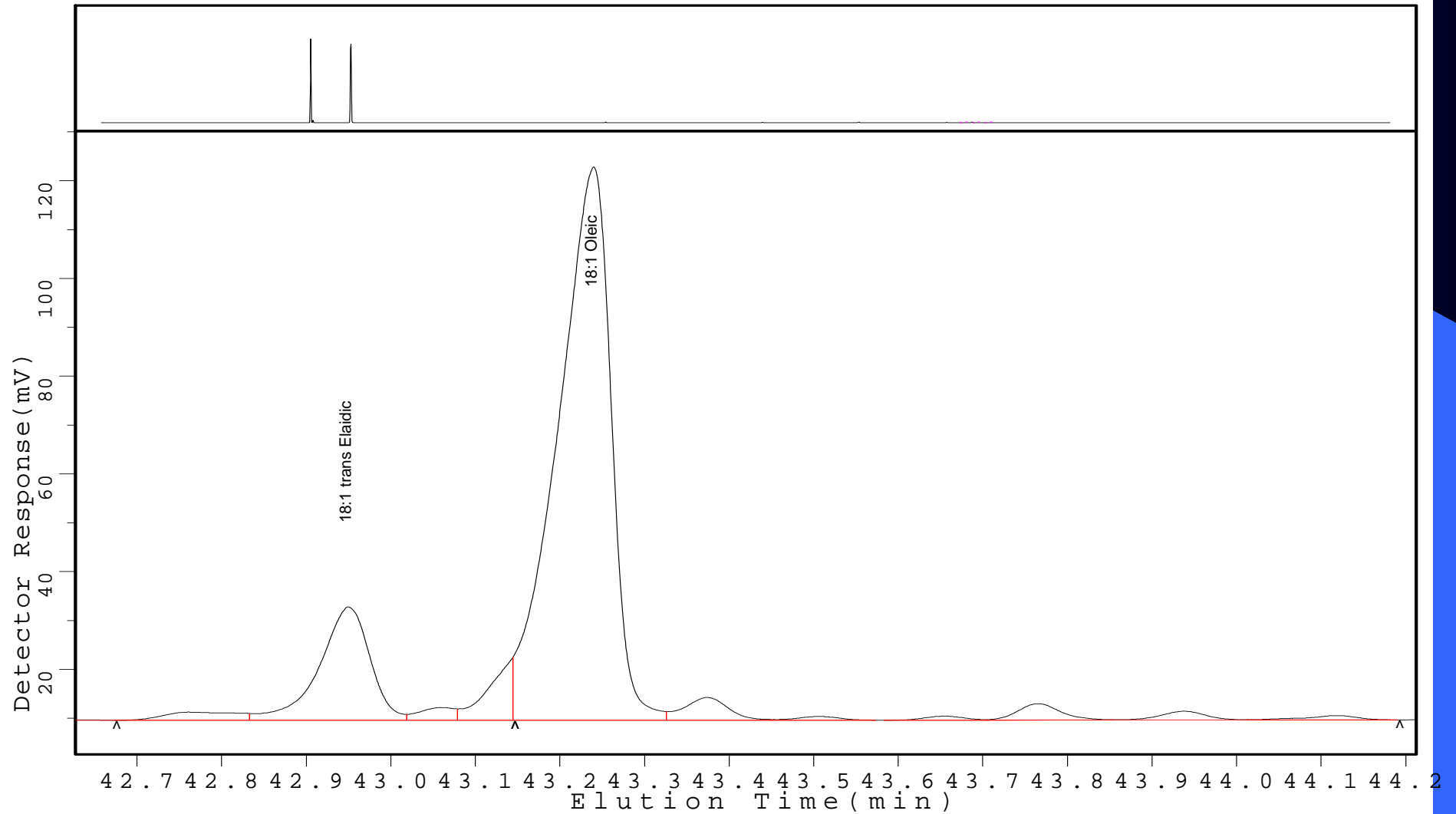
Margarine



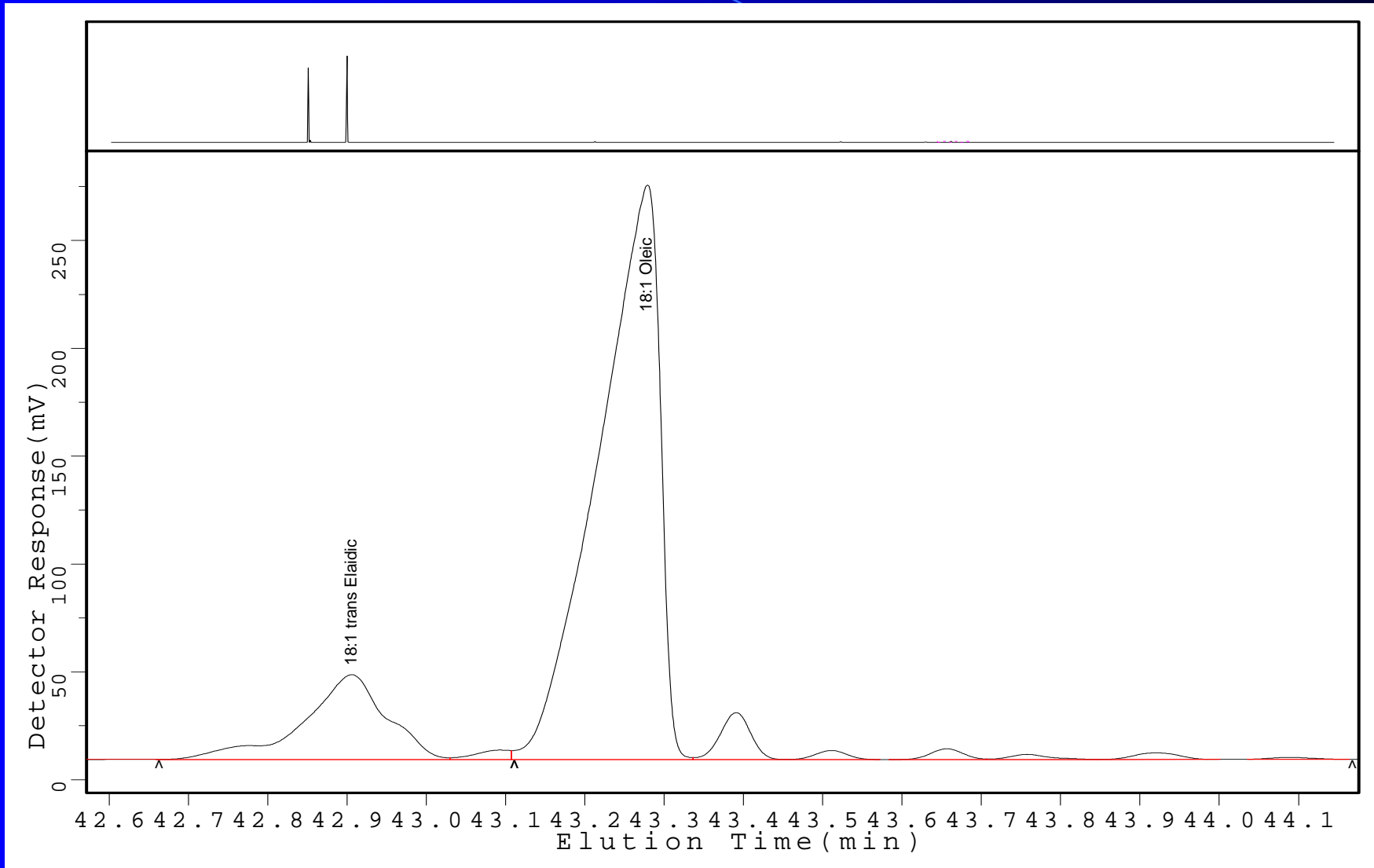
	Normalized by Weight	%(w/w) as Triglyceride in Product	Saturated Fatty Acids	Monounsaturated Fatty Acids	cis-cis Polyunsaturated Fatty Acids	trans Fatty Acids
4:0 Butyric	1.203%	0.097	0.085			
6:0 Caproic	0.682%	0.055	0.050			
8:0 Caprylic	0.385%	0.031	0.028			
10:0 Capric	0.868%	0.070	0.065			
12:0 Lauric	0.980%	0.079	0.074			
13:0 Tridecanoic	0.037%	0.003	0.003			
14:0 Myristic	4.068%	0.328	0.311			
14:1 t-Tetradecenoic	0.285%	0.023				0.022
14:1 Myristoleic	0.471%	0.038		0.036		
15:0 Pentadecanoic	0.459%	0.037	0.035			
15:1 Pentadecenoic						
16:0 Palmitic	21.248%	1.713	1.632			
16:1 t-Hexadecenoic	0.360%	0.029				0.028
16:1 Palmitoleic	1.823%	0.147		0.140		
17:0 Margaric	0.695%	0.056	0.053			
17:1 Margardeic						
18:0 Stearic	12.850%	1.036	0.992			
18:1 trans Elaidic	8.546%	0.689				0.659
18:1 Oleic	32.089%	2.587		2.476		
18:2 t-Octadecadienoic	1.761%	0.142				0.136
18:2 Linoleic	9.092%	0.733			0.701	

18:0 Stearic	12.850%	1.036	0.992				
18:1 trans Elaidic	8.546%	0.689					0.659
18:1 Oleic	32.089%	2.587			2.476		
18:2 t-Octadecadienoic	1.761%	0.142					0.136
18:2 Linoleic	9.092%	0.733				0.701	
20:0 Arachidic	0.223%	0.018	0.017				
18:3 g-Linolenic	0.037%	0.003				0.003	
20:1 Gadoleic	0.558%	0.045			0.043		
18:3 Linolenic	0.744%	0.060				0.057	
21:0 Heneicosanoic							
18:2 conj-Linoleic	0.050%	0.004					0.004
18:4 Octadecatetraenoic							
20:2 Eicosadienoic	0.025%	0.002				0.002	
22:0 Behenic	0.161%	0.013	0.013				
20:3 g-Eicosatrienoic	0.062%	0.005				0.005	
22:1 Erucic							
20:3 Eicosatrienoic							
20:4 Arachidonic	0.087%	0.007				0.007	
23:0 Tricosanoic	0.037%	0.003	0.003				
22:2 Docosadienoic							
24:0 Lignoceric	0.074%	0.006	0.006				
20:5 Eicosapentaenoic							
24:1 Nervonic							
22:3 Docosatrienoic							
22:4 Docosatetraenoic							
22:5 Docosapentaenoic	0.037%	0.003				0.003	
22:6 Docosahexaenoic							
Totals	100.0%	8.06	3.37	2.70	0.78	0.85	
Percent of Fatty Acid Components based on Total Fat			43.79%	35.05%	10.12%	11.04%	

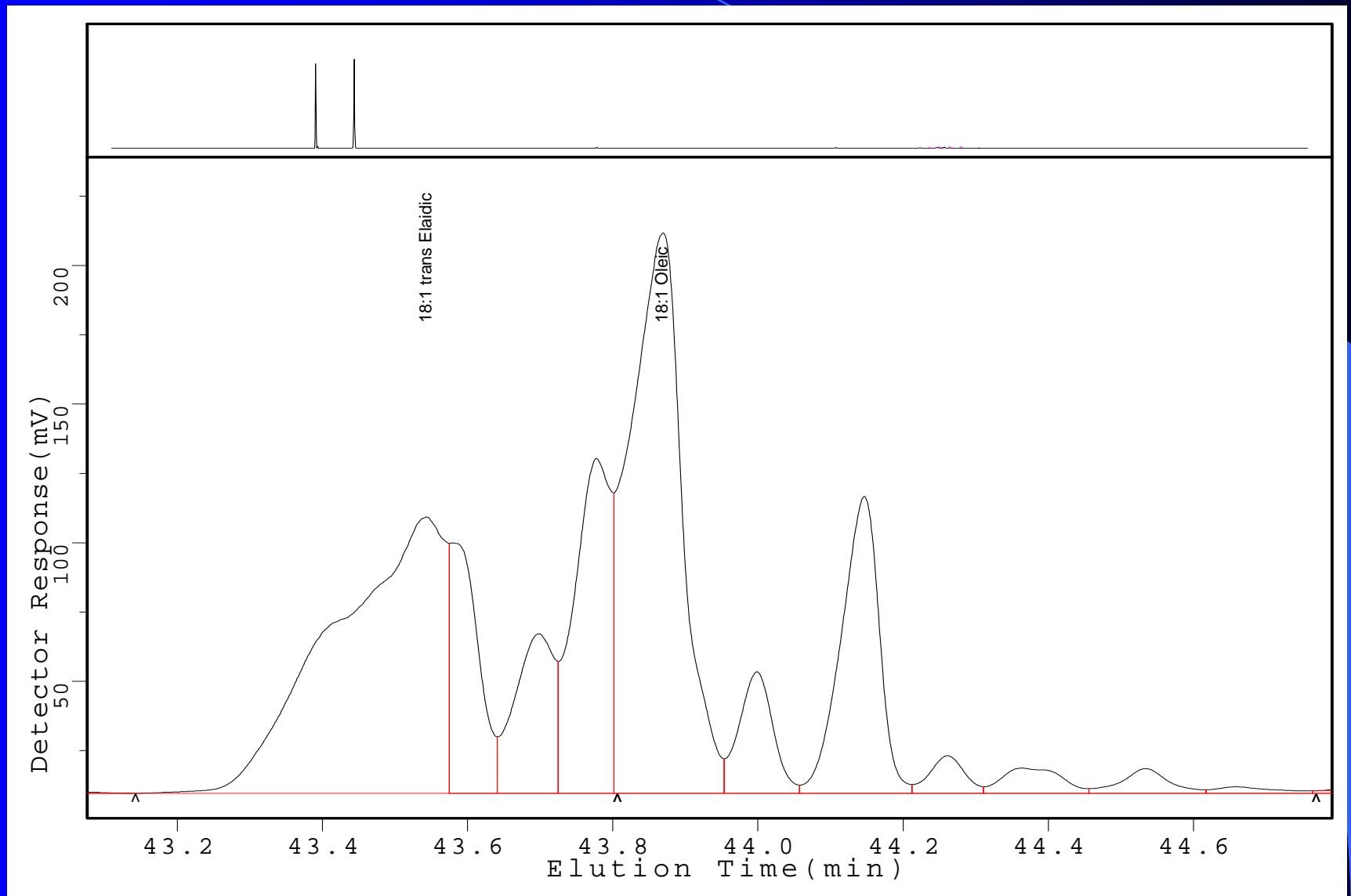
Butter *Trans*



Tallow



Commercial Vegetable Shortening



Trans FATS

Effect of Processing

- *Trans* Fats levels can change with processing especially if oxidation can occur, e.g. where no antioxidants are being used. Therefore it is recommended that the finished product be analyzed

Method Precautions

- Avoid all traces of water in the BF_3 Methanol
 - Can make 3-5% difference
- Assure sample size is small enough to provide approximately 1:1 ratios with standards for largest peaks
- Assure all reaction times are closely followed

AOCS Efforts

- GC Columns determined to be best:
 - CP Sil88
 - SP 2560
- Adjusted “Area Normalized” approach desired for convenience of fats/oil suppliers
- Proposals for “faster” procedures

AOCS Efforts

Proposals for “faster” procedures

- Silliker Laboratories
- Cargill Ingredients
- Nestle QA
- Will not change results, just less analyst time

Updates to Official Method 996.06 AOAC International

Thus far there have
been no formal approaches to
AOACI
regarding an update

Summary

- Trans fat is now a mandatory nutrient required for all FDA regulated products
- All package labels will need to change
- January 1, 2006 is the compliance date

Summary

- Method AOAC 996.06 is effective for all foods analyses
- Skilled analysts are necessary for accurate data
- Method streamlining is being investigated.

NLEA

- **N**utrition
- **L**abeling
- **E**ducation
- **A**ct

Trans Fat Labeling Activities NLEA

- **N**on *cis* Fatty Acids
- **L**ess than
- **E**asy to
- **A**nalyze

NLEA

- **N**eed
- **L**otsa
- **E**xcellent
- **A**nalysts

● Questions?