

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

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Database Conference  
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# ***Trans FAT LABELING*** **an** ***Industry Perspective***

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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”

The background is a dark blue gradient. A thin, light blue curved line starts from the left edge and curves downwards towards the center. A larger, semi-transparent blue shape, resembling a spotlight or a lens flare, is positioned below the text, pointing upwards towards the words "General Mills?".

**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

<b>Calories</b>		130
Calories from Fat		35
<hr/>		
		<b>% Daily Value*</b>
<b>Total Fat</b>	4g	6%
Saturated Fat	0.5g	3%
Trans Fat	0.5g	
<b>Cholesterol</b>	0mg	0%
<b>Sodium</b>	410mg	17%
<b>Potassium</b>	50mg	1%
<b>Total Carbohydrate</b>	22g	7%
Dietary Fiber	1g	4%
Sugars	2g	
<b>Protein</b>	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
<b>Total Fat</b>	Less than	65g	80g
<b>Sat Fat</b>	Less than	20g	25g
<b>Cholesterol</b>	Less than	300mg	300mg
<b>Sodium</b>	Less than	2,400mg	2,400mg
<b>Potassium</b>		3,500mg	3,500mg
<b>Total Carbohydrate</b>		300g	375g
<b>Dietary Fiber</b>		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**

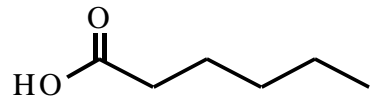
- **Structures and Properties of Fatty Acids**
  - **Methods of Analysis**
    - **Wrap Up Q & A**

# 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

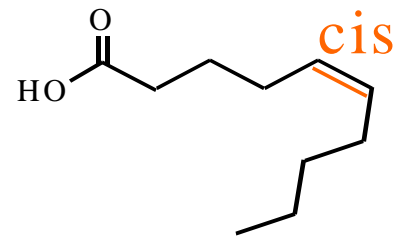
## Saturated Fatty Acids (no double bonds)



**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 ( $\geq 1$ *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 ( $\geq 1$ *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 type II diabetes.**

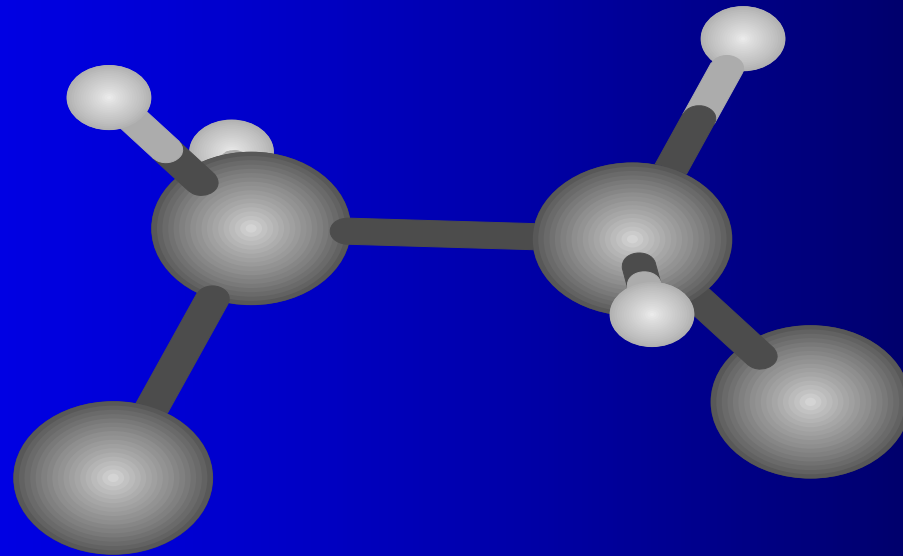
# TYPES OF FATTY ACIDS

- Saturated Fats- **No** Double Bonds
- Monounsaturates- **One** Double Bond
  - *Cis* Configuration
  - *Trans* Configuration
- Polyunsaturates-**Multiple** Double Bonds
  - *Cis* -CH<sub>2</sub>-*Cis* Configuration
  - Numerous *Cis* and *Trans* Configurations

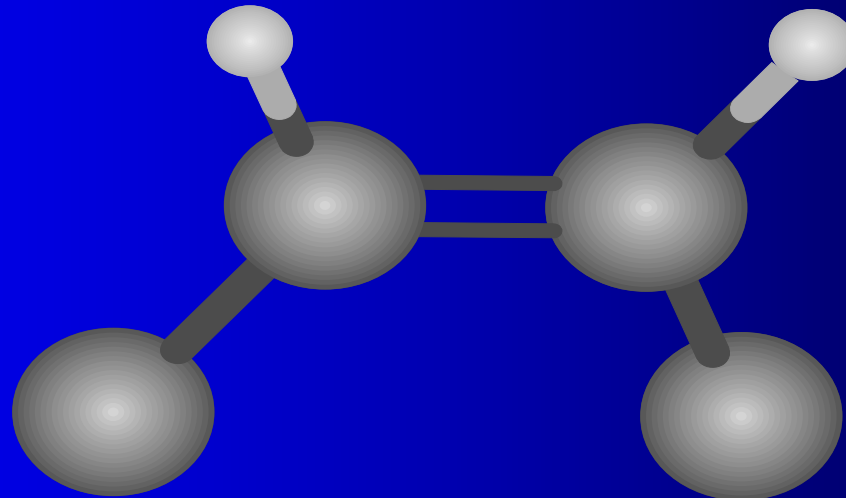
# Defining *trans* Fatty Acids for Labeling Purposes

- *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

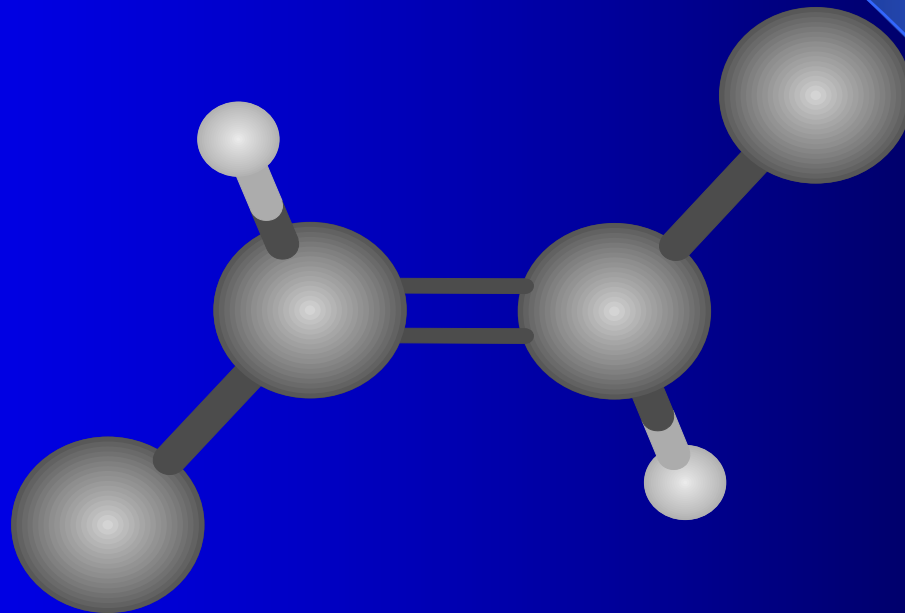
# Saturated Chain



# Cis Unsaturated Chain



# Trans Unsaturated Chain

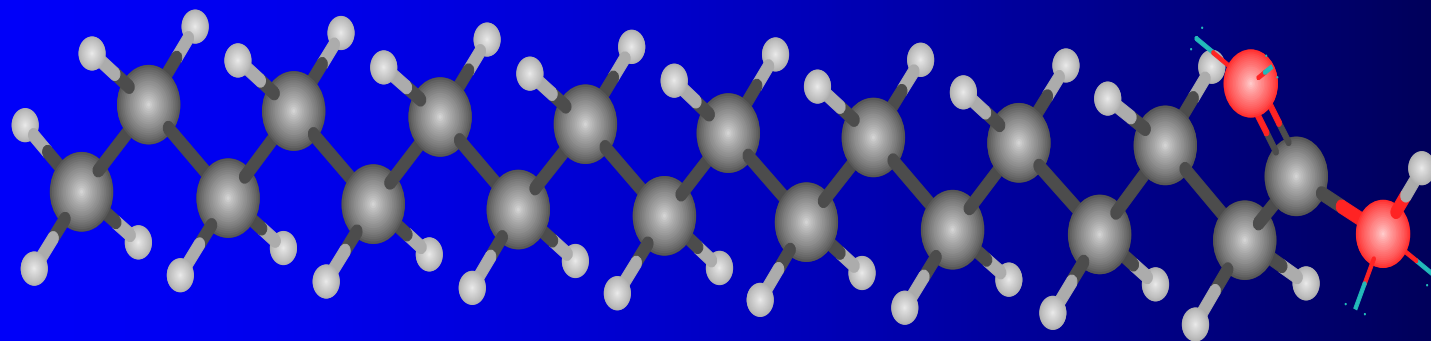


# Saturated Fatty Acid-Stearic Acid

Melting Point: 69.6° C

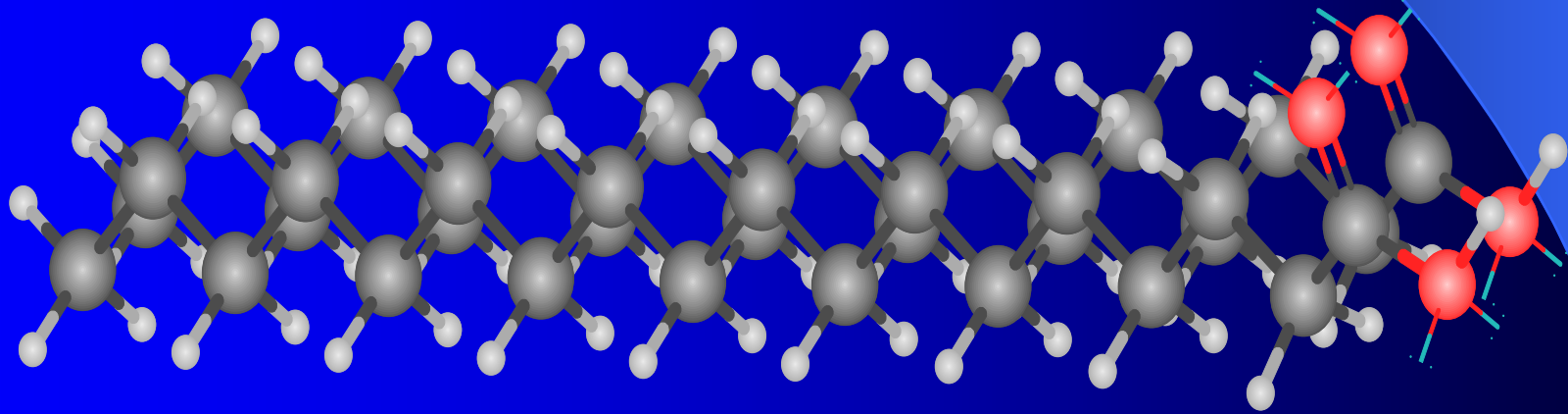
Boiling Point: 383° C

Sources: Animal Fats and Cocoa Butter



# Coupling of Stearic Acid (Saturated Fat)

- High Melting Point
- Crystallizes

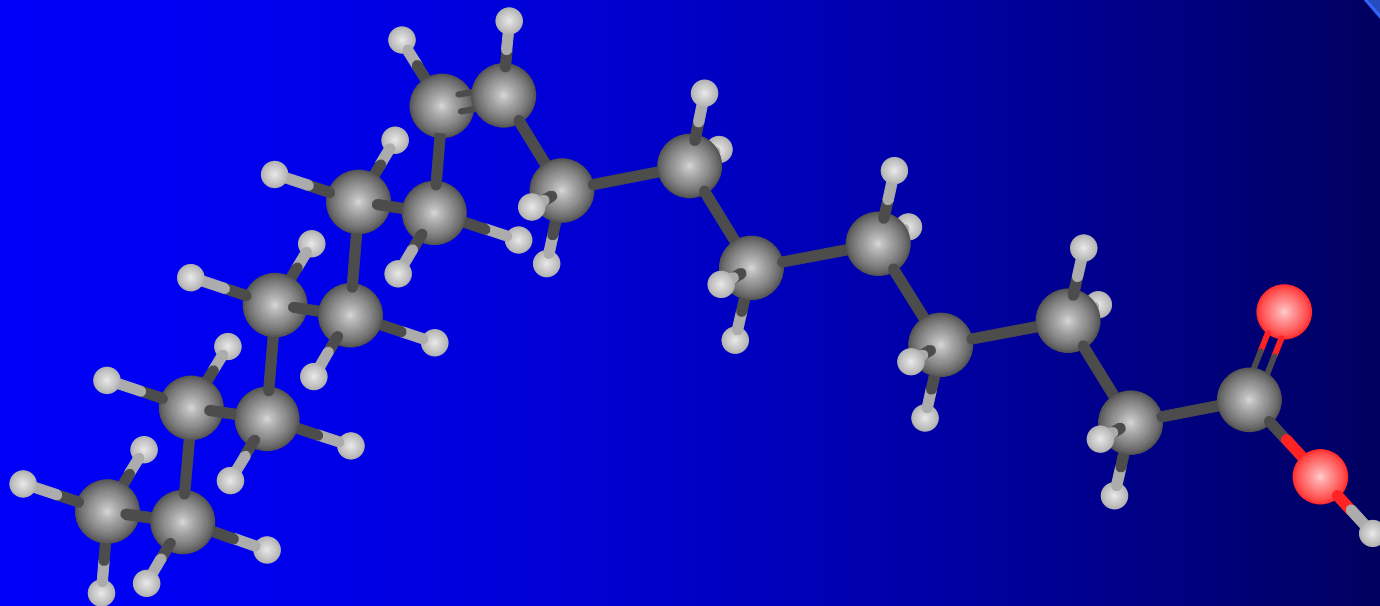


# *Cis* Unsaturated Fatty Acid-Oleic

Melting Point: 13.6° C

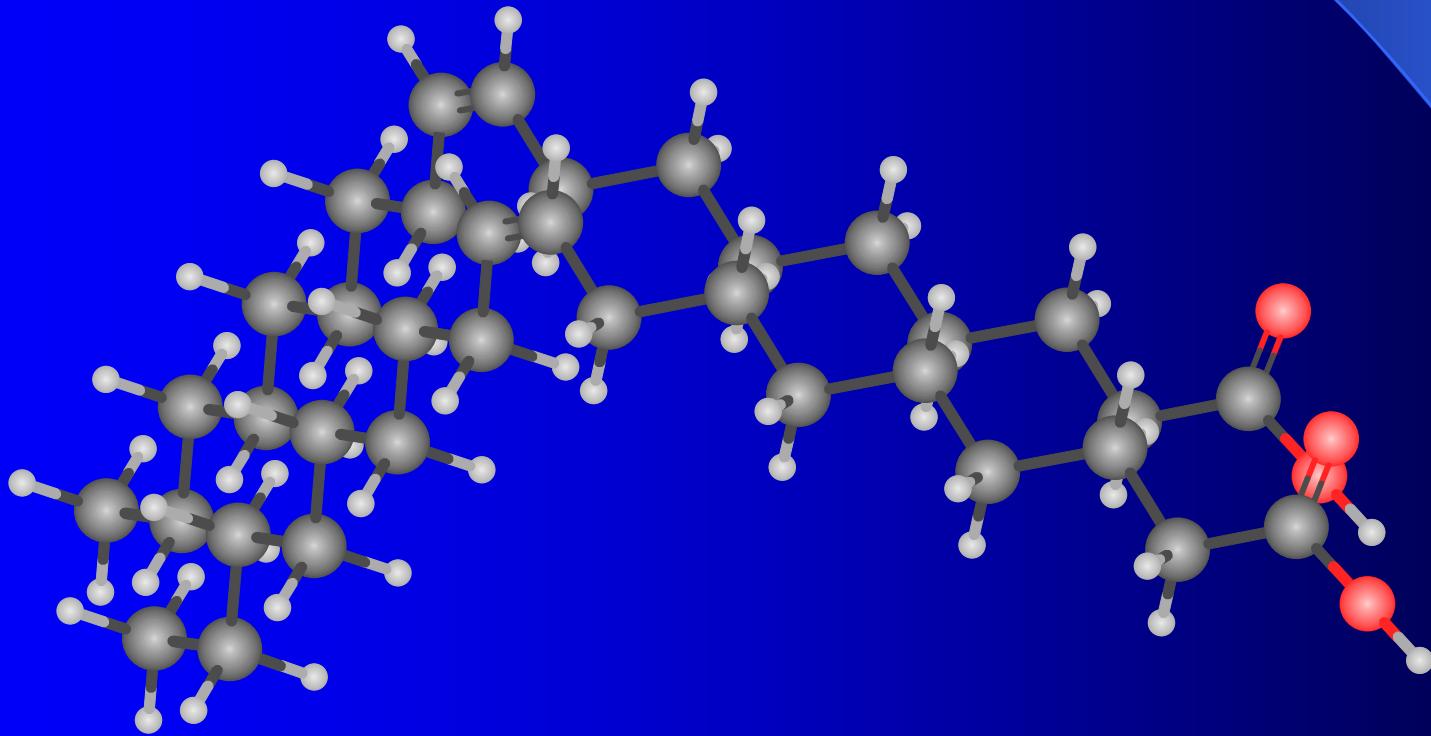
Boiling Point: 286° C

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



# Coupling of Oleic Acid

Lower Melting Point  
Less crystallization

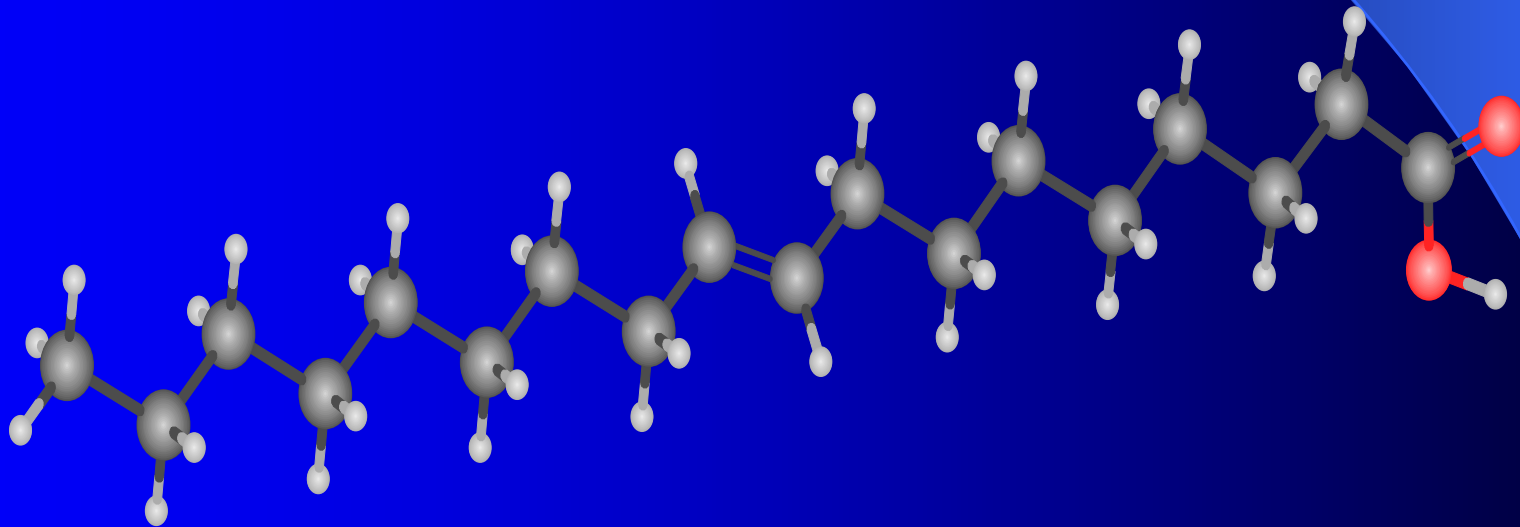


# *Trans* Unsaturated Fatty Acid-Elaidic

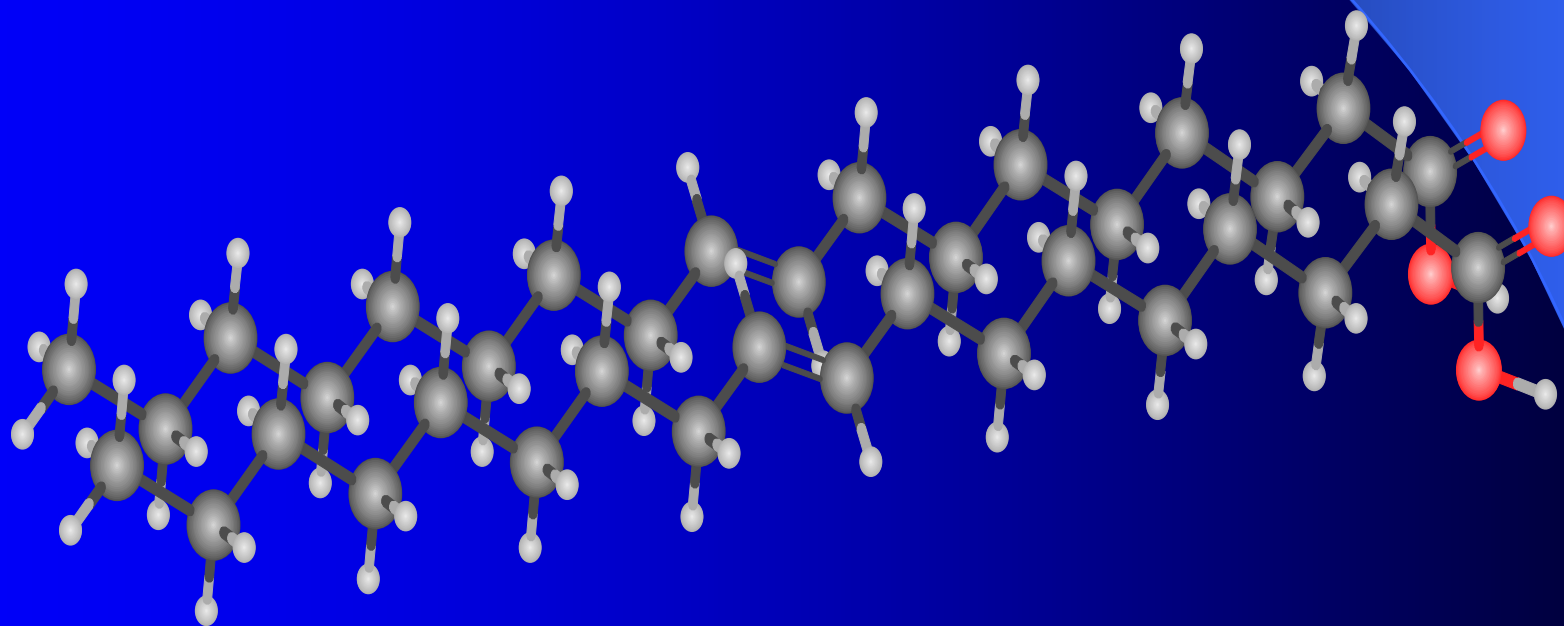
Melting Point: 43.7° C

Boiling Point: 288° C

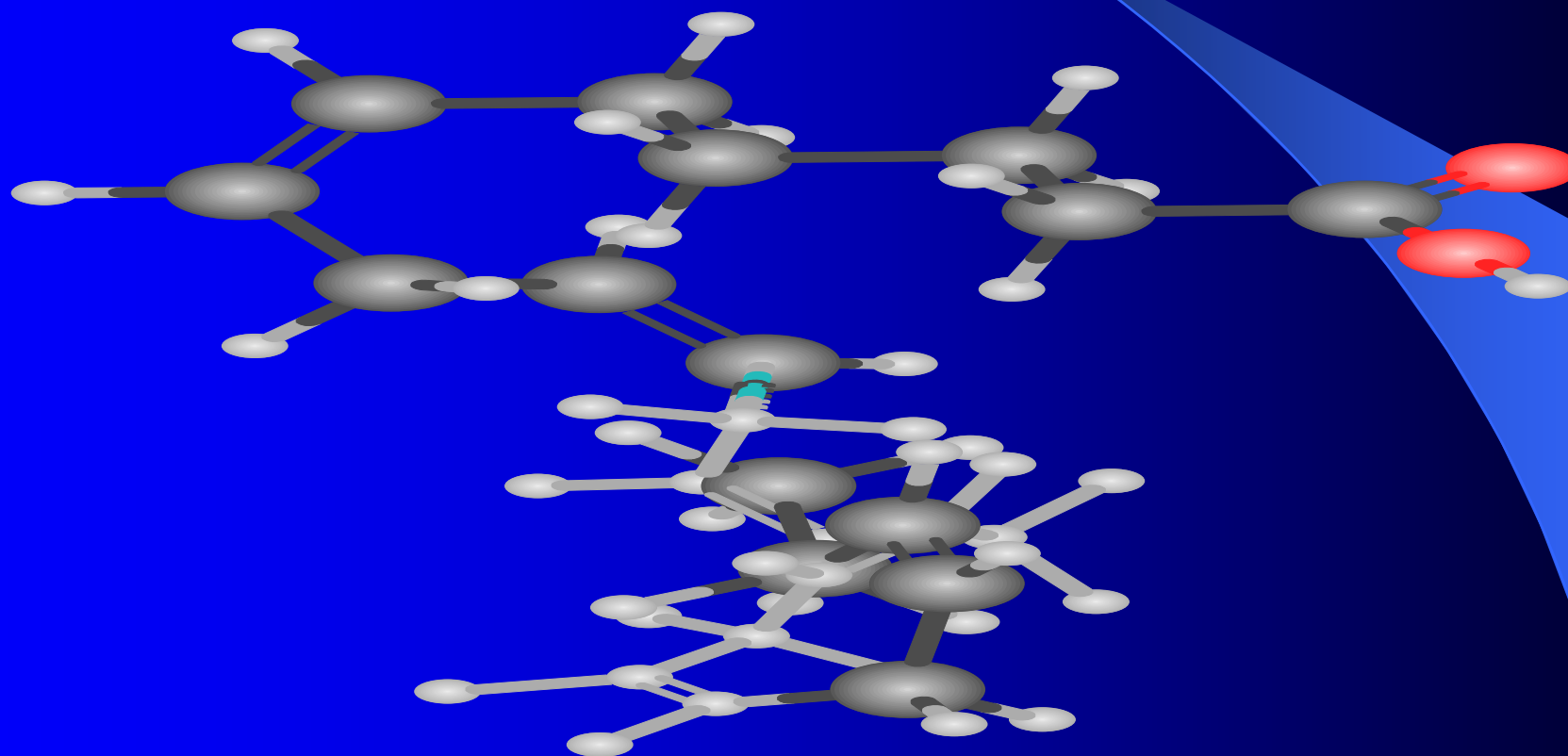
Sources: Hydrogenated Vegetable Oils  
And Processed Food



# 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  
(Pyrogallol 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  $\text{BF}_3$ -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 $\gamma$ -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

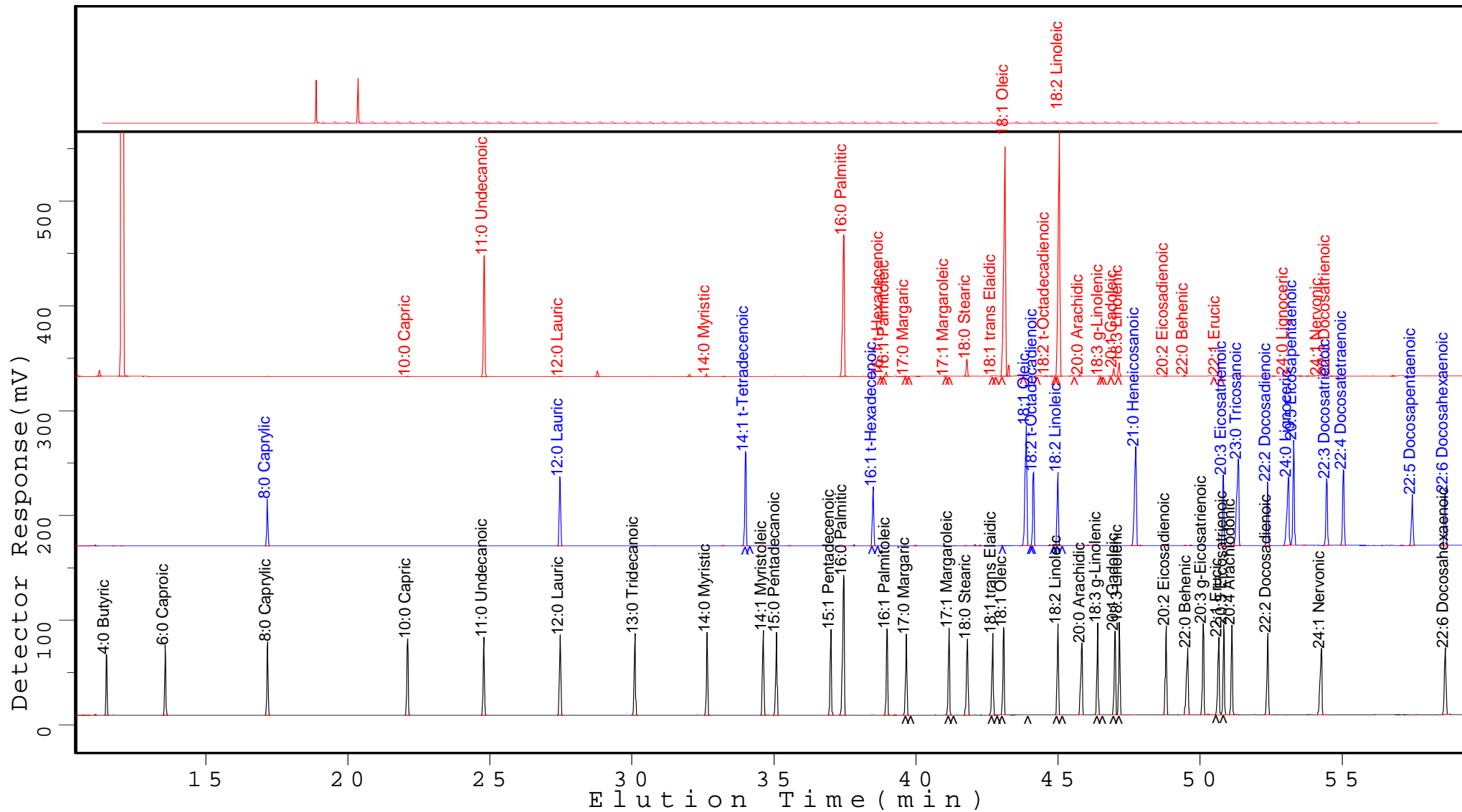
# Fatty Acids Included in AOAC 996.06

<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

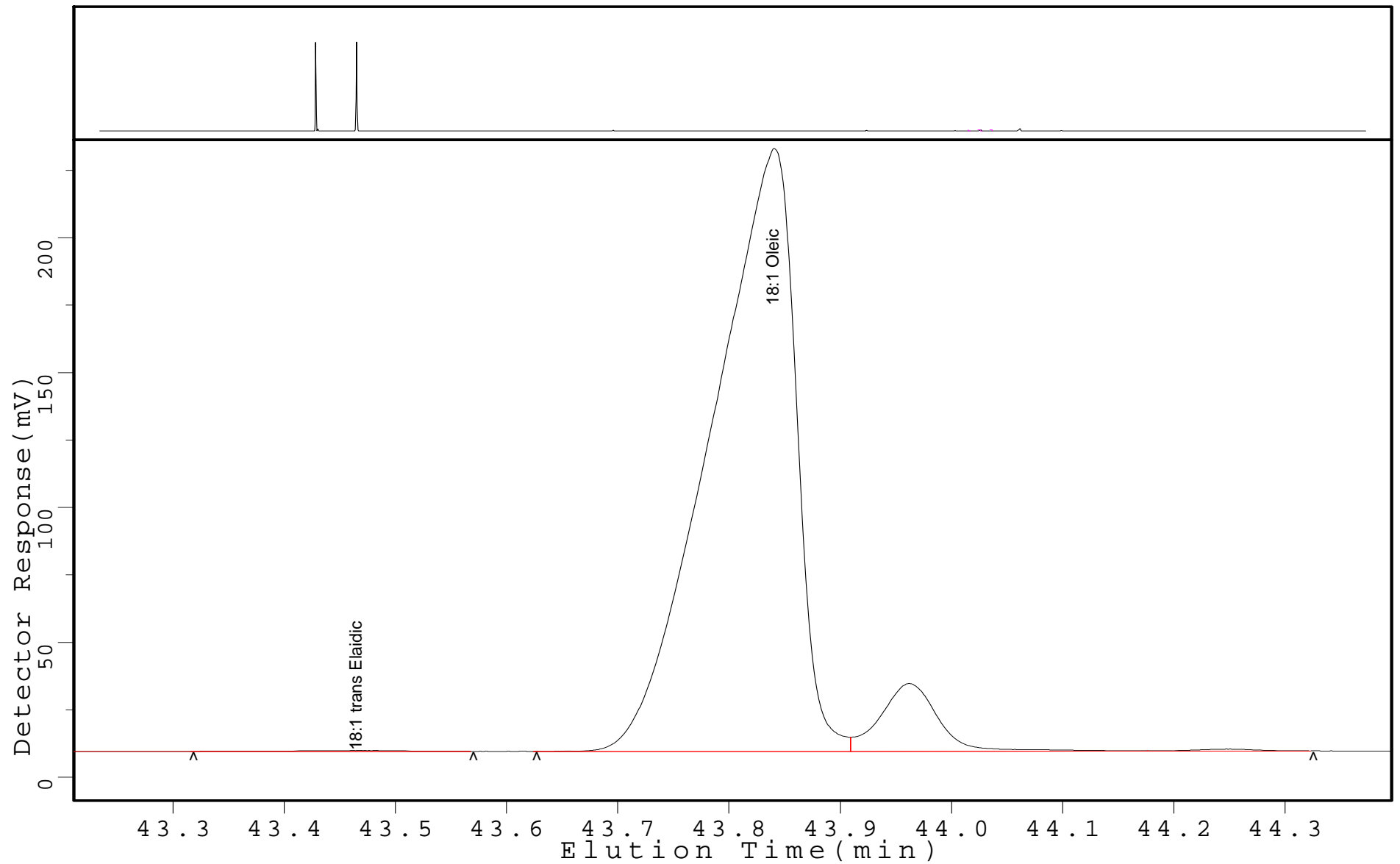
# Fatty Acids Included in AOAC 996.06

- ✓ 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)

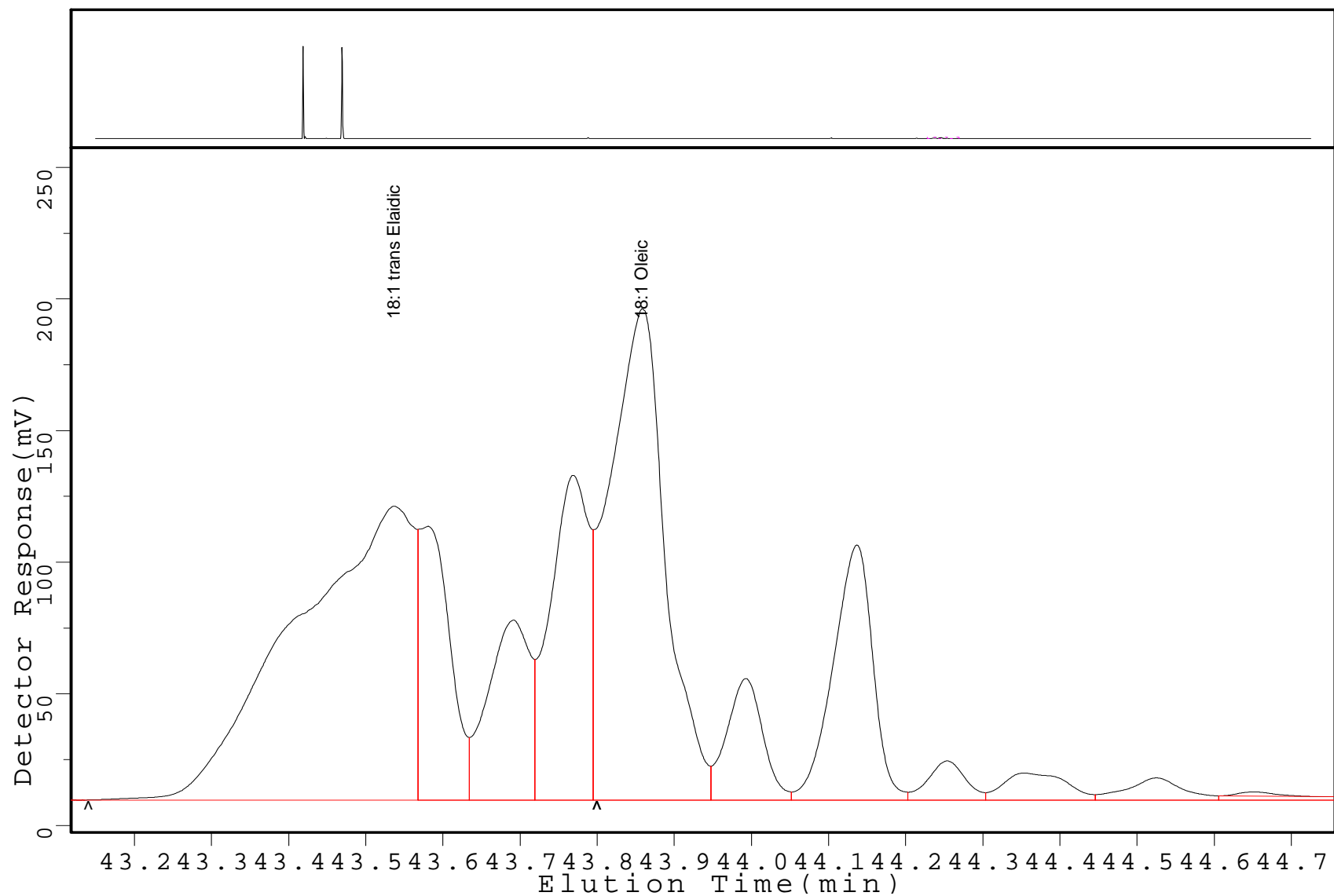
# STANDARD FATTY ACID Methyl Esters



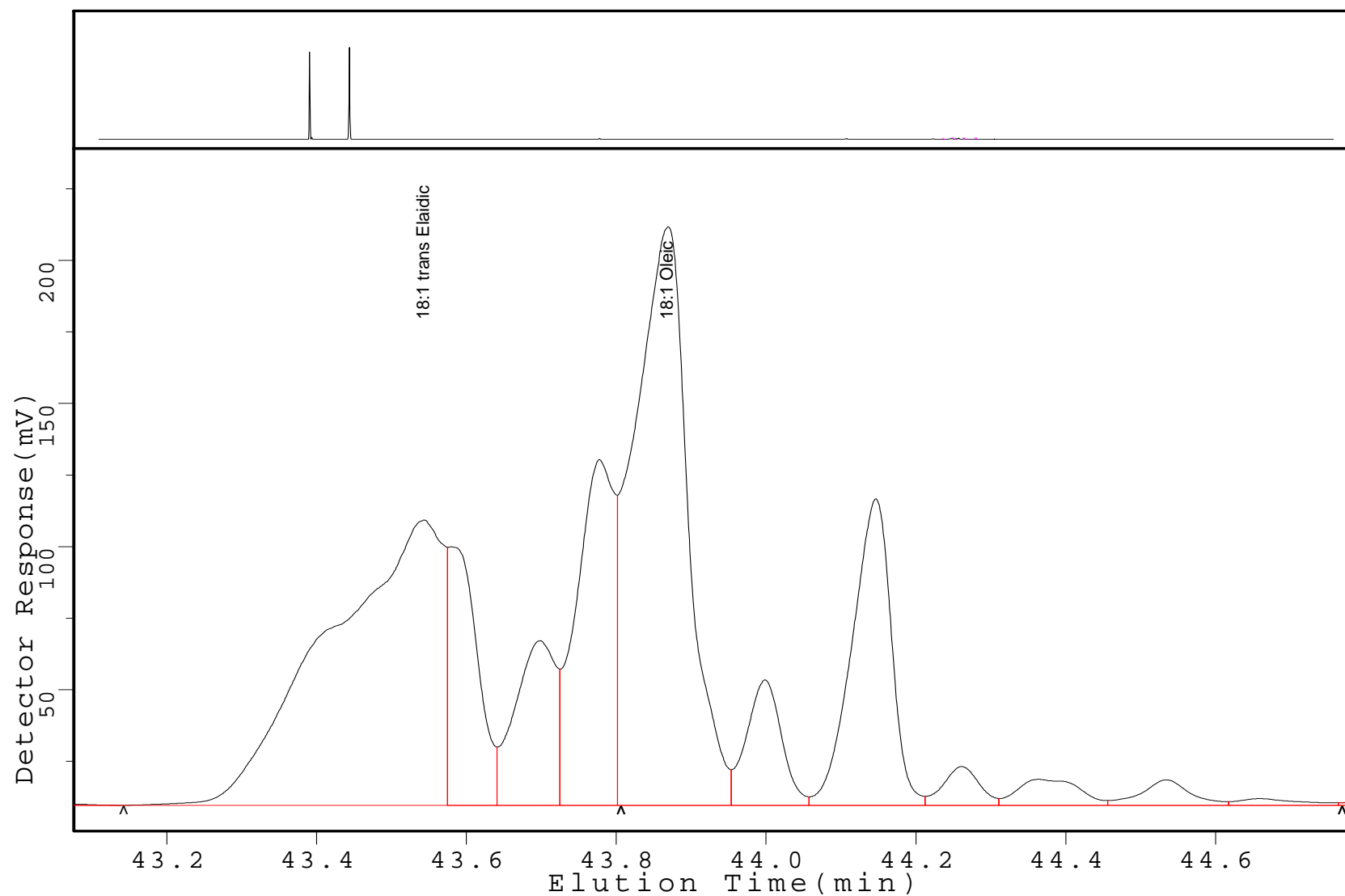
# Soybean Oil



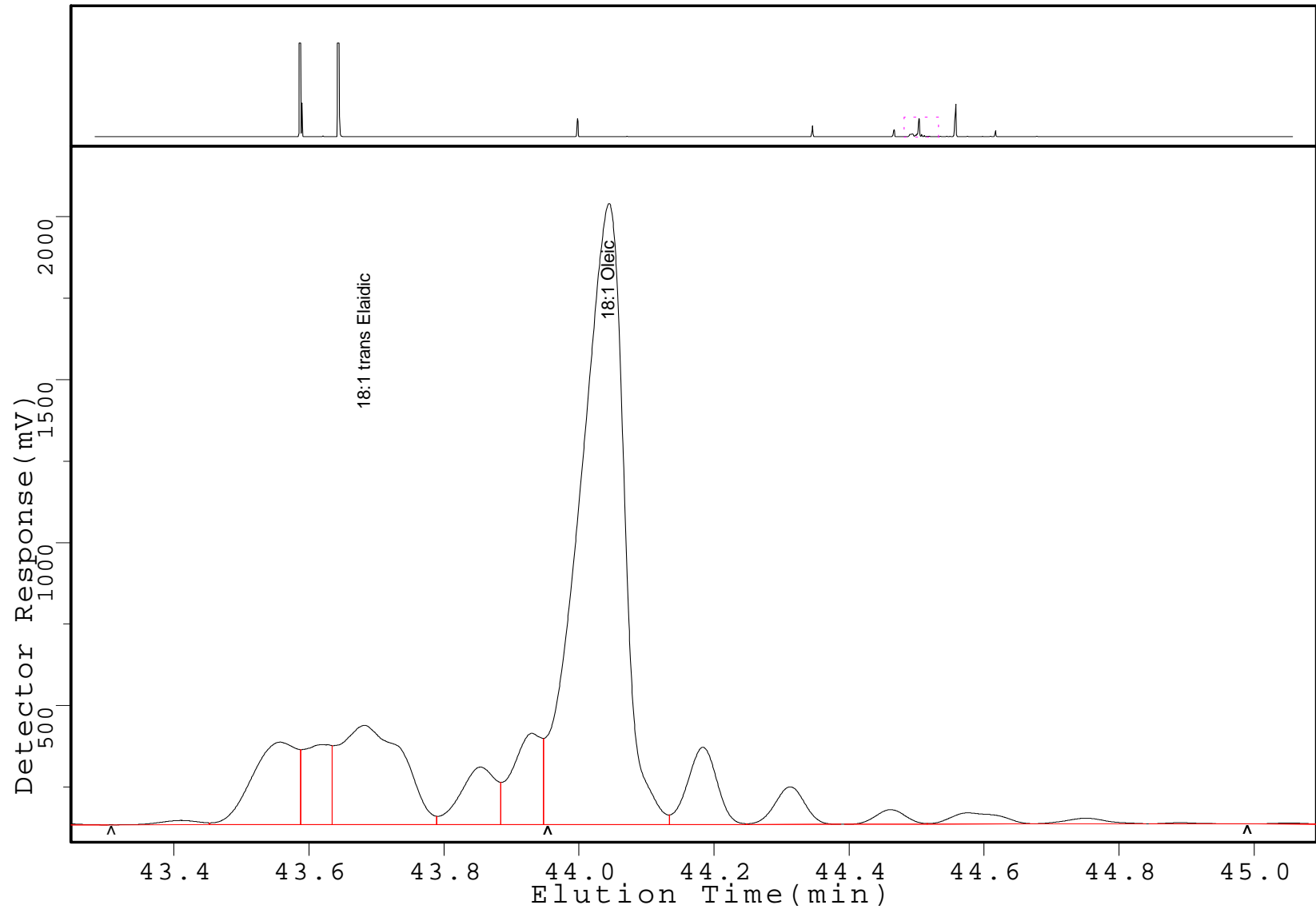
# Hydrogenated Soy Oil



# Commercial Vegetable Shortening



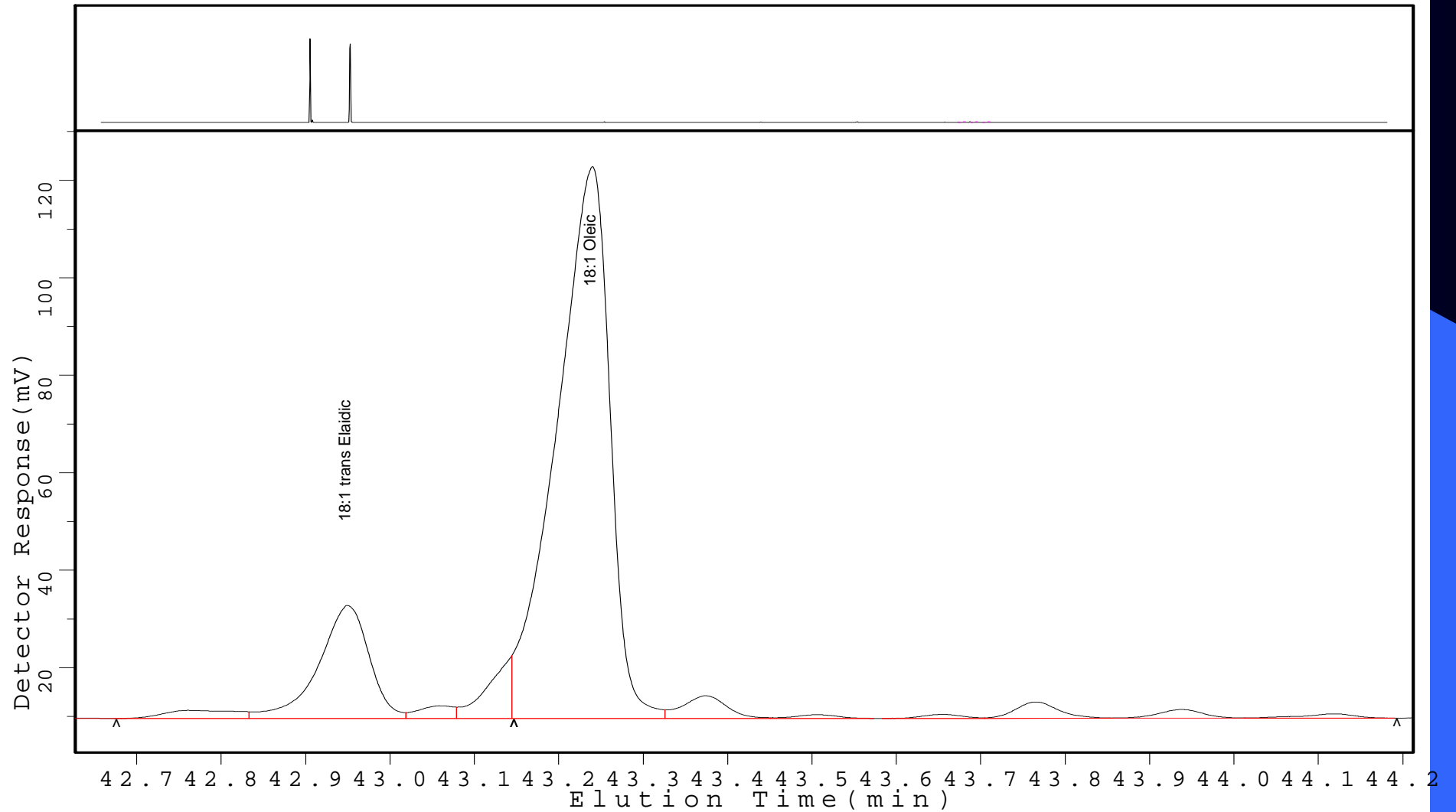
# Margarine



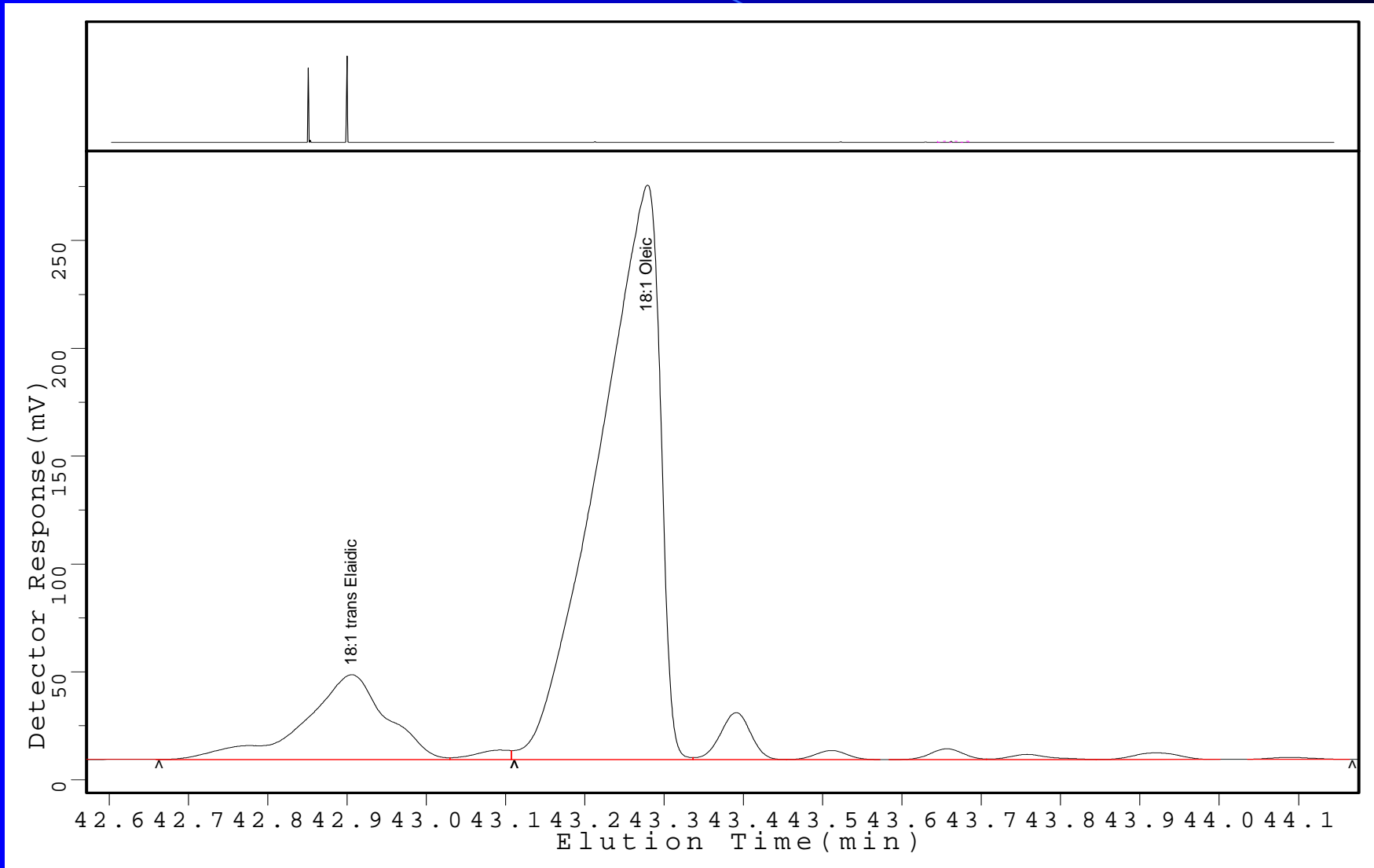
	Normalized by Weight	%(w/w) as Triglyceride in Product	Saturated Fatty Acids	Monounsaturated Fatty Acids	cis-cis Polyunsaturated Fatty Acids	trans Fatty Acids
4:0 Butyric	1.203%	0.097	0.085			
6:0 Caproic	0.682%	0.055	0.050			
8:0 Caprylic	0.385%	0.031	0.028			
10:0 Capric	0.868%	0.070	0.065			
12:0 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							
<b>Totals</b>	<b>100.0%</b>	<b>8.06</b>	<b>3.37</b>	<b>2.70</b>	<b>0.78</b>	<b>0.85</b>	
Percent of Fatty Acid Components based on Total Fat			43.79%	35.05%	10.12%	11.04%	

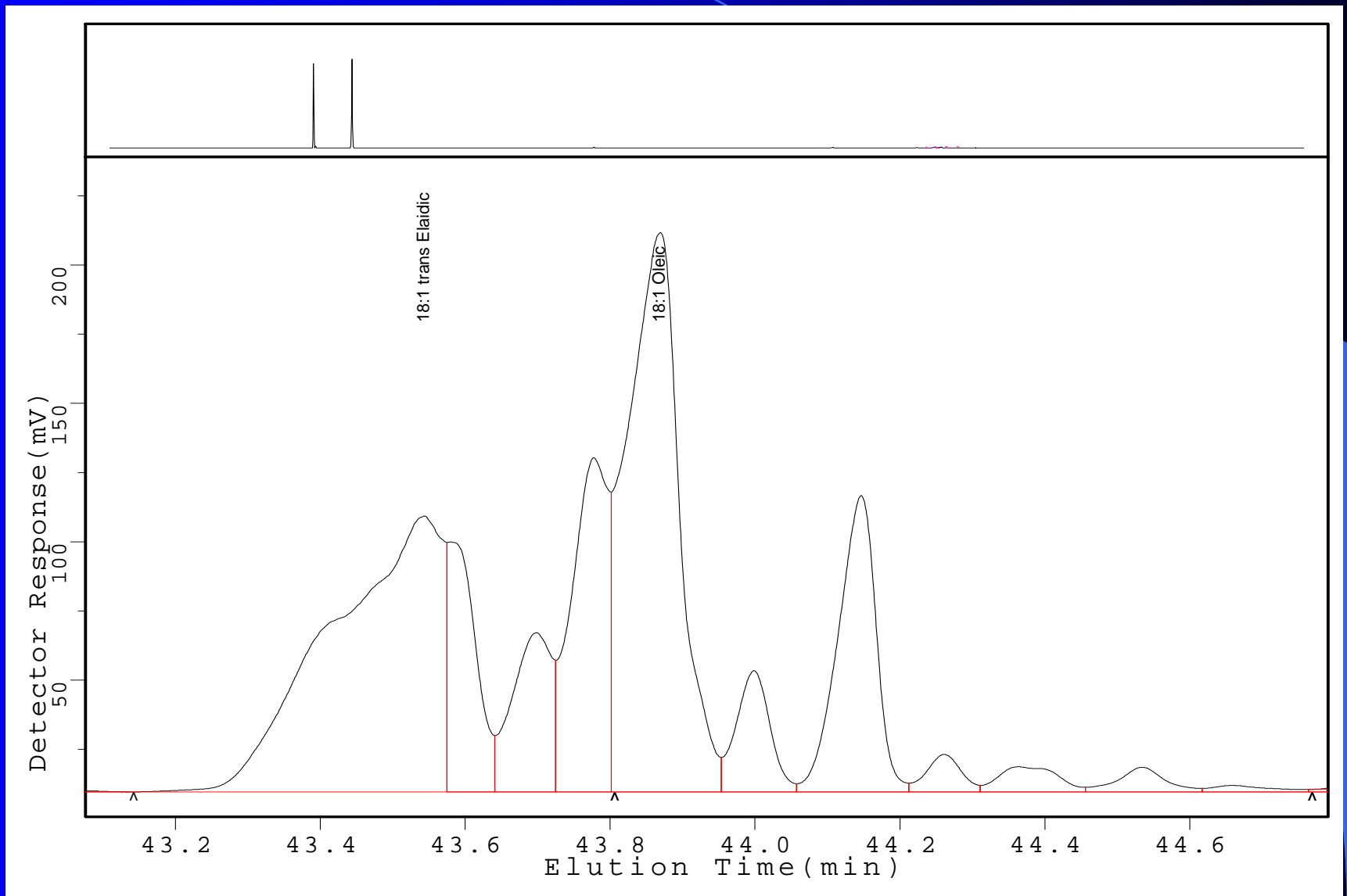
# Butter *Trans*



# 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  $\text{BF}_3$  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?