



# FATS: SATURATED AND UNSATURATED PART 2



## Liquid fat vs solid fat

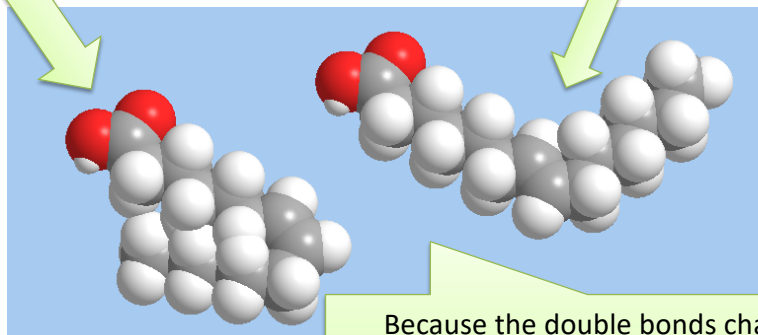
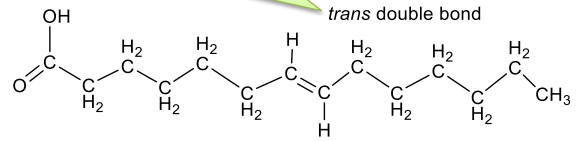
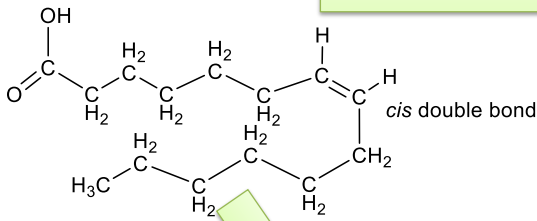
Source	Fatty acids in triglycerides are...	Physical appearance
Animal triglycerides (e.g. butter, lard, tallow from cow, pig etc)	50% Saturated, 50% unsaturated (1-5% of the unsaturated is trans)	Solid (fat)
some Fish triglycerides (e.g. fish oil)	Cis unsaturated and polyunsaturated (contain omega-3 fatty acids)	Liquid (oil)
Plant triglycerides (e.g. peanut oil, olive oil, corn oil)	85% Cis unsaturated and polyunsaturated, 15% saturated	Liquid (oil)

Solids are *solid* because of extensive intermolecular (between molecule) attraction. The large number of interactions holds the molecules tightly together in the solid phase. Liquids have fewer intermolecular attractions – and the molecules flow past each other more easily.



# The shape of unsaturation

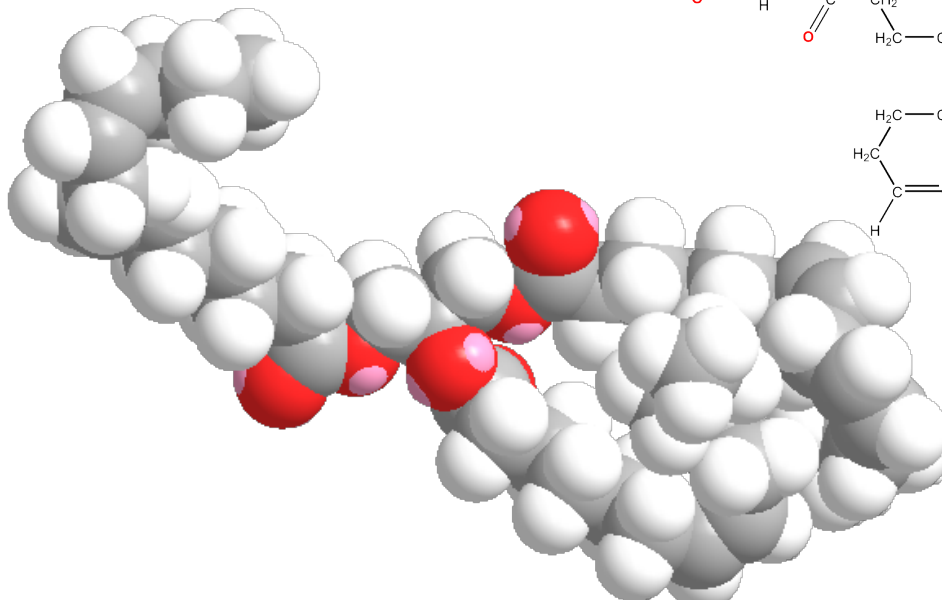
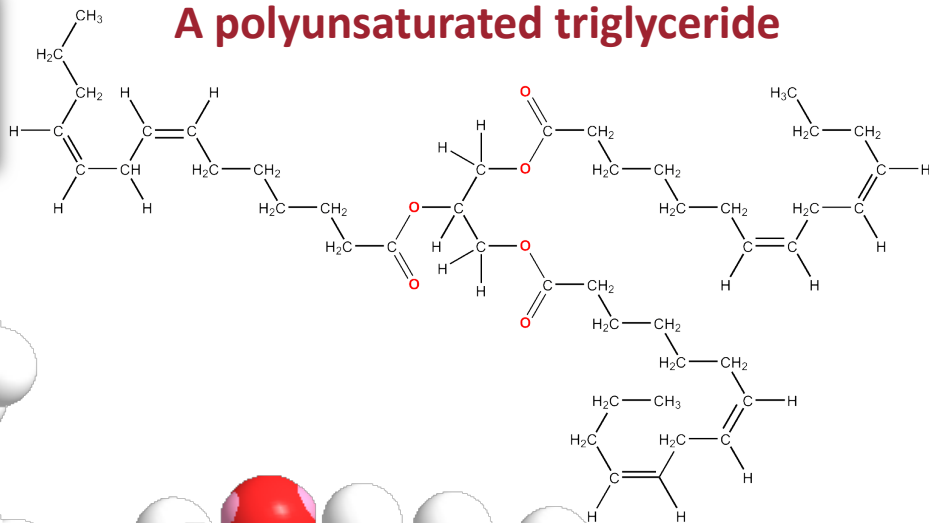
unsaturated fatty acids have kinks or folds in their chains due to the double bonds



Because the double bonds change the 3-dimensional shape of unsaturated fatty acids, TGs made with these fatty acids don't stack well

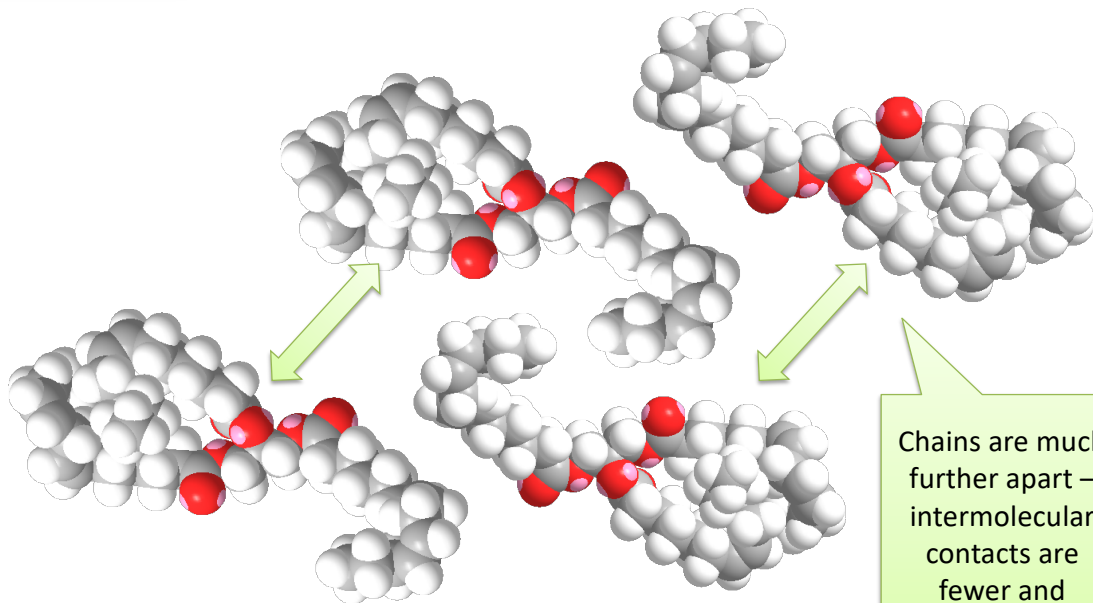


# A polyunsaturated triglyceride





## Unsaturated triglycerides make fewer VDW contacts



Chains are much further apart – intermolecular contacts are fewer and weaker



## Liquid fat vs. solid fat

(At room temperature), Generally speaking, animals fat is a solid and plant based fat is a liquid...but there are exceptions



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This is controversial in the current scientific literature

# Should be based on a Nutrition Label by type?

- Dietary fat has more than twice the calories per gram as either carbohydrate or protein
- Saturated and trans fats can raise the levels of total cholesterol and low-density lipoprotein (LDL or “bad”) cholesterol in the blood – which, in turn, can increase the risk of developing cardiovascular disease.
- The Dietary Guidelines for Americans recommends consuming less than 10% of calories per day from saturated fat by replacing it with monounsaturated and polyunsaturated fats.
- To reduce the risk of developing chronic diseases, while maintaining adequate intake of important nutrients, follow these ranges for total fat intake
  - Adults (ages 19 years and older): 20-35% of calories from fat
  - Older children and adolescents (ages 4 to 18 years): 25-35% of calories from fat
  - Young children (ages 1 to 3 years): 30-40% of calories from fat

## Nutrition Facts

Serving Size 16 crackers (34g)

Trans Fat	0g	
Polyunsaturated Fat	3g	
Monounsaturated Fat	1g	
<b>Cholesterol</b>	0mg	<b>0%</b>
<b>Potassium</b>	96mg	<b>3%</b>
<b>Sodium</b>	238mg	<b>10%</b>
<b>Total Carbohydrate</b>	24g	<b>8%</b>
Dietary Fiber	2g	<b>8%</b>
Sugars	5g	
<b>Protein</b>	3g	<b>6%</b>
Calcium	3%	
Iron	5%	

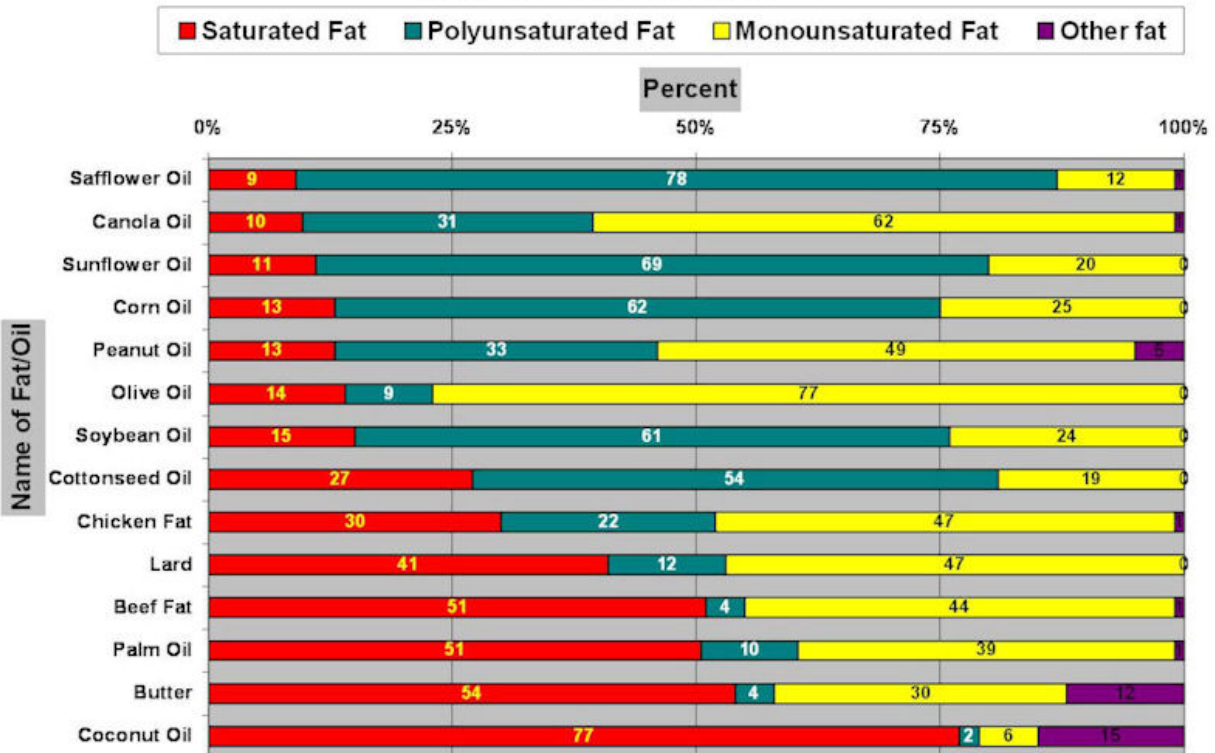
\*Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	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	2400mg	2400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Cardiovascular disease is the leading cause of death in both men and women in the U.S.

[FDA Nutrition Facts Sheet on Fat](#)

## Compare the Fats and Oils



J. B. Reeves and J. L. Weiltrauch, *Composition of Foods, Agricultural Handbook No. 8-1* (Washington, D.C.: USDA, 1979) as cited by Proctor & Gamble in copyrighted material provided as a professional service, 1992.