CONCEPT: PHYSICAL PROPERTIES OF FATTY ACIDS

- The physical properties of fatty acids are determined by carbon chain length and their number of ____ bonds.

Solubility in Water

- Length of carbon chain is _____ proportional to solubility in water.
    - □ ___ the length of carbon chain ___ the solubility in water.

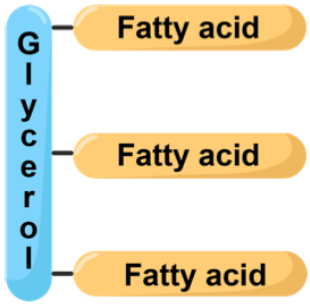
EXAMPLE: Which of the following fatty acids would have the lowest solubility in water?

a) Palmitic acid (16:0) b) Oleic acid (18:1) c) Lauric acid (12:0) d) Arachidic acid (20:0)

PRACTICE: Arrange the following fatty acids in order of decreasing solubility in a hexane solution.

I. Myristic Acid II. Stearic Acid III. Lauric Acid IV. Arachidic Acid

PRACTICE: A triglyceride or triacylglycerol represents a glycerol molecule that has bonded to 3 fatty acid chains. Based on the following descriptions, which of the following would be the most soluble in an aqueous solution?



a) A triglyceride composed of 1 glycerol molecule + 3 lauric acid chains.

b) A triglyceride composed of 1 glycerol molecule + 2 stearic acid chains + 1 lauric acid chain.

c) A triglyceride composed of 1 glycerol molecule + 3 arachidic acid chains.

d) A triglyceride composed of 1 glycerol molecule + 2 myristic acid chains + 1 lauric acid chain.

CONCEPT: PHYSICAL PROPERTIES OF FATTY ACIDS

Melting Point

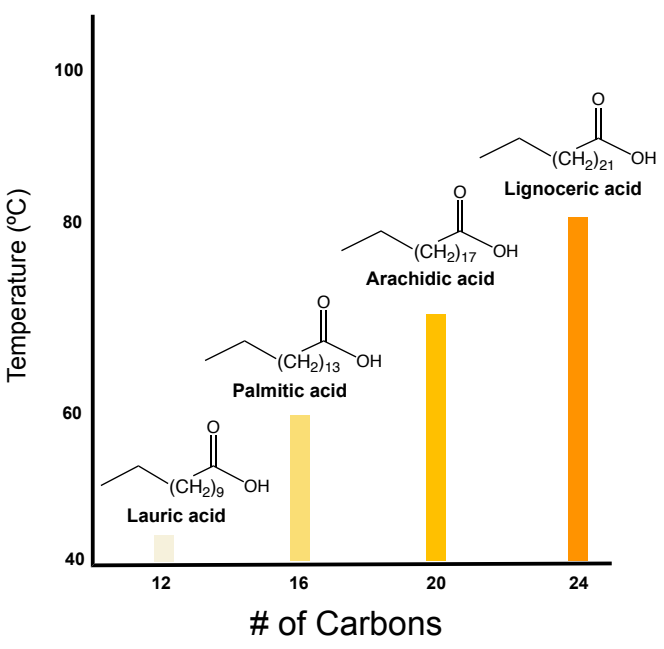
- Carbon chain length and the number of pi bonds have _____ effects on the melting points of fatty acids.

Melting Point Factors

Melting Point (Carbon Chain Length)

Length is _____ proportional to MP.

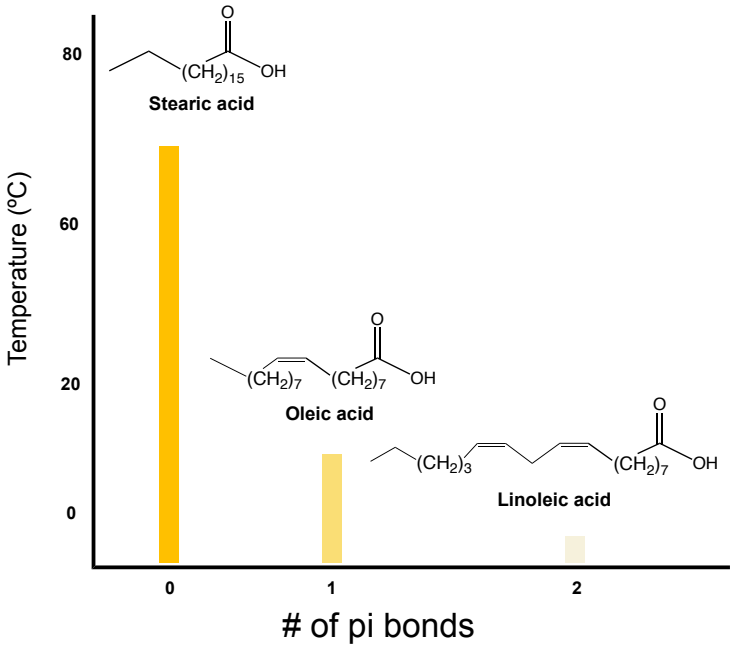
□ ____ carbon chain length ____ the MP.



Melting Point (Pi Bonds)

Number of Pi Bonds is _____ proportional to MP.

□ ____ number of pi bonds ____ the MP.



EXAMPLE: Within each pair, determine the fatty acid with the greater melting point.

a) Stearic acid (18:0) vs Oleic acid (18:1)

b) Linolenic acid (18:3) vs Mead acid (20:3)

c) Vaccenic acid (18:1) vs Palmitoleic acid (16:1)

d) Stearidonic acid (18:4) vs Sciadonic acid (20:3)

CONCEPT: PHYSICAL PROPERTIES OF FATTY ACIDS

PRACTICE: Arrange the following fatty acids in order of increasing melting point.

I. Linolenic Acid (18:3) II. Capric Acid (10:0) III. Erucic Acid (22:1) IV. Cerotic Acid (26:0)

PRACTICE: The fatty acid percentage composition from various commercially available oils is given below. Based on what you know about fatty acids, determine which of the following would have the highest melting point?

	Fatty Acids (Saturated)			Fatty Acids (Unsaturated)			Other
Source	Palmitic	Stearic	Arachidic	Palmitoleic	Oleic	Arachidonic	Misc.
A	0	0.3	5	83	6	3	4.7
B	0	7	28	11	51	0	3
C	44	22	21	0	0	10	3
D	0.2	9	1	19	19	48	3.8