

1. (7.1) Types of Attractive Forces (Intermolecular forces (IMF)). IMF's are attractive forces between molecules due to electrostatic attraction. Therefore a molecule must have "+" and "-" electrical properties. Be able to explain for the different IMF's.

- a. Know the names, the why, the relative strength of the IMF's.

_____ attractions are the only ones that all molecules have regardless of their structure.
 A) London B) Dipole-dipole C) Hydrogen bonding D) Ionic

- b. Know the kind of molecule, in terms of its polarity, that is associated with each IMF.

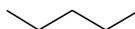
What is the intermolecular force present in these molecules?



i.



ii.



iii.

A) London B) dipole-dipole C) hydrogen bonding D) ion-dipole E) None

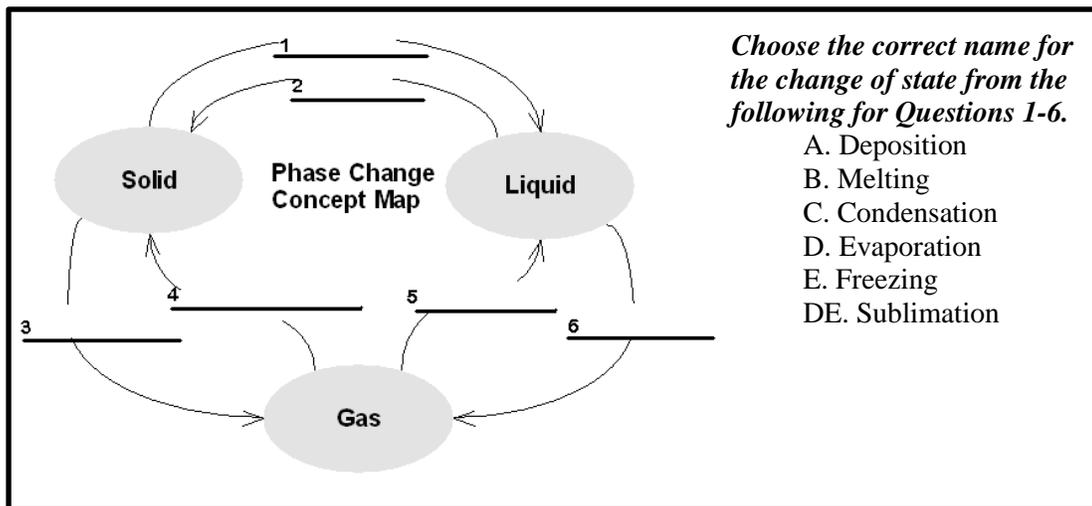
- c. Be able to associate IMF's with molecular structure. This is determined by molecular polarity and other structural characteristics. For example, hydrogen bonding only occurs with molecules that have -OH, -NH, or FH bonds.

What kind of intermolecular force exists between the following molecules?

Water and NaCl	A. London
Oil and water	B. Dipole-dipole
Between HCl molecules	C. H-bonding
	D. Ion-dipole
	E. None

2. (7.2 & 7.3) Liquids, solids, gases-Attractive Forces are Everywhere.

- a. Know how heat (molecular motion) and attractive forces (between molecules) affect changes of state and the terms used for changes of state.



- b. Be able to rank molecules from lowest to highest boiling depending on polarity and IMF
 c. Be able to rank b.p. of various alkanes (London force).

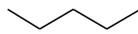
Rank these from strongest to weakest intermolecular forces which is the same as highest to lowest boiling point? Explain your ranking.



i.



ii.



iii.

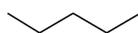
How would you rank these from lowest to highest boiling point?



i.



ii.

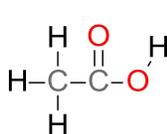


iii.

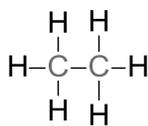
- A) $i < iii < ii$ B) $ii < iii < i$ C) $ii < i < iii$ D) $iii < ii < i$ E) $i < ii < iii$

Use these structures to answer the following questions.

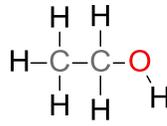
Electronegativities for the elements are C=2.5, H=2.1, N=3.0, O=3.5)



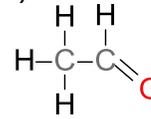
A.



B.



C.



D.

Which compound is most least polar? _____

Which compound has the strongest intermolecular forces? _____

Which compound has the highest boiling point? _____

- d. Be able to predict solubilities (dissolving/mixing ability) of compounds in polar or non-polar solvents. Apply the rule "Like dissolves like". This means that compounds with similar IMF's will dissolve/mix with each other.

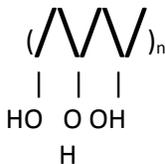
Remember the rule, like dissolves like. For each of the following decide if it will

A) dissolve or B) not dissolve with gasoline, a non-polar substance?

CCl ₄	MgSO ₄	hexane
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- e. Be able to draw a diagram showing Hydrogen Bonding between molecules that includes labeling the donor and acceptor atoms in the Hydrogen Bond.

Draw a diagram showing some of the hydrogen bonding between PVA (polyvinyl alcohol), boric acid, and water that resulted in the making of your "Jiggle Jelly" in lab. Label the donor "d" and acceptor "a" in your diagram.



- f. Remember the properties of a soap molecule which is an amphiphatic or amphipathic substance. These molecules have a polar head and non-polar tail. Be able to identify this structure. Other names for these types of compounds are: detergent, surfactant, emulsifier.

Oil and water do not mix. Which of the following could be used to help mix oil and water?

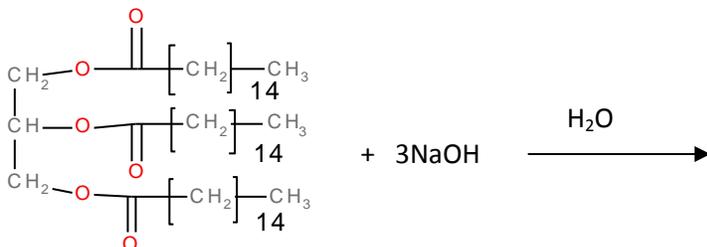
- A. An ionic substance like NaCl.
- B. A non-polar substance like a hydrocarbon.
- C. A fatty acid.
- D. A soap molecule.

The long hydrocarbon tails of soap molecules are:

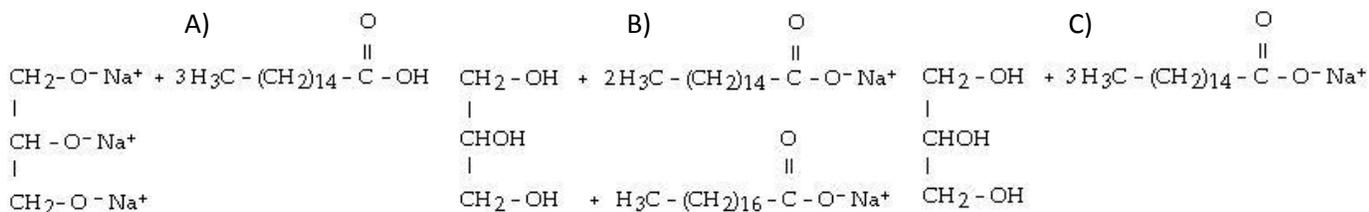
- A) hydrophilic and attracted to water
- B) hydrophobic and attracted to water
- C) hydrophobic and attracted to oils
- D) hydrophilic and attracted to oils

- g. Remember the soap synthesis lab and how to complete the reaction for the synthesis of soap.

Complete the following saponification reaction. This is a hydrolysis reaction using NaOH/H₂O.



Palmitic acid is a 16 carbon acid. The products of the saponification of tripalmitin (the triglyceride of palmitic acid) are



3. (7.4) Gases: Attractive Forces Are Limited.

- Know the quantities that affect the properties of gases (P,V,T,n)
- Know how to convert P,V and T units, one unit to another, using dimensional analysis or proportions. For example be able to convert 250 mL into L or 23°C into K and vice versa. Also know how to convert pressures. Conversion factors, except for metric prefixes will be provided.
- Know in descriptive terms how P,V & V,T are related. For example, if P increases V decreases.

Which of the following correctly describes the process of inspiration (air entering the lungs)?

- The lungs expand, causing their internal pressure to decrease.*
- The lungs expand, causing their internal pressure to increase.*
- The lungs contract, causing their internal pressure to decrease.*
- The lungs contract, causing their internal pressure to increase.*
- There is no change in the internal pressure in the lungs.*

- Know how to solve gas law problems using Boyles Law and Charles Law.

If the volume of a gas container at 32.0 °C changes from 1.55 L to 755 mL, what will the final temperature be?

- A) 149 °C B) 353 °C C) 273 °C D) -124 °C

If I have 5.6 liters of gas in a piston at a pressure of 1.5 atm and compress the gas until its volume is 4.8 L, what will the new pressure inside the piston be? Show calculations.

4. (7.5) Dietary Lipids and Trans Fats & relevant chemical reactions

- Know the building blocks of triglycerides and their structures. These are always a glycerol molecule and 3 fatty acids. Remember their properties (non-polar compounds called oils and fats (why?)).

Unsaturated fatty acids have lower melting points than saturated fatty acids because

- they have fewer hydrogen atoms.*
- they have more hydrogen atoms.*
- their molecules fit closely together.*
- the cis double bonds give them an irregular shape.*
- the trans double bonds give them an irregular shape.*

Fats are triglycerides that contain mostly ___ fatty acids and oils are triglycerides that contain mostly ___ fatty acids.

- saturated...unsaturated*
- unsaturated...saturated*
- saturated...saturated*
- unsaturated...unsaturated*

- Know all the functional groups found in lipids (alcohols, carboxylic acids, esters, carboxylate anion, alkene, cis and trans isomers). Be able to circle and name them in structural formulas.
- Remember the names/notation/structures of fatty acids that you learned previously. A fatty acid structure sheet, without names will be provided.

- d. Know the function of triglycerides
 e. Know how to complete an esterification (condensation) reaction to make a triglyceride

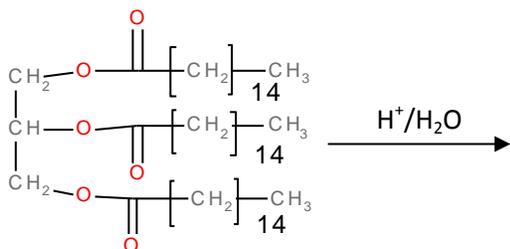
Draw the structure of the triglyceride that results from glycerol and oleic acid.

What veggie oil is this found in?

What is the major function of triglycerides?

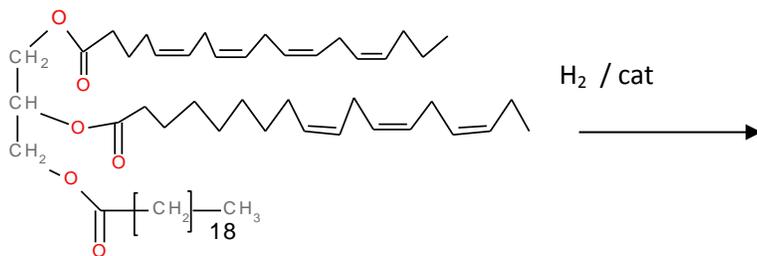
- f. Know how to complete hydrolysis (both saponification & acid hydrolysis) and hydrogenation reactions of triglycerides. Saponification is the reaction that makes soap.

Complete the following acid hydrolysis reaction



- g. Be able to complete hydrogenation reactions and know that partial hydrogenation gives trans fatty acids in the triglyceride and that triglycerides with trans fatty acids are BAD!

Complete the following hydrogenation reaction. Assume complete hydrogenation.



Why are triglycerides hydrogenated and what is a major health risk associated with hydrogenation of lipids?

5. (7.6) Attractive Forces and the Cell Membrane & cell membrane structure
- Know the structural characteristics of phospholipids and where the ester bonds are.
 - Know how phospholipids associate to form a bilayer membrane.
 - Know all the components of a cell membrane including, the lipid bilayer, carbohydrates, cholesterol, peripheral proteins, and integral proteins.

Answer the following question(s) 21-24 about the diagram shown below using these ANSWERS.

The objects labeled (A) are _____

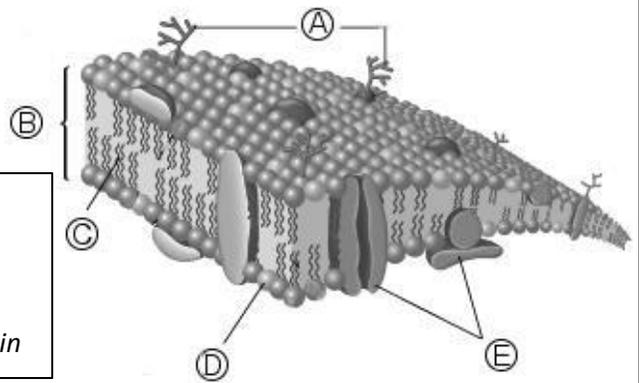
The object labeled (B) is a _____

The region labeled (C) is _____

The objects labeled (D) are _____

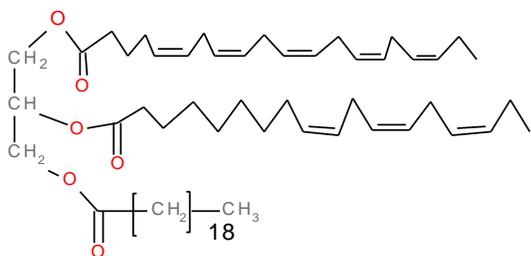
The objects labeled (E) are _____

A) hydrophilic head.
 B) hydrophobic region.
 C) membrane protein.
 D) lipid bilayer
 E) carbohydrate side chain



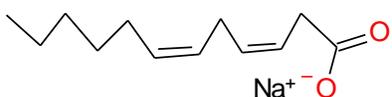
Some of the following lipids have ester bonds (there are 6). **Label the ester bonds with an "E"**. Also write the type of lipid in the space provided (some lipids can be labeled more than one type and some types may not be used). Write the type and the function of the lipid in the space provided.

A) Fatty acid B) fat C) oil D) triglyceride E) phospholipid AB) steroid AC) soap



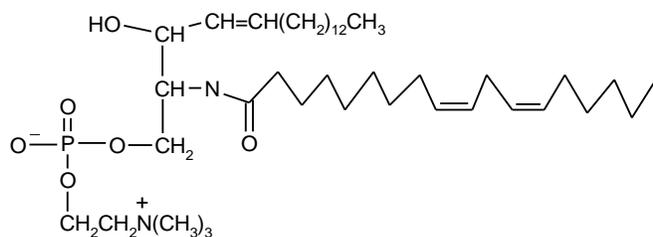
Type of lipid _____

Function _____



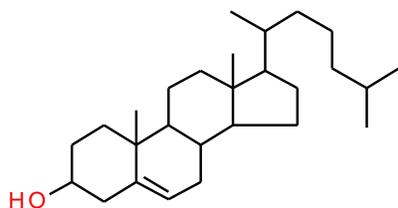
Type of lipid _____

Function _____



Type of lipid _____

Function _____



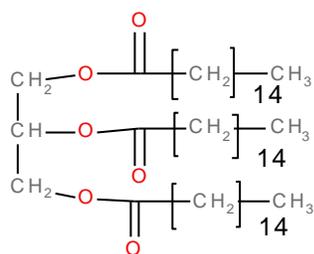
Type of lipid _____

Function _____



Type of lipid _____

Function _____



Type of lipid _____

Function _____