

1. Answer the following:

a. Which lipids have a lower melting point, saturated or unsaturated? \_\_\_\_\_

b. Indicate four important functions of lipids:

i. \_\_\_\_\_ ii. \_\_\_\_\_

iii. \_\_\_\_\_ iv. \_\_\_\_\_

c. Which of the following lipids are saponifiable lipids? Circle the correct ones.

i. glycerophospholipids ii. steroids iii. triglycerides iv. waxes

d. What is an essential fatty acid? \_\_\_\_\_

e. What is the name of the type of reaction that applies to each of the following? The choices are: saponification, hydrolysis, hydrogenation, dehydration, esterification. There can be more than one choice for a reaction.

i. Glycerol with 3 molecules of a fatty acid. \_\_\_\_\_

ii. A triglyceride with water in the presence of an acid. \_\_\_\_\_

iii. A triglyceride with aqueous NaOH. \_\_\_\_\_

iv. An unsaturated fatty acid with hydrogen. \_\_\_\_\_

f. Give two examples of substances that are steroids: \_\_\_\_\_, \_\_\_\_\_

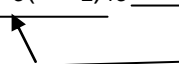
g. Which fats and oils come from plants? \_\_\_\_\_ animals? \_\_\_\_\_  
(The choices are saturated or unsaturated)

h. For each of the following identify the hydrophobic and the hydrophilic end of the molecule:

i. glycerophospholipid : fatty acid C-H backbone \_\_\_\_\_

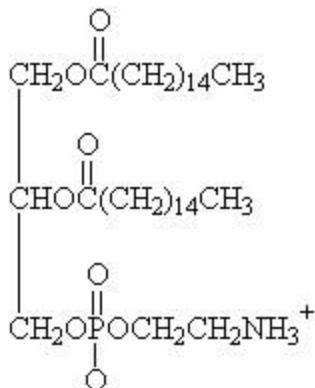
phosphate and amino alcohol end \_\_\_\_\_

ii. soap:  $\text{CH}_3(\text{CH}_2)_{13}\text{COO}^-\text{Na}^+$  ← \_\_\_\_\_

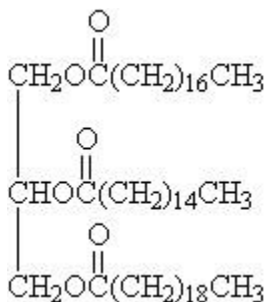


2. Identify the type of lipid for each of the following. The choices are: wax, steroid, triglyceride, and glycerophospholipid:

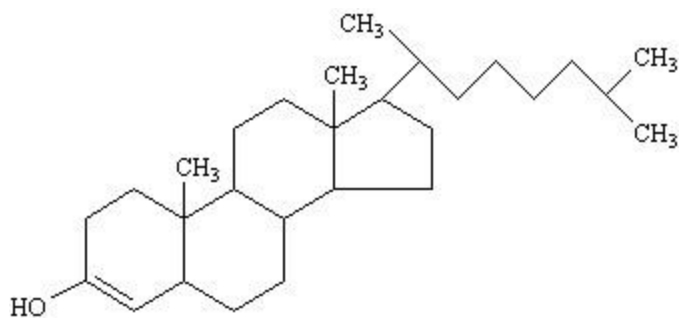
a. \_\_\_\_\_



b. \_\_\_\_\_

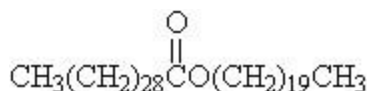


c.



\_\_\_\_\_

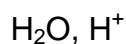
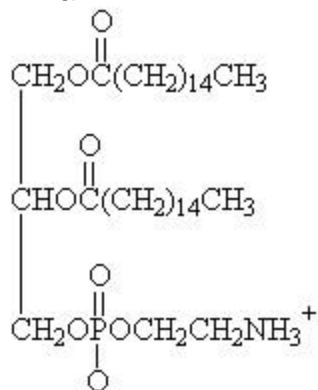
d.



\_\_\_\_\_

3. Indicate the products **and the name** of each of the following reactions:

4. a.

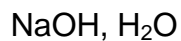
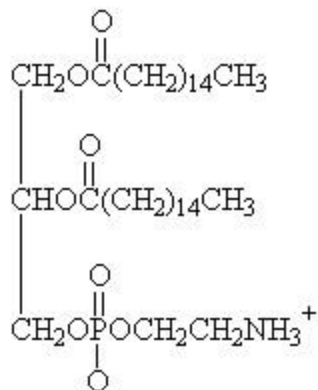


Product

Name of the Reaction

\_\_\_\_\_

b.



\_\_\_\_\_

c. CH<sub>2</sub>OH

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CHOH

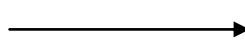
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CH<sub>2</sub>OH

+ 3 CH<sub>3</sub>(CH<sub>2</sub>)<sub>12</sub>C=O

|

OH



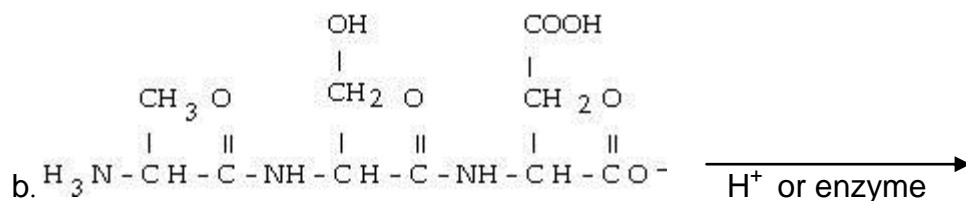
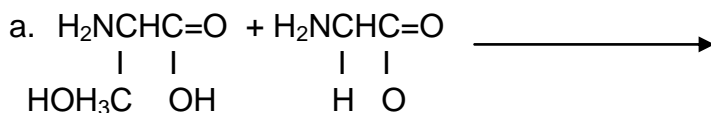
\_\_\_\_\_

d. CH<sub>3</sub>(CH<sub>2</sub>)<sub>5</sub>CH=CH(CH<sub>2</sub>)<sub>7</sub>CH<sub>3</sub> + H<sub>2</sub>



\_\_\_\_\_

5. List the seven functions of proteins:
- a. \_\_\_\_\_ b. \_\_\_\_\_  
 c. \_\_\_\_\_ d. \_\_\_\_\_  
 e. \_\_\_\_\_ f. \_\_\_\_\_  
 g. \_\_\_\_\_
6. What is the structure of the amino acid glycine?
7. What is the structure of the amino acid alanine?
8. Indicate the structure of the zwitterion for the amino acid alanine.
9. The isoelectric point for the amino acid alanine is 6.00.
- a. What is the structure of alanine at a pH of 5.00?
- b. What is the structure of alanine at a pH of 7.00?
10. Draw the structure of the dipeptide ala-ala.
11. Identify each of the following as either primary, secondary, tertiary, or quaternary structures of proteins. Each choice may be used more than once:
- a. \_\_\_\_\_ Within a single polypeptide chain, the disulfide linkages which are formed between individual amino acid units.
- b. \_\_\_\_\_ Between two identical polypeptide chains for a single protein, the salt bridges which occur between two individual amino acid units.
- c. \_\_\_\_\_ The amino acid sequence of a protein.
- d. \_\_\_\_\_ The hydrogen bonding between two amino acids in a single polypeptide that gives rise to the  $\alpha$  helix structure of the protein, which is similar in appearance to a telephone coil.
- e. \_\_\_\_\_ The hydrogen bonding which occurs between two amino acids in two different polypeptide chains in a single protein.
- f. \_\_\_\_\_ The formation of a  $\beta$  pleated sheet by the hydrogen bonding which occurs between two different but identical polypeptide chains in a protein.
12. The linkages between each of the three carboxylic acids and glycerol in a triglyceride are \_\_\_\_\_ linkages. The linkages between individual amino acids in a polypeptide are \_\_\_\_\_ linkages.
13. Complete the following reactions:



14. What are the five factors that can cause a protein to become denatured?

- a. \_\_\_\_\_ d. \_\_\_\_\_
- b. \_\_\_\_\_ e. \_\_\_\_\_
- c. \_\_\_\_\_

15. What happens when a protein becomes denatured? \_\_\_\_\_

16. When a reaction proceeds in the presence of an enzyme that catalyzes the reaction, why does the reaction occur faster than in the absence of the enzyme?

17. List the three steps involved in a reaction of a substrate (S) in the presence of an enzyme (E):

a. \_\_\_\_\_ + \_\_\_\_\_  $\longrightarrow$  \_\_\_\_\_

b. \_\_\_\_\_  $\longrightarrow$  \_\_\_\_\_

c. \_\_\_\_\_  $\longrightarrow$  \_\_\_\_\_

18. A cofactor is either a(n) \_\_\_\_\_ or a(n) \_\_\_\_\_ associated with an enzyme. When an enzyme is associated with a cofactor, the result is a more complex enzyme called a(n) \_\_\_\_\_.

19. What are the four factors that affect the rate at which enzymes catalyze a reaction?

- a. \_\_\_\_\_ b. \_\_\_\_\_
- b. \_\_\_\_\_ d. \_\_\_\_\_

20. Indicate whether the following inhibitions by an inhibitor are competitive or noncompetitive:

- a. The inhibitor is similar in structure to the substrate. \_\_\_\_\_
- b. The inhibitor attaches itself to a different part of the enzyme than the substrate does.  
\_\_\_\_\_
- c. The addition of additional substrate does not reverse the inhibition.  
\_\_\_\_\_