

## LIPIDS – TOPIC TEST 1

### QUESTION 1

At room temperature:

- A. oils tend to be liquids because they have less saturated carbon- carbon bonds
- B. fats tend to be liquids because they have less saturated carbon- carbon bonds
- C. oils tend to be solids because they have more saturated carbon- carbon bonds
- D. oils tend to be liquids because they have more saturated carbon- carbon bonds

### QUESTION 2

Oils have:

- A. higher melting temperatures and more unsaturated bonds per molecule than fats
- B. lower melting temperatures and more unsaturated bonds per molecule than fats
- C. higher melting temperatures and less unsaturated bonds per molecule than fats
- D. lower melting temperatures and more saturated bonds per molecule than fats

### QUESTION 3

Which of the following statements relating to unsaturated fats is INCORRECT?

- A. Unsaturated fats contain at least one double bond between carbon atoms.
- B. Unsaturated fats experience stronger dispersion forces between their molecules than saturated fats.
- C. Unsaturated fats have higher reactivity than saturated fats.
- D. Unsaturated fats are insoluble in water.

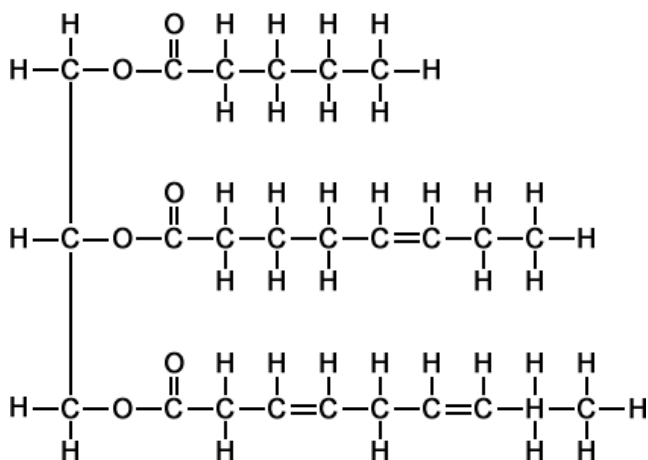
### QUESTION 4

One mole of a triglyceride reacts completely with six mole of hydrogen gas. If the hydrocarbon chains in the triglyceride are identical to each other, how many double bonds are on each chain?

- A. 6
- B. 3
- C. 2
- D. 12

### QUESTION 5

The structure of a lipid is shown below.



Give the semi-structural formulae of each of the 3 fatty acid molecules that make up this lipid. Label each fatty acid as either saturated, mono-unsaturated or polyunsaturated.

#### **Solution**

### QUESTION 6

The formula of a triglyceride made from identical fatty acids has the molecular formula  $C_{42}H_{80}O_6$ . Is it saturated or unsaturated?

#### **Solution**



## SOLUTIONS

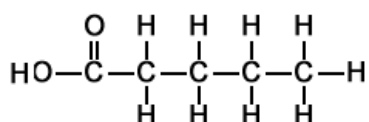
**QUESTION 1** Answer is A

**QUESTION 2** Answer is B

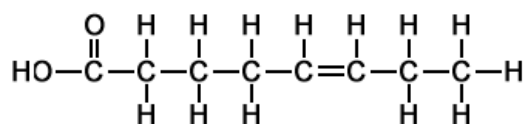
**QUESTION 3** Answer is B

**QUESTION 4** Answer is C

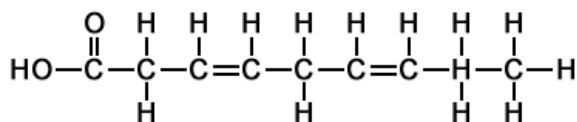
**QUESTION 5**



Saturated

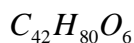


Mono-unsaturated



Poly-unsaturated

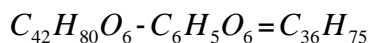
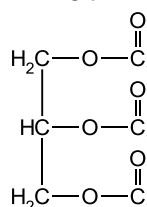
**QUESTION 6**



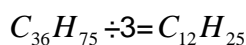
Determine the number of C, H and O that originate from the glycerol and the ester link (see diagram below).

This section has a formula of  $C_6H_5O_6$

Subtract this from the overall formula to determine the number of C and H in the hydrocarbon chains

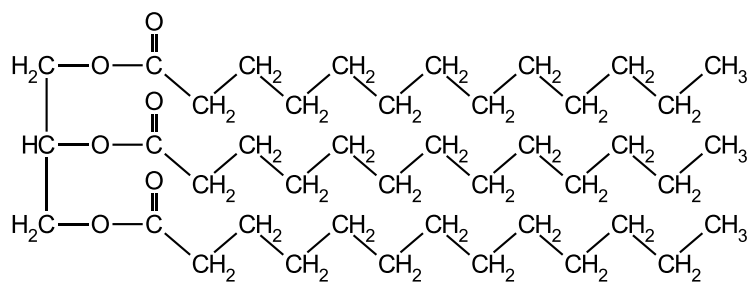


The three hydrocarbon chains have the same formula so divide by 3.



The formula of a saturated fatty acid chain in a triglyceride is  $C_nH_{2n+1}$

If the number of carbons is 12, there should be  $2 \times 12 + 1 = 25$  hydrogen atoms which there is. The triglyceride is saturated.

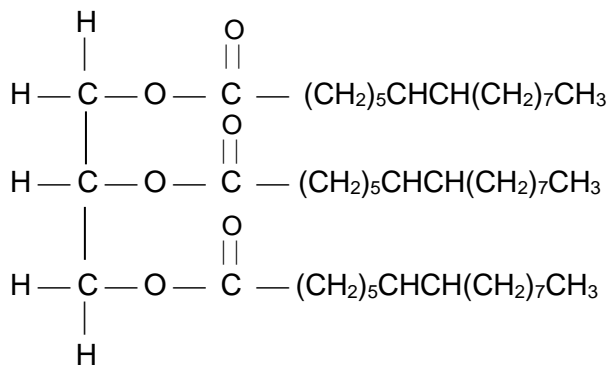


### QUESTION 7

(a) Palmitoleic acid has one double bond between carbons so it is said to be monounsaturated. Linolenic acid has more than one double bond between carbon atoms so it is said to be polyunsaturated.

(b)

i.



ii. Condensation

iii. H<sub>2</sub>O