UTEC

UNIVERSIDAD DE INGENIERÍA
Y TECNOLOGÍA

Lípidos

Sesión 10

Alejandra Ratti

Química Orgánica

Pautas de la sesión online:

Tiempo aproximado 2 horas

Silenciar su micrófono.

Habilitar la cámara.

Realizar preguntas por el chat.

Indicaré el momento en que responderé las preguntas hechas por el chat.

La grabación de la sesión se cargará en Canvas.

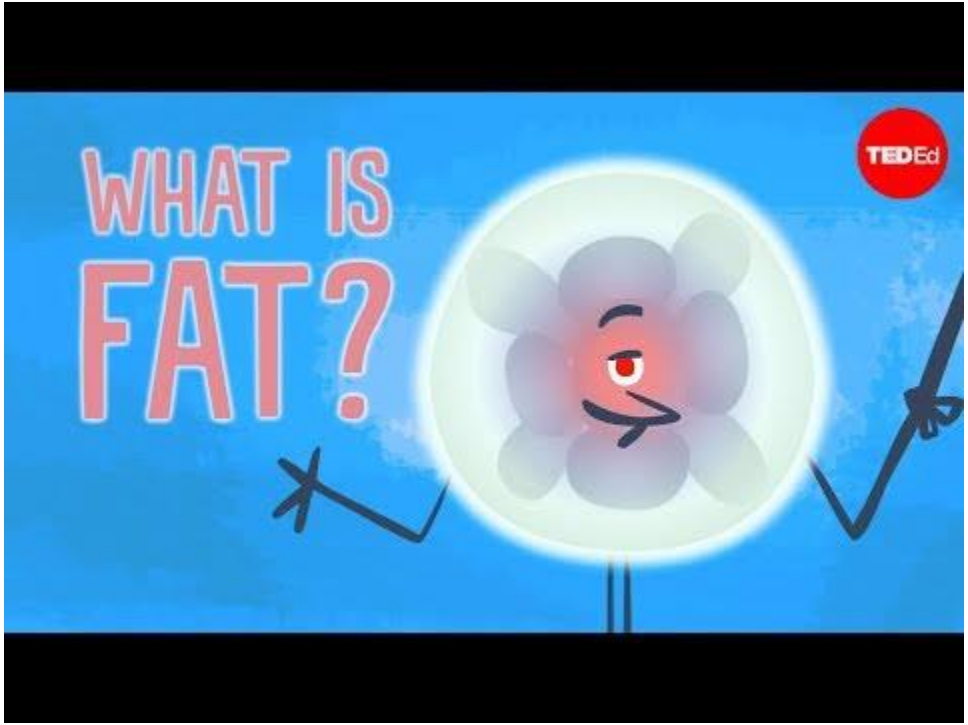
Objetivo de la sesión online:

- **Explicar** la importancia de los lípidos en la química biológica a partir de: su clasificación (de acuerdo a su estructura química), sus propiedades y función en los seres vivos, respondiendo a la hoja de trabajo de manera clara, concisa y ordenada.

Contenidos:

- Clasificación
- Lípidos en nuestros alimentos
- Isomería cis/trans
- Propiedades de los lípidos
- Reacciones químicas que involucran lípidos
- Lípidos en el contexto biológico
- Ejercicios de aplicación - Hoja de trabajo

Video - ¿Qué son los lípidos?

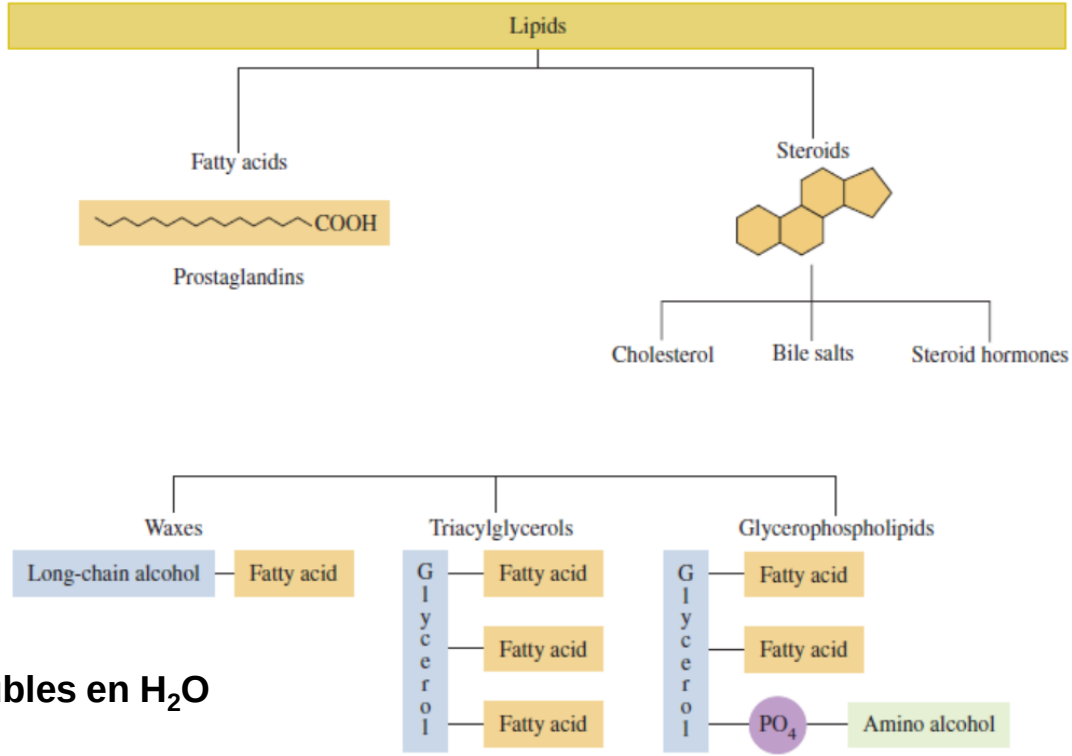


Comprobamos lo que aprendimos del video

Tipos de lípidos

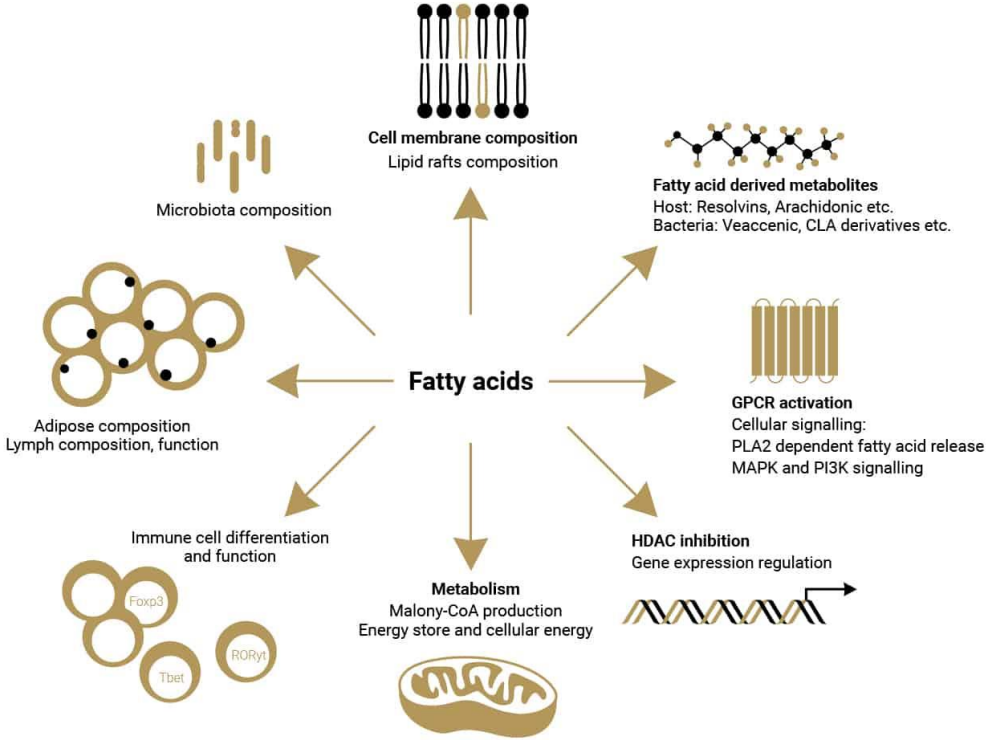
Grupos funcionales presentes:
- COOH
- PO_4^{3-}

Compuestos formados, mayormente por C, H y O

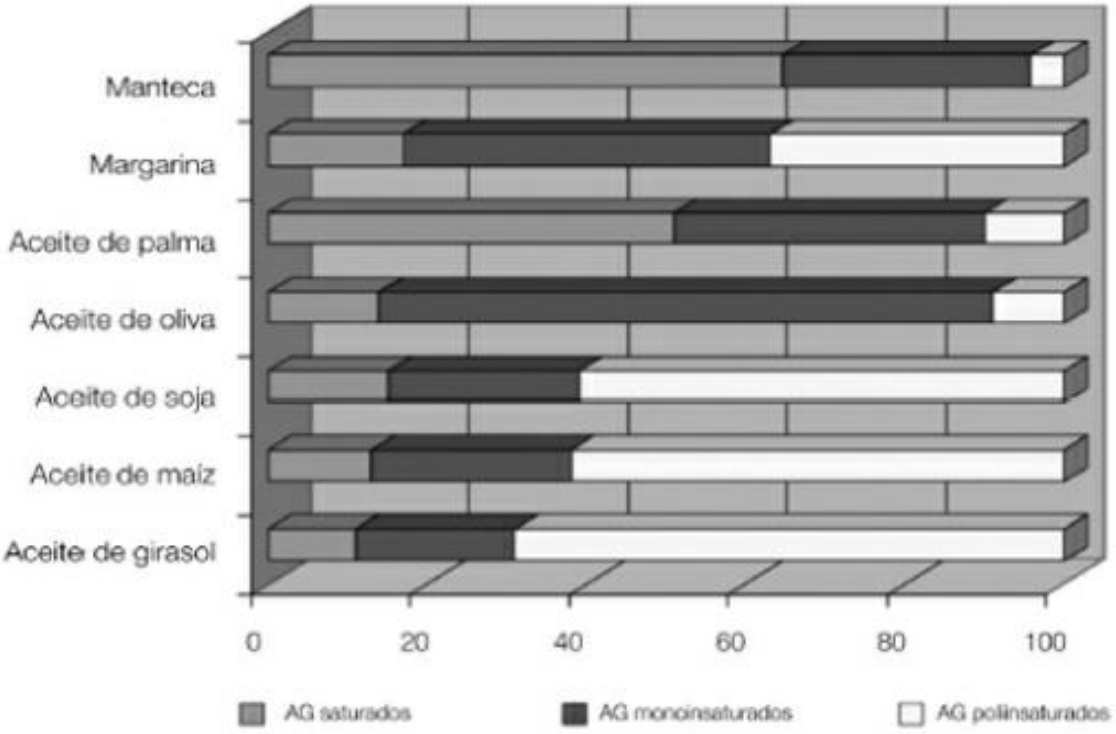


Mayormente insolubles en H_2O

Funciones de los lípidos en nuestro organismo

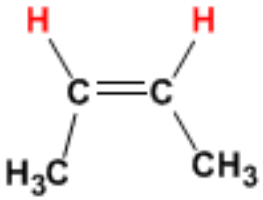


Presencia de distintos lípidos en nuestros alimentos

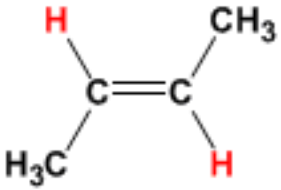


Isomería CIS/TRANS o Isómeros geométricos

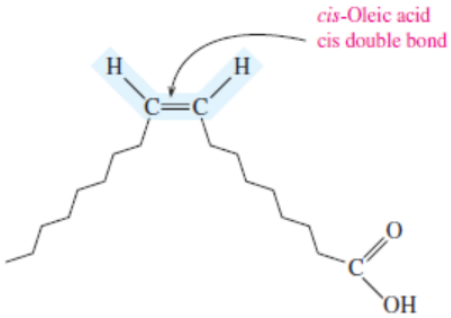
La isomería cis-trans o geométrica es debida a la <u>rotación restringida</u> entorno a un enlace carbono-carbono. restricción puede ser debida a la presencia de dobles enlaces o ciclos.

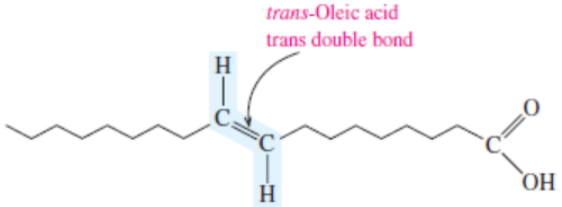


cis-2-Buteno

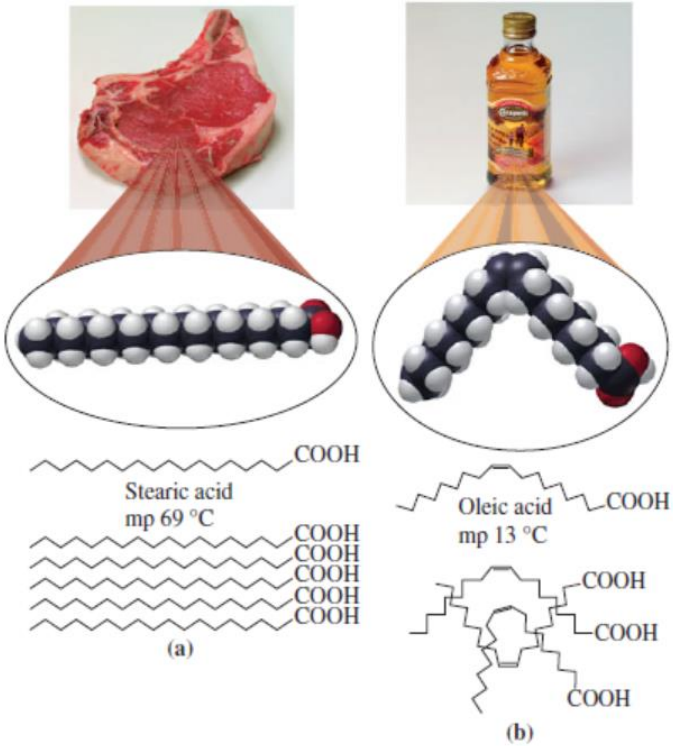


trans-2-Buteno





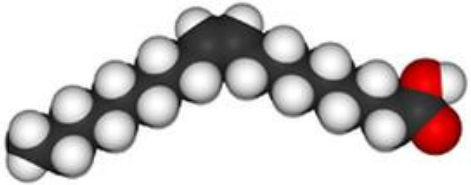
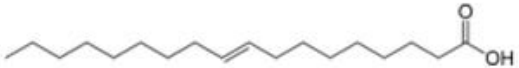
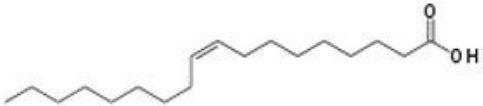
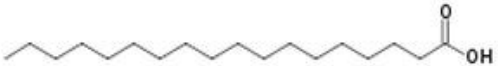
Propiedades de los lípidos



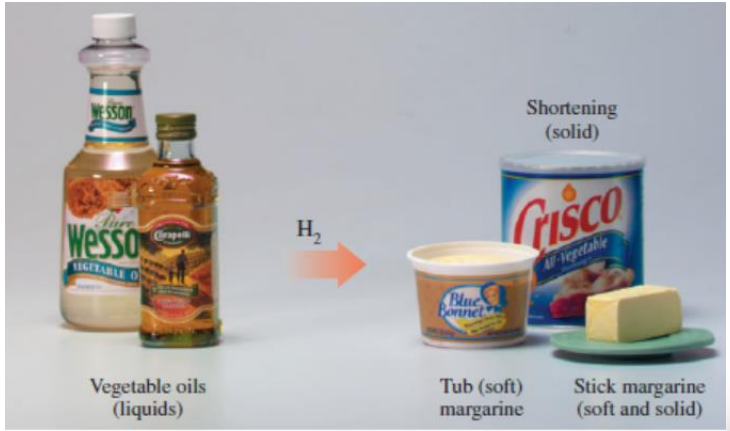
ácido esteárico, pf 70 °C

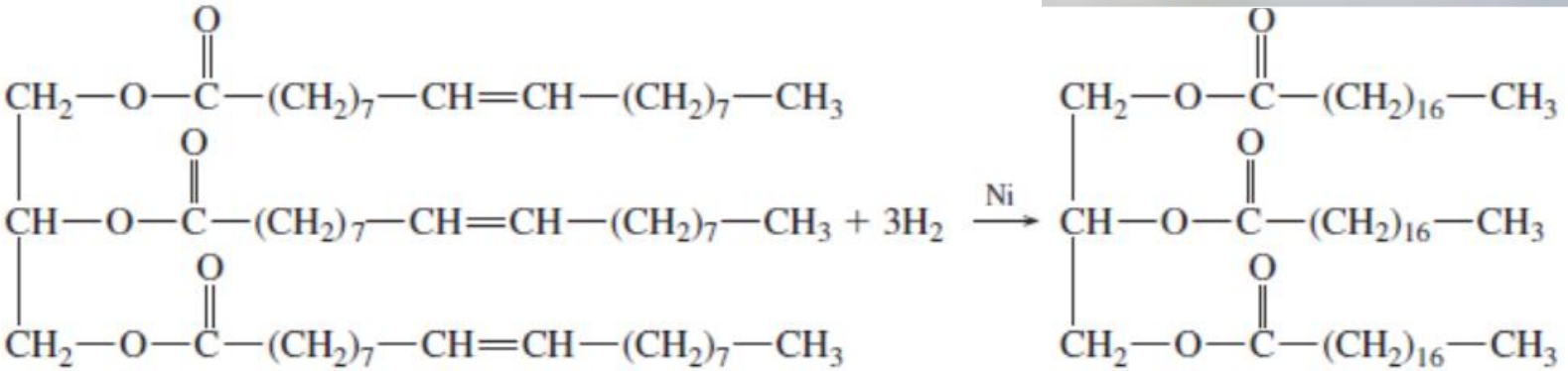
ácido oleico, pf 4 °C

Grasas *trans*

Trans (Elaidic acid)	Cis (Oleic acid)	Saturated (Stearic acid)
Elaidic acid is the principal *trans* unsaturated fatty acid often found in partially hydrogenated vegetable oils.[41]	Oleic acid is a *cis* unsaturated fatty acid making up 55–80% of olive oil.[42]	Stearic acid is a saturated fatty acid found in animal fats and is the intended product in full hydrogenation. Stearic acid is neither *cis* nor *trans* because it has no carbon-carbon double bonds.
		
		

Hidrogenación de los triglicéridos

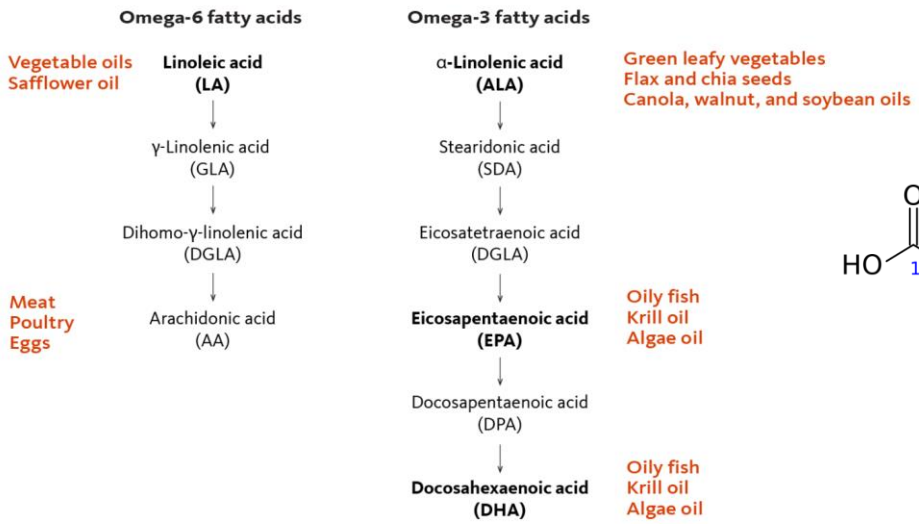


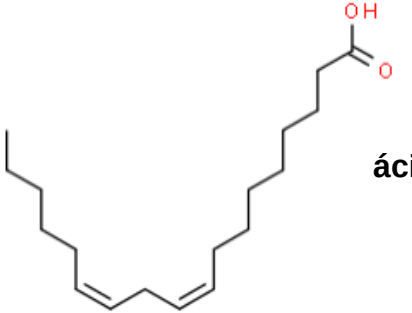


Glyceryl trioleate (triolein) → Glyceryl tristearate (tristearin)

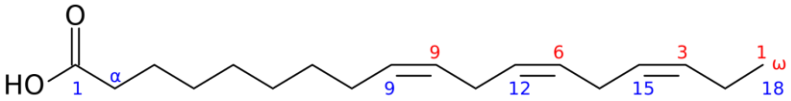
Videos: https://www.youtube.com/watch?v=2iKczqO1TiE&t=8s
https://www.youtube.com/watch?v=KG_ybdk1VaE

Ácidos grasos esenciales y omega

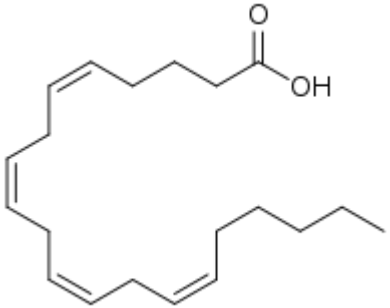




ácido linoleico



ácido linolénico



ácido docosahexaenoico (DHA)

Omega-6 Fatty Acids

Linoleic acid (LA) $CH_3—(CH_2)_4—CH=CH—CH_2—CH=CH—(CH_2)_7—COOH$

1 6

Arachidonic acid (AA) $CH_3—(CH_2)_4—(CH=CH—CH_2)_4—(CH_2)_2—COOH$

1 6

Omega-3 Fatty Acids

Linolenic acid (ALA) $CH_3—CH_2—(CH=CH—CH_2)_3—(CH_2)_6—COOH$

1 3

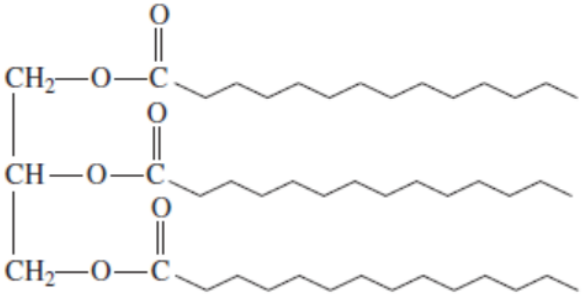
Eicosapentaenoic acid (EPA) $CH_3—CH_2—(CH=CH—CH_2)_5—(CH_2)_2—COOH$

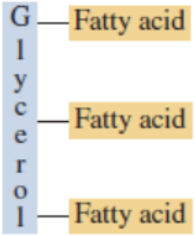
1 3

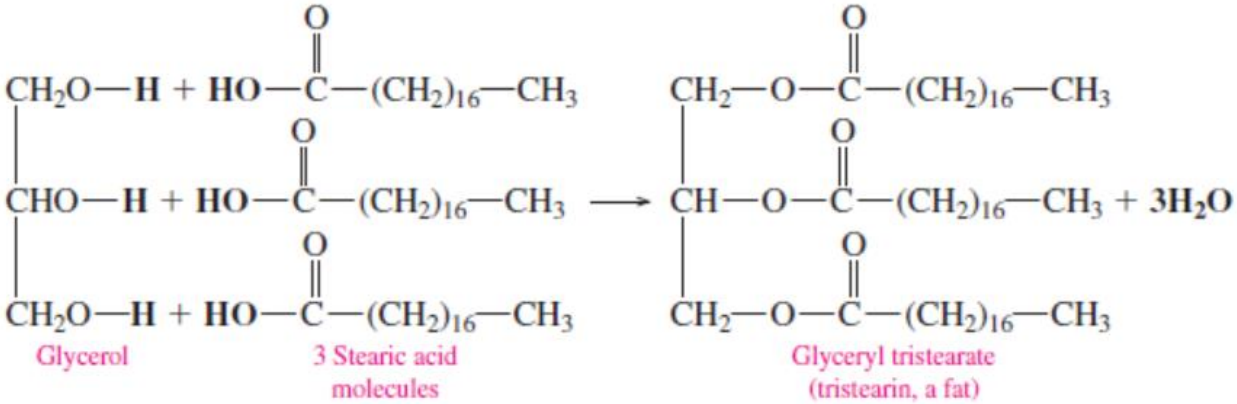
Docosahexaenoic acid (DHA) $CH_3—CH_2—(CH=CH—CH_2)_6—CH_2—COOH$

1 3

Transesterificación de los lípidos - formación de triglicéridos

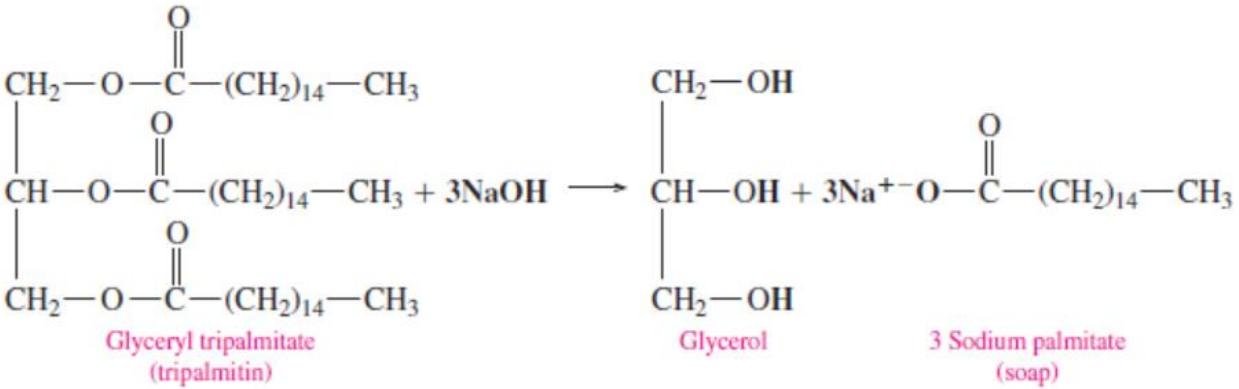


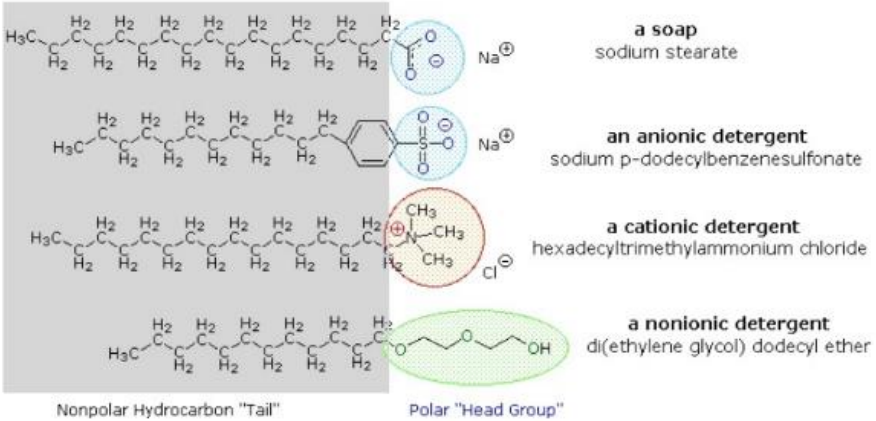




Saponificación

Fat or oil + strong base ⟶ glycerol + salts of fatty acids (soaps)

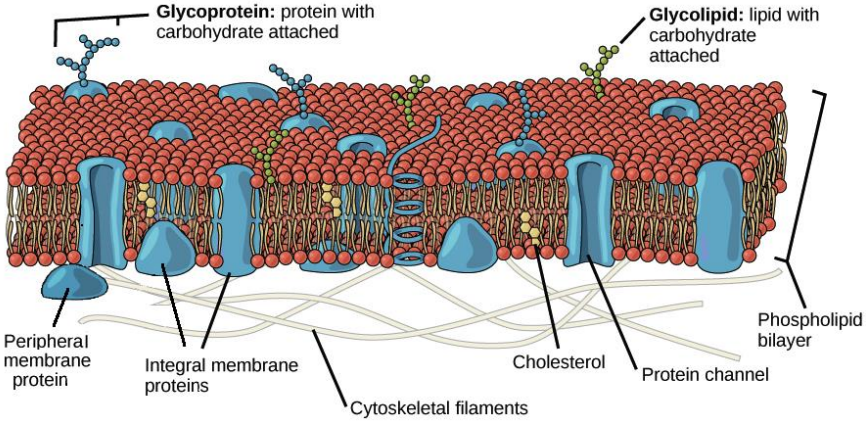


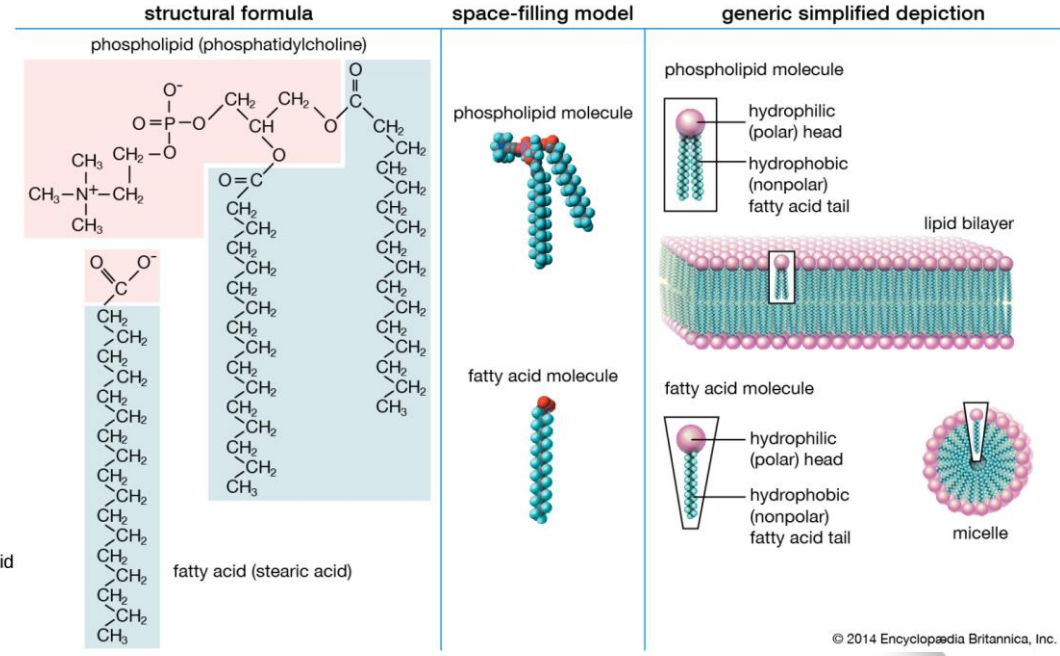


Resumen de las reacciones químicas que involucran lípidos

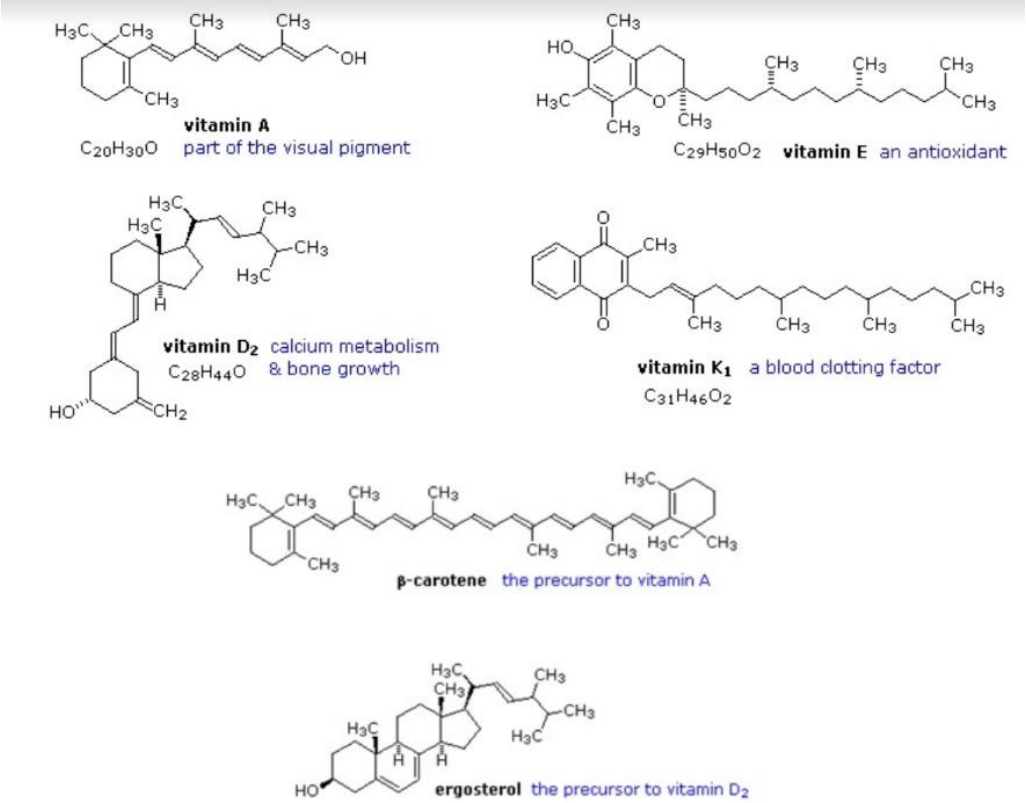
Reaction	Organic Reactants and Products	Lipid Reactants and Products
Esterification	Carboxylic acid + alcohol $\xrightarrow{H^+, \text{Heat}}$ ester + water	3 Fatty acids + glycerol $\xrightarrow{\text{Enzyme}}$ triacylglycerol (fat) + 3 water
Hydrogenation	Alkene (double bond) + hydrogen $\xrightarrow{\text{Pt}}$ alkane (single bonds)	Unsaturated fat (double bonds) + hydrogen $\xrightarrow{\text{Ni}}$ saturated fat (single bonds)
Hydrolysis	Ester + water $\xrightarrow{H^+, \text{Heat}}$ carboxylic acid + alcohol	Triacylglycerol (fat) + 3 water $\xrightarrow{\text{Enzyme}}$ 3 fatty acids + glycerol
Saponification	Ester + sodium hydroxide $\longrightarrow$ sodium salt of carboxylic acid + alcohol	Triacylglycerol (fat) + 3 sodium hydroxide $\longrightarrow$ 3 sodium salts of fatty acid (soaps) + glycerol

Membrana plasmática





Vitaminas liposolubles



Aplicar lo aprendido

Canvas → Página de inicio → Semana 10

Quiz de salida

Bibliografía

Wade, LG Jr. (2017), Química Orgánica, 9na Edición, EEUU, Prentice Hall. Cap.25 pp.1200-1214 (no 25.8).

Imágenes de Google imágenes

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