



**UTE**C

UNIVERSIDAD DE INGENIERÍA  
Y TECNOLOGÍA



# Grupos funcionales I: hidrocarburos alifáticos y aromáticos

## Sesión 2

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Química Orgánica



# Pautas de la sesión online:



Tiempo aproximado 2 horas



Realizar preguntas por el chat.



Silenciar su micrófono.



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



Habilitar la cámara.



La grabación de la sesión se cargará en Canvas.

# Objetivo de la sesión online:

- **Resolver** ejercicios sobre estructura, función y propiedades físico-químicas de compuestos alifáticos y aromáticos, considerando su estructura química y datos relevantes, respondiendo a la hoja de trabajo de manera clara, concisa y ordenada.

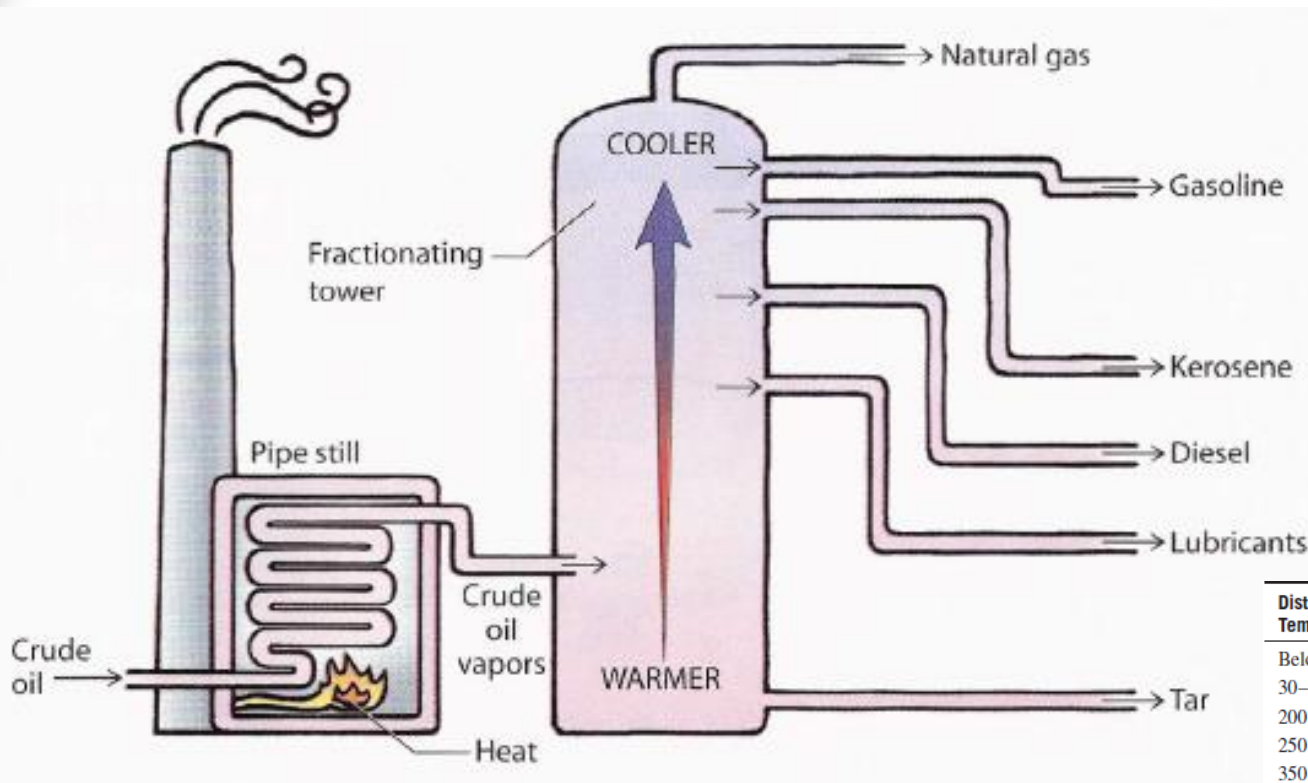
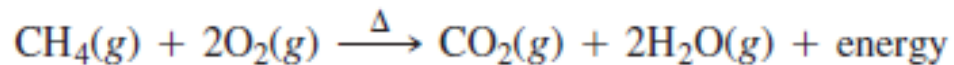
# Contenidos:

- Alcanos y cicloalcanos
- Alquenos y alquinos
- Hidrocarburos aromáticos

# ¿Qué son y de dónde provienen los hidrocarburos?

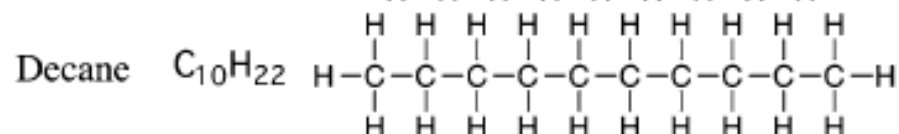
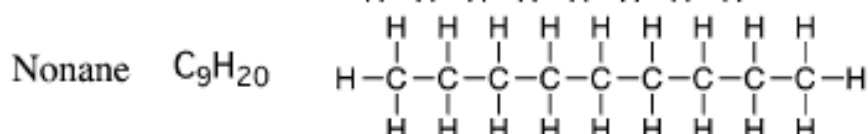
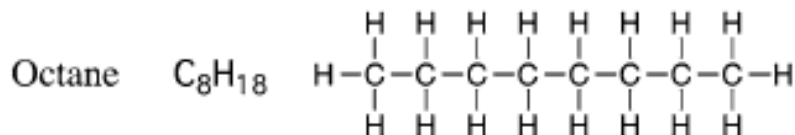
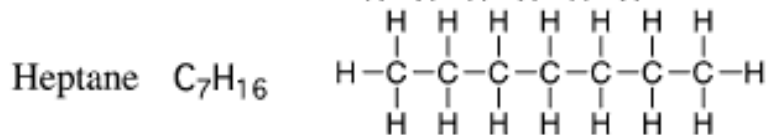
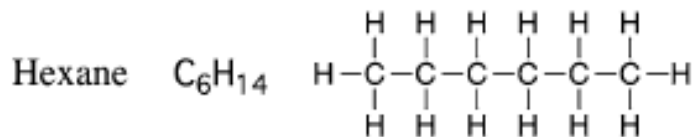
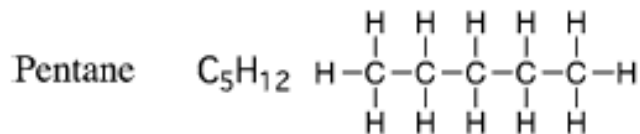
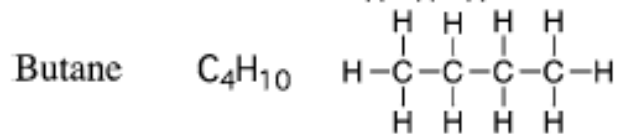
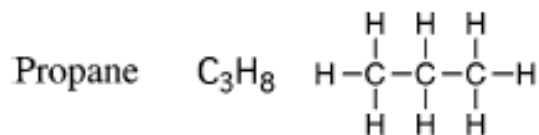
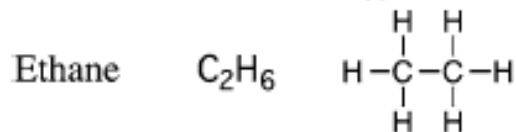
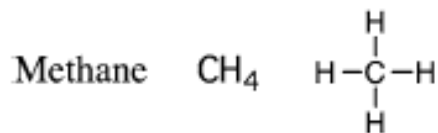


# Los hidrocarburos



Distillation Temperatures (°C)	Number of Carbon Atoms	Product
Below 30	1-4	Natural gas
30-200	5-12	Gasoline
200-250	12-16	Kerosene, jet fuel
250-350	15-18	Diesel fuel, heating oil
350-450	18-25	Lubricating oil
Nonvolatile residue	Over 25	Asphalt, tar

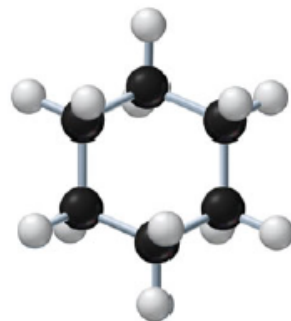
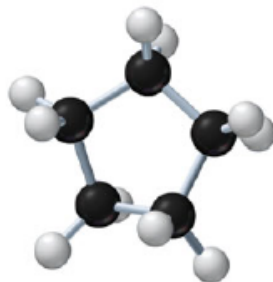
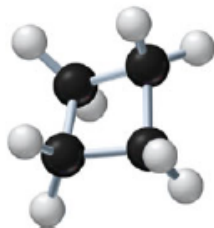
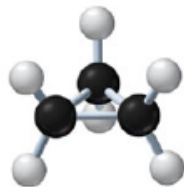
# Alcanos - $C_nH_{2n+2}$



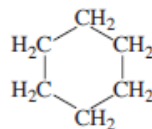
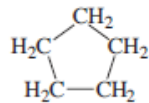
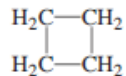
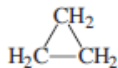


# Cicloalcanos

## Ball-and-Stick Models



## Condensed Structural Formulas



## Skeletal Formulas



## Names

Cyclopropane

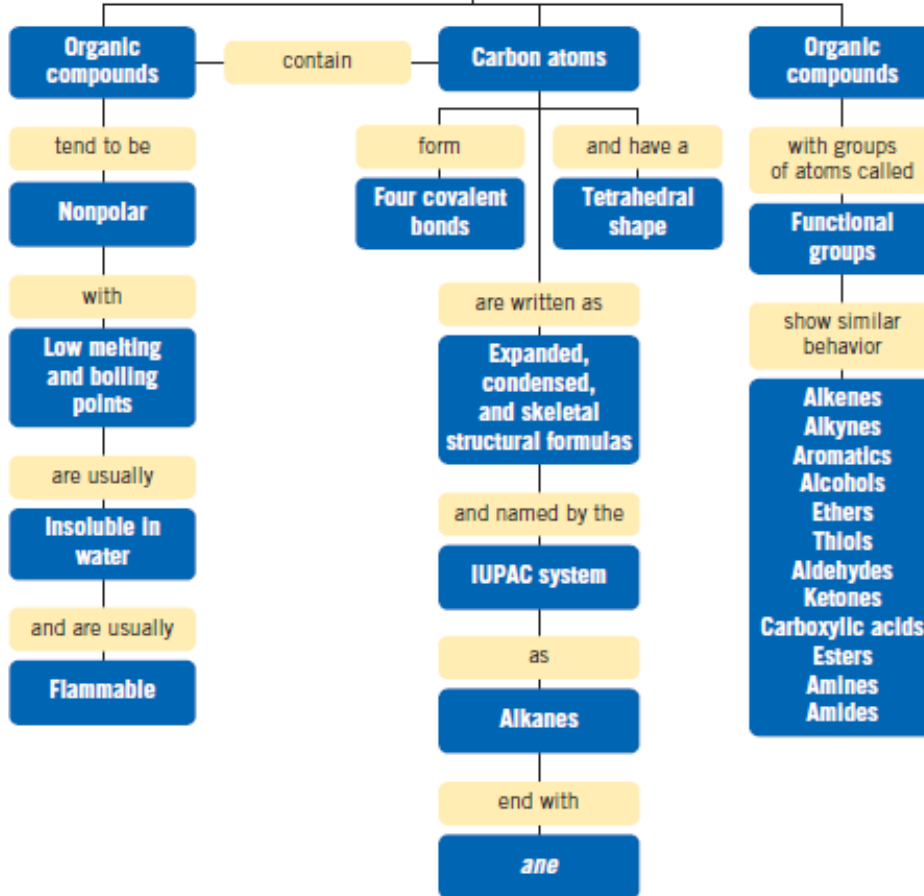
Cyclobutane

Cyclopentane

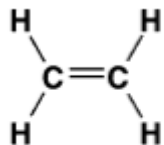
Cyclohexane

# En resumen...

## INTRODUCTION TO ORGANIC CHEMISTRY: ALKANES



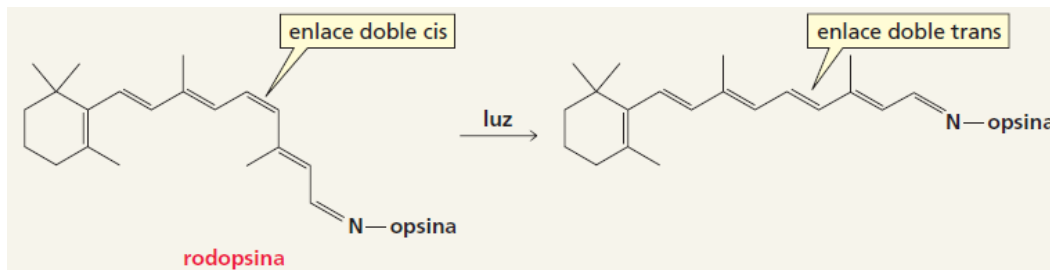
# Hidrocarburos insaturados: Alquenos ( $C_nH_{2n}$ ) y Alquinos ( $C_nH_{2n-2}$ )



**Ethene  
(Ethylene)**



**Ethyne  
(Acetylene)**

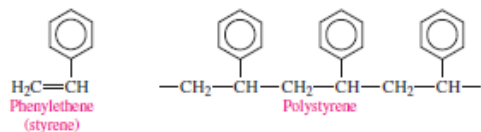


**Table 24: Boiling Points of Alkenes and Alkynes**

name	formula	boiling point ( $^{\circ}C$ )
Ethylene	$CH_2=CH_2$	-103.7
Acetylene	$HC \equiv CH$	-84.0
Propene	$CH_2=CHCH_3$	-47.6
Propyne	$HC \equiv CCH_3$	-23.2
1-Butene	$CH_2=CHCH_2CH_3$	-6.1
<i>cis</i> -2-Butene	$cis-CH_3CH=CHCH_3$	+3.7
<i>trans</i> -2-Butene	$trans-CH_3CH=CHCH_3$	+0.9
2-Methylpropene	$CH_2=C(CH_3)_2$	-6.6
1-Butyne	$HC \equiv CCH_2CH_3$	+8.1
2-Butyne	$CH_3C \equiv CCH_3$	+27.0
1-Pentene	$CH_2=CHCH_2CH_2CH_3$	+30.2
1-Pentyne	$HC \equiv CCH_2CH_2CH_3$	+40.2

# ¿Dónde los encontramos? - Ejemplos

Monomer	Polymer Section	Common Uses
$\text{H}_2\text{C}=\text{CH}_2$ Ethene (ethylene)	$\begin{array}{cccccc} \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} \\   &   &   &   &   &   \\ -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C}- \\   &   &   &   &   &   \\ \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} \end{array}$ Polyethylene	Plastic bottles, film, insulation materials
$\begin{array}{c} \text{Cl} \\   \\ \text{H}_2\text{C}=\text{CH} \end{array}$ Chloroethene (vinyl chloride)	$\begin{array}{cccccc} \text{H} & \text{Cl} & \text{H} & \text{Cl} & \text{H} & \text{Cl} \\   &   &   &   &   &   \\ -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C}- \\   &   &   &   &   &   \\ \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} \end{array}$ Polyvinyl chloride (PVC)	Plastic pipes and tubing, garden hoses, garbage bags
$\begin{array}{c} \text{CH}_3 \\   \\ \text{H}_2\text{C}=\text{CH} \end{array}$ Propene (propylene)	$\begin{array}{cccccc} \text{H} & \text{CH}_3 & \text{H} & \text{CH}_3 & \text{H} & \text{CH}_3 \\   &   &   &   &   &   \\ -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C}- \\   &   &   &   &   &   \\ \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} \end{array}$ Polypropylene	Ski and hiking clothing, carpets, artificial joints
$\begin{array}{c} \text{F} & \text{F} \\   &   \\ \text{F}-\text{C} & =\text{C}-\text{F} \end{array}$ Tetrafluoroethene	$\begin{array}{cccccc} \text{F} & \text{F} & \text{F} & \text{F} & \text{F} & \text{F} \\   &   &   &   &   &   \\ -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C}- \\   &   &   &   &   &   \\ \text{F} & \text{F} & \text{F} & \text{F} & \text{F} & \text{F} \end{array}$ Polytetrafluoroethylene (Teflon)	Nonstick coatings
$\begin{array}{c} \text{Cl} \\   \\ \text{H}_2\text{C}=\text{C}-\text{Cl} \end{array}$ 1,1-Dichloroethene	$\begin{array}{cccccc} \text{H} & \text{Cl} & \text{H} & \text{Cl} & \text{H} & \text{Cl} \\   &   &   &   &   &   \\ -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C}- \\   &   &   &   &   &   \\ \text{H} & \text{Cl} & \text{H} & \text{Cl} & \text{H} & \text{Cl} \end{array}$ Polydichloroethylene (Saran)	Plastic film and wrap



Plastic coffee cups and cartons, insulation

Plastic packaging is made from seven different types and some are recycled more often than others

Commonly      Commonly      Almost never      Sometimes



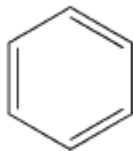
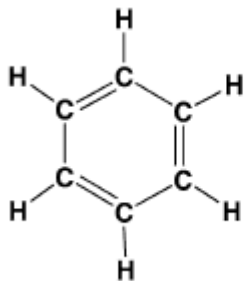
Commonly      Almost never      Almost never



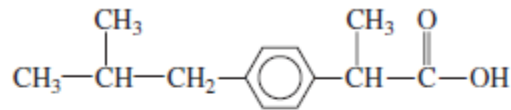
BBC

1	2	3	4	5	6	7
PETE	HDPE	PVC	LDPE	PP	PS	O
Polyethylene terephthalate	High-density polyethylene	Polyvinyl chloride	Low-density polyethylene	Polypropylene	Polystyrene	Other

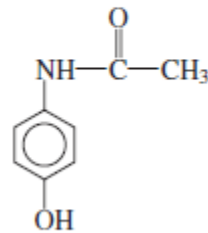
# Hidrocarburos aromáticos



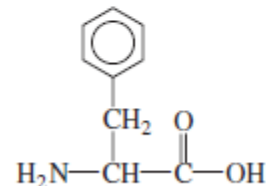
**Benceno**



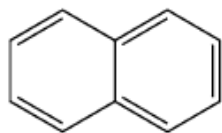
**Ibuprofen**



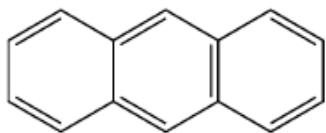
**Acetaminophen**



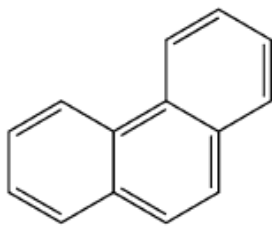
**Phenylalanine  
(amino acid)**



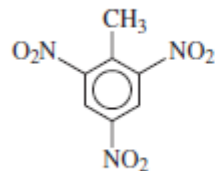
**Naphthalene**



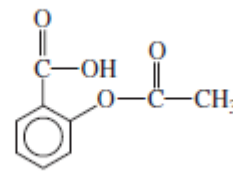
**Anthracene**



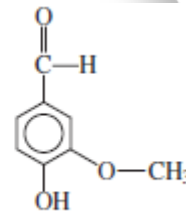
**Phenanthrene**



**TNT (2,4,6-trinitrotoluene)**

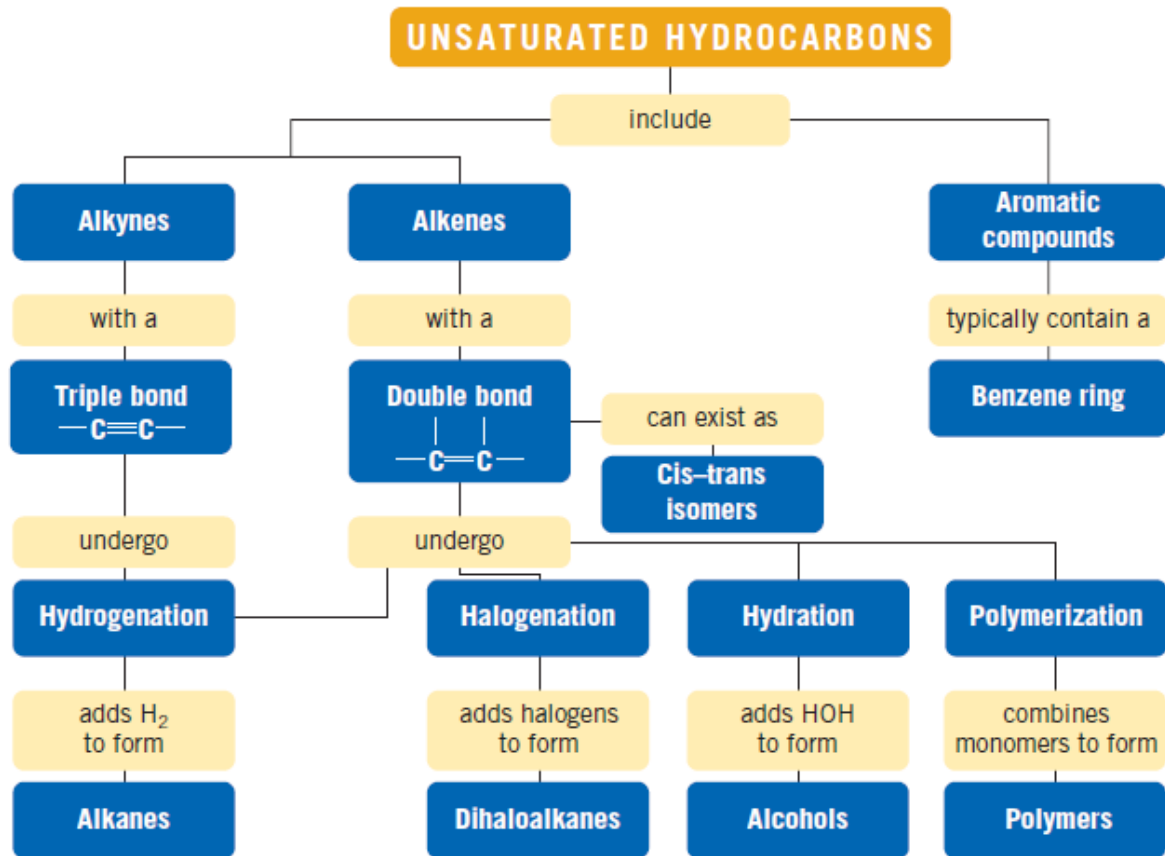


**Aspirin**



**Vanillin**

## En resumen...



# Aplicar lo aprendido

Canvas → Página de inicio → Semana 4

# Conclusiones de la Sesión



# Bibliografía

Yurkanis Bruice, P. (2007), Fundamentos de Química Orgánica, México, Pearson. Cap.3 y 4.

Vancik, H. (2014), Basic Chemistry for the Life Sciences, Suiza, Springer. Cap. 1.

# Gracias

## Próxima Clase - 21/04:

- Quiz de entrada
- Tema a ver: Grupos funcionales II: Compuestos oxigenados





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