



UNIVERSIDAD DE GUADALAJARA

Centro Universitario de Ciencias Exactas e Ingenierías
Secretaría Académica / Coordinación de la Licenciatura en Química

1.- GENERAL INFORMATION

Learning Unit Organic Chemistry Theory I		Department Chemistry		Format Lecture
Prerequisites(P) General Chemistry I	Corequisites (CO) Organic Chemistry Lab I	Ascribed Academy Academy of Organic Chemistry	Module Structure of Matter	
Type Basic Particular Mandatory	Lecture hours 68 hours	Practice hours 0 hrs.	Total hours 68 hrs.	Credits 9

2.- GENERIC COMPETENCIES

Students...

- Recognize the structure and stereochemistry of the organic molecules and their different functional groups.
- Distinguish the chemical reactions to obtain the reactions of alkanes and alkyl halides, highlighting the reaction mechanisms to understand concepts, principles and theories that are fundamental in chemistry.



UNIVERSIDAD DE GUADALAJARA

Centro Universitario de Ciencias Exactas e Ingenierías
Secretaría Académica / Coordinación de la Licenciatura en Química
Comité de Innovación Curricular de la Licenciatura en Química

3.- SPECIFIC CHARACTERISTICS OF THE COMPETENCY

Knowledge	Students... -know and relate knowledge from different fields and mark relationships between the knowledge and everyday life.
Skills	-are able to analyze, synthesize and evaluate.
Aptitudes	-have analytical abilities, inductive reasoning and observation skills.
Values	-are honest and responsible.

4.- TRANSVERSAL COMPETENCIES

<input checked="" type="checkbox"/>	Foreign Language (English)
<input checked="" type="checkbox"/>	Critical, analytical and synthetic thinking.
<input type="checkbox"/>	Oral and written expression
<input type="checkbox"/>	Professional ethics
<input type="checkbox"/>	Administration of human and material resources
<input type="checkbox"/>	Leadership and sustainability
	Creativity, innovation and entrepreneurship
	Other



UNIVERSIDAD DE GUADALAJARA

Centro Universitario de Ciencias Exactas e Ingenierías
Secretaría Académica / Coordinación de la Licenciatura en Química
Comité de Innovación Curricular de la Licenciatura en Química

5.- COURSE CONTENT OF THE LEARNING UNIT

1. Introduction and review.
2. Structure and properties of organic molecules.
3. Structure and stereochemistry of alkanes.
4. Study of chemical reactions.
5. Stereochemistry.
6. Alkyl halides: nucleophilic and elimination

6.- ASSESSMENT

- | | |
|-------------------------------------|---------------|
| <input checked="" type="checkbox"/> | Numeric grade |
| <input type="checkbox"/> | |
| <input type="checkbox"/> | |



UNIVERSIDAD DE GUADALAJARA

Centro Universitario de Ciencias Exactas e Ingenierías
Secretaría Académica / Coordinación de la Licenciatura en Química
Comité de Innovación Curricular de la Licenciatura en Química

7.- GRADING CRITERIA OF THE LEARNING UNIT

Indicator of evaluation	Percentage
Departmental exams	25
Partial exam	35
Homework	10
Research activities	10
Practice reports	0
Class participation	10
Other: Activities in Moodle	10

8.- REQUIRED MATERIAL (for students)

<input type="checkbox"/>	Calculator
<input type="checkbox"/>	Periodic table
<input type="checkbox"/>	Lab coat
<input checked="" type="checkbox"/>	Text book
<input type="checkbox"/>	Workbook
<input type="checkbox"/>	



UNIVERSIDAD DE GUADALAJARA

Centro Universitario de Ciencias Exactas e Ingenierías
Secretaría Académica / Coordinación de la Licenciatura en Química
Comité de Innovación Curricular de la Licenciatura en Química

9.-SPECIFIC CONTENT BY LEARNING UNITS					
Content unit	Generic competency of the content unit	Topics	Class hours	Student activities	Bibliography
Unit 1 Introduction and review	Students interpret Lewis structures, identifying formal charges and drawing resonance structures according to the general rules.	1.1 Principles of atomic structure.		Before: Identify the learning objective and reading about the topic of this unit.	L.G. Wade, Jr. <i>Química Orgánica</i> . Volume 1.
		1.2 Bonding formation: octet rule and multiple bonds.			
		1.3 Formal charges and ionic structures.			
		1.4 Resonance			
		1.5 Structural formulas			
		1.6 Acids and bases of Arrhenius	8	During: Listen and take notes, reflect, analyze and do the activities indicated by the professor.	
		1.7 Brønsted-Lowry and Lewis			



UNIVERSIDAD DE GUADALAJARA

Centro Universitario de Ciencias Exactas e Ingenierías
Secretaría Académica / Coordinación de la Licenciatura en Química
Comité de Innovación Curricular de la Licenciatura en Química

Unit 2 Structure and properties of organic molecules.	Students predict the hybridization and geometry of atoms and draws tridimensional representations. Identify constitutional isomers and stereoisomers.	2.1 Undulatory properties of the electrons in molecular orbits.	10			L.G. Wade, Jr. <i>Química Orgánica.</i> Volume 1.
		2.2 Hybridization and molecular forms.				
		2.3 constitutional isomerism and stereoisomers.				
		2.4 Polarity of bonds and molecules.				
		2.5 intermolecular forces.				
	Identify the general types of hydrocarbons as well as the compounds that contain oxygen or nitrogen.	2.6 Hydrocarbons. 2.7 Alkanes alkenes alkynes 2.8 Aromatic Hydrocarbons 2.9 Organic compounds that contain oxygen. Organic compounds that contain nitrogen.				
Unit 3 Stereochemical structure of the alkanes.	Students name and draw alkanes, cycloalkanes and bicycloalkanes correctly. Compare the energy of the alkane formations and predict a more stable formation.	3.1 Alkane nomenclature	10			L.G. Wade, Jr. <i>Química Orgánica.</i> Volume 1.
		3.2 Physical properties of alkanes.				
		3.3 Alkane reactions.				
		3.4 Alkane structure				
		3.5 Cis-trans isomerism in cycloalkanes.				



UNIVERSIDAD DE GUADALAJARA

Centro Universitario de Ciencias Exactas e Ingenierías
Secretaría Académica / Coordinación de la Licenciatura en Química
Comité de Innovación Curricular de la Licenciatura en Química

Unit 4 Study of chemical reactions	Identify and draw trans and cis isomers of the cycloalkanes. Draw the formation of the cyclohexane and predicts the most stable formations of disubstituted cyclohexanes.	3.6 Stability of cycloalkanes. Ring strain				
		3.7 Cyclohexane formation				
		3.8 Monosubstituted cyclohexane formation.				
		3.9 Disubstituted cyclohexane formation.				
	Students predict the halogenation products of an alkane, calculate the enthalpy changes from the bond dissociation, and use energy diagrams to explain the transition states, activation energies, intermediaries, and the limiting step of the reaction rate of different steps. Describe the structure of carbocations, carbanions, free radicals	4.1 Methane chlorination.	10			L.G. Wade, Jr. <i>Química Orgánica.</i> Volume 1.
		4.2 Chain reaction of free radicals.				
		4.3 Equilibrium constant and free energy.				
		4.4 Enthalpy and entropy				
		4.5 Enthalpy of bond dissociation.				
		4.6 Transition states.				
		4.7 Selective halogenation.				
		4.8 Hammond's postulate.				



UNIVERSIDAD DE GUADALAJARA

Centro Universitario de Ciencias Exactas e Ingenierías
Secretaría Académica / Coordinación de la Licenciatura en Química
Comité de Innovación Curricular de la Licenciatura en Química

	and carbenes as well as the structures that stabilize them.	4.9 Intermediary reagents				
Unit 5 Stereochemistry	Students classify chiral or achiral molecules and identify specular symmetry planes. Identify asymmetric atoms and names according to the(R) and (S) nomenclature. Draw the stereoisomers of a given structure. Identify the enantiomers, diastomers and meso compounds. Draws Fisher projections of asymmetric carbon atoms.	5.1 Chirality, nomenclature (R) and (S) of the asymmetric carbon atoms.	10			L.G. Wade, Jr. <i>Química Orgánica.</i> Volume 1.
		5.2 Optical activity, biological discrimination of enantiomers.				
		5.3 Racemic mixtures, enantiomeric excess and optical purity.				
		5.4 Chirality of conformationally mobile systems.				
		5.5 Chiral compounds without asymmetric atoms.				
		5.6 Fisher projections and their application.				
		5.7 Diastereomers.				
		5.8 Stereochemistry of molecules with two or more asymmetric carbons.				
		5.9 Meso compounds.				
		5.10 Absolute and relative configuration.				
		5.11 Physical properties of diastereomers.				
		5. 12 Resolution of enantiomers.				
		6.1 Nomenclature of alkyl halides.	18			



UNIVERSIDAD DE GUADALAJARA

Centro Universitario de Ciencias Exactas e Ingenierías
Secretaría Académica / Coordinación de la Licenciatura en Química
Comité de Innovación Curricular de la Licenciatura en Química

Unit 6 Alkyl halides, nucleophilic substitution and elimination.	Students name the alkyl halides correctly and identifies them as primary, secondary and tertiary. Predict the products of the reactions S_N1 , S_N2 , E1, and E2 including their stereochemistry. Establish the energy mechanisms and profiles of reactions S_N1 , S_N2 , E1, and E2. Predict if a reaction belongs to the first or second order. Utilize the Zaitsev rule to predict the main and secondary products of elimination.	6.2 Common uses of alkyl halides.				L.G. Wade, Jr. <i>Química Orgánica.</i> Volume 1.
		6.3 Structure and physical properties of alkyl halides.				
		6.4 Preparation of alkyl halides.				
		6.5 Alkyl halide reactions: nucleophilic substitution and elimination.				
		6.6 Second order nucleophilic substitution of S_N2 reaction.				
		6.7 Generalities of the S_N2 reaction: nucleophile strength, substrate reactivity and stereochemistry.				
		6.8 First order nucleophilic substitution of reaction S_N1				
		6.9 Stereochemistry, reordering.				
		6.10 Comparison of reactions S_N1 and S_N2				
		6.11 First order elimination				
		E1. Positional orientation of elimination: Zaitsev rule.				
		6.12 Second order elimination: E2 reaction.				
		6.13 Stereochemistry of E2 reaction.				
		6.14 Comparison of mechanisms of E1 and E2				

Haga clic aquí para escribir texto.



UNIVERSIDAD DE GUADALAJARA

Centro Universitario de Ciencias Exactas e Ingenierías
Secretaría Académica / Coordinación de la Licenciatura en Química
Comité de Innovación Curricular de la Licenciatura en Química