

BASIC SCIENCES

# DIVISION

Department of Chemistry

Inorganic Chemistry I



CUCEI



### 1.- GENERAL INFORMATION

<b>Learning Unit</b> Inorganic Chemistry I		<b>Department</b> Chemistry		<b>Format</b> Lecture
<b>Prerequisites(P)</b> Molecular Structure	<b>Corequisites (CO)</b> Inorganic Chemistry Lab I	<b>Ascribed Academy</b> Academy of Chemistry	<b>Module</b> Structure of Matter	
<b>Type</b> Basic Particular Mandatory	<b>Lecture hours</b> 4 hours per week	<b>Practice hours</b> 0 hrs.	<b>Total hours</b> 68 hrs.	<b>Credits</b> 9

**Degree in which this class is taught: B.S in Chemistry.**

### 2.- GENERIC COMPETENCIES

Students...

- ... relate the position of an element in the periodic table with its properties and their quantic numbers.
- ... identify, quantify and utilize the concepts of acidity and basicity of substances.
- ... understand the importance of oxidation and reduction in chemical reactions.
- ... understand the importance of the solid state in the study of chemistry and the relationship structure- material properties.

### 3.- SPECIFIC CHARACTERISTICS OF THE COMPETENCY

Knowledge	<input type="checkbox"/> Symmetry <input type="checkbox"/> Unit cell, crystal systems, Bravais lattices. <input type="checkbox"/> Miller indexes <input type="checkbox"/> X- Ray diffraction, Bragg's Law. <input type="checkbox"/> Acidity, basicity, <input type="checkbox"/> Oxidation and reduction, <input type="checkbox"/> Descriptive chemistry of the main groups. (s and p blocks)
Skills	<input type="checkbox"/> Calculation <input type="checkbox"/> Drawing <input type="checkbox"/> Imagination <input type="checkbox"/> Memory
Aptitudes	<input type="checkbox"/> Perseverance <input type="checkbox"/> Observation <input type="checkbox"/> Investigation



Values	<input type="checkbox"/> Honesty <input type="checkbox"/> Veracity <input type="checkbox"/> Solidarity
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#### 4.- TRANSVERSAL COMPETENCIES

<input checked="" type="checkbox"/>	Foreign Language (English)
<input checked="" type="checkbox"/>	Critical, analytical and synthetic thinking.
<input checked="" 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
<input type="checkbox"/>	Creativity, innovation and entrepreneurship
<input type="checkbox"/>	Other



## 5.- COURSE CONTENT OF THE LEARNING UNIT

### 1. Symmetry

- 1.1 Symmetry elements and operations
- 1.2 Point groups
  - 1.2.1 High and low symmetry groups

### 2. Solid state chemistry

- 2.1 Hard spheres
  - 2.1.1 Closed packed structure
  - 2.1.2 Hollow, square, triangular and tetragonal structures
- 2.2 Unit cell
  - 2.2.1 Primitive cells and non-primitive cells
- 2.3 Structures
  - 2.3.1 Crystal systems
  - 2.3.2 Bravais 14 lattices
- 2.4 Miller indexes
  - 2.4.1 Interplanar distance
  - 2.4.2 Interplanar angles
- 2.5 Defects and dislocation
- 2.6 X-ray Diffraction
  - 2.6.1 Bragg's Law

### 3. Acids and bases

- 3.1 Acidity
  - 3.1.1 Arrhenius theory
  - 3.1.2 Bronsted-Lowry's theory
  - 3.1.3 Lewis' theory
  - 3.1.4 Pearson's acid-bases, hard-soft theories

### 4. Oxidation and reduction

- 4.1 Basic concepts of oxidation and reduction
- 4.2 Electrode potentials as thermodynamic functions.
- 4.3 Diagrams
  - 4.3.1 Latimer's diagram (reduction potential)
  - 4.3.2 Frost diagram (oxidation states)

### 5. Descriptive chemistry of the main groups (Blocks s and p)

- 5.2 Descriptive chemistry of the main groups (Blocks s and p)

## 6.- ASSESSMENT



Numeric grade



### 7.- GRADING CRITERIA OF THE LEARNING UNIT

Indicator of evaluation	Percentage
Departmental exams	25
Partial exam	65
Homework	5
Research activities	5
Practice reports	0
Class participation	0

### 8.- REQUIRED MATERIAL (for students)

<input checked="" type="checkbox"/>	Calculator
<input checked="" type="checkbox"/>	Periodic table
<input type="checkbox"/>	Lab coat
<input checked="" type="checkbox"/>	Text book
<input type="checkbox"/>	Workbook
<input type="checkbox"/>	Tables of standard potential, table of mobility, etc



9.-SPECIFIC CONTENT BY LEARNING UNITS

Content unit	Generic competency of the content unit	Topics	Class hours	Professor activities	Student activities	Bibliography
<b>Unit 1:</b> Symmetry	Students... - are able to assign the point group of a molecule.	1.1 Symmetry elements and operations	5	Professor... -lectures -creates and corrects homework. - designs exams.	Students... - answer online and paper activities as well as homework and exams.	Alan Vincent. <i>Molecular Symmetry and group theory.</i>
		1.2 Point groups	5			
<b>Unit 2.</b> Solid state chemistry	Students - are able to distinguish the different crystal structures of inorganic phases. -interpret the diffractions of crystals correctly.	2.1 Hard spheres	6	Professor... - lectures - solves problems and clarifies doubts. - administer exams.	Students... -answer exercises and problems in the classroom and on their own. -Investigate topics to understand basic concepts.	Glen E. Rodgers, <i>Descriptive Inorganic, Coordination, and Solid-State Chemistry.</i> Brooks S/Cole Cengage Learning L. Smart and E. Moore, <i>Química del Estado Sólido, una introducción,</i> Addison-Wesley Iberoamericana
		2.2 Unit cell cells	5			
		2.3 Structures	7			
		2.4 Miller indexes	6			
		2.5 Defects and dislocations	2			



		2.6 Diffraction of x-rays.	4			A.F. Wells, <i>Structural Inorganic Chemistry</i> . Clarendon Press-Oxford Oxford University Press Ely House, London W1
<b>Unit 3.</b> Acids and bases	Students... - understand the different ways to approach acidity and basicity in different compounds. - are able to predict the properties of acidity and basicity of different aqueous and non-aqueous systems.	3.1 Acidity concepts	10	Professor... - lectures - solves problems and clarifies doubts. - administer s exams.	Students... -answer exercises and problems in the classroom and on their own. -investigate topics to understand basic concepts.	Geoff Rayner-Canham, <i>Química Inorgánica Descriptiva</i> , Prentice Hall.  Huheey, J. E., Keiter, E. A., Keiter, R. L. <i>Inorganic Chemistry</i> , Harper Collins.
<b>Unit 4.</b> Oxidation and reduction	Students... -understand the concepts of oxidation and reduction	4.1 Basic concepts of oxidation and reduction	4	Professor... - lectures - solves problems and	Students... -answer exercises and problems in the classroom	Geoff Rayner-Canham, <i>Química Inorgánica Descriptiva</i> , Prentice Hall.



	and their relationship with the thermodynamics and chemical equilibrium.			clarifies doubts. - administer exams.	and on their own. -Investigate topics to understand basic concepts.	
		4.2 Electrode potentials as thermodynamic functions.	4			
		4.3 Diagrams	4			
<b>Unit 5.</b> Descriptive chemistry of the main groups (Blocks s and p)	Students... -are able to relate the position of an element in the periodic table based on their quantic numbers with their physical and chemical properties.	5 5.2 Descriptive chemistry of the main groups (Blocks s and p)	6	Professor... - lectures - solves problems and clarifies doubts. - administer exams.	Students... -answer exercises and problems in the classroom and on their own. -Investigate topics to understand basic concepts.	Giuseppe Bruni, <i>Química Inorgánica</i> , Uteha.  Geoff Rayner-Canham, <i>Química Inorgánica Descriptiva</i> , Prentice Hall.  James E. House, Kathleen A. House, <i>Descriptive Inorganic Chemistry</i> , Elsevier.
<b>COURSE EVIDENCES</b> <b>(Deliverables)</b>						
<ul style="list-style-type: none"> <li>- Partial Exam</li> <li>- Departmental exam</li> <li>- Research tasks</li> <li>- Problem and concept solutions</li> </ul>						





#### 10.-PROFESSOR'S PROFILE

Bachelor, Master or Doctorate degree in Chemistry, Chemical Engineering, or related degrees.

#### 11.-AUTHORS OF THE LEARNING UNIT

Karina Viridiana Chávez Hernández, Araceli Guadalupe Trujillo Orozco, Maite Rentería Urquiza, Sara Angélica Cortés Llamas, Víctor Manuel Soto García

#### 12.-MODIFICATION AND UPDATE

March 22, 2017