Code: **QF635**

Name: **Físico-Química Experimental**

Name in English: **Physical Chemistry Laboratory**

Name in Spanish: **Físico-química Experimental**

Subject type: Weekly

Approval Type: Grade and Attendance

Characteristic: Regular

Frequency: 75%

Period Type / Offering period: Semester / 2nd Period - even periods

Requires Final Exam: Yes

Vectors

T	L	P	O	PE	OE	SL	WEEKS	CREDITS
-	**4**	**-**	**1**	**-**	**-**	**4**	**15**	**5**

Occurrence on curriculum: **50,56**

Pre requirement: **QF531**

Summary: **Experiments related to topics: chemical thermodynamics, kinetics, electrochemistry, phase equilibrium, colligative properties, material properties, and physical chemistry of colloids and surfaces.**

Program:

The experiments selected for this discipline aim to reinforce fundamental concepts of Physical Chemistry, complementing the content of theoretical courses and introducing students to new methods, techniques, and equipment. Half of the discipline is dedicated to fundamental experiments in Physical Chemistry and the other part to experiments of a technological nature. Specific bibliography for each experiment is indicated in the experimental guide.

I: Experiments of fundamental nature.

Ia. (Chemical Kinetics and Ionic Mobility):

1. Kinetics of methylene blue reduction
2. Sucrose inversion kinetics
3. Conductivity

Ib. Phase Equilibrium

1. Liquid-vapor equilibrium
2. Liquid-liquid equilibrium
3. Phase equilibrium in ternary systems
4. Solid-solid phase equilibrium

Ic. Thermodynamics

1. Excess molar volume
2. Heat capacity of materials
3. Solution enthalpies

Id. Chemical Equilibrium and Potential

1. Reaction equilibrium
2. Ebulliometry
3. Cryoscopy
4. Electrochemistry

II: Experiments of a technological nature.

IIa. Material Properties

1. Polymer crystallization (by optical polarization microscopy)
2. Thermal Analysis (DSC)
3. Extrusion, injection, and measurements of mechanical and surface properties of polymers (experiment in the polymer processing plant).
4. X-ray Diffraction

IIb. Polymers in Solution

1. Viscosity of polymeric solutions
2. Polyelectrolytes: influence of ionic strength on viscosity
3. Polymer Solubility Parameter
4. Colloid rheology

IIc. Surface Physical Chemistry

1. Surface Tension
2. Foams and Emulsions
3. Adsorption at Interfaces

Basic Bibliography

1) ATKINS, P.; DE PAULA, J. **Físico-Química.** 9º ou 10° Edições. LTC - Livros Técnicos e Científicos Editora LTDA. Volumes 1 e 2.
2) LEVINE, I. N. **Physical Chemistry.** 6 Edição. McGraw-Hill, Inc. 2008. Volume 1.
3) LEVINE, I. N. **Físico Química.** 6º Edição. LTC - Livros Técnicos e Científicos Editora LTDA. 2012. Volumes 1 e 2.

Supplementary Bibliography

1) SHOEMAKER, D. P.; GARLAND, C.W.; NIBLER, J.W. **Experiments in Physical Chemistry.** 5th Edition. McGraw-Hill,Inc. 1989. Volume 1.
2) FINDLAY, A. **Pratical Phisical Chemistry.** 8th Edition. Longmans, Green and Co. Ltd. 1967. Volume 1.
3) DANIELS, F.; ALBERTY, R.; WILLIANS, J.W.; CORNWELL, C. D. **Experimental Physical Chemistry**. 7thEdition. McGraw-Hill,Inc. 1970. Volume 1.
4) CROCKFORD, H.D.; NOWELL, J.W.; BAIRD, F.W.G. **Laboratory Manual of Physical Chemistry.** 2thEdition. John Wiley & Sons, Inc. 1975. Volume 1.
5) Além das bibliografias contemplando os Fundamentos das Disciplinas, os Docentes irão completá-la com a bibliografia específica para a realização dos experimentos.