

# PHARMACEUTICAL CHEMISTRY OF ELEMENTS AND INORGANIC COMPOUNDS

**Code number:** ΝΠ18-04

**Cycle:** Undergraduate

**Semester:** 1st

**Course type**

	Background/General knowledge
X	Scientific area (pharmacy)

**Credit Units (ECTS):** 7

**Lectures (hours/week):** 4

**Tutorial (hours):**

**Laboratory work (hours):** 1.5

**Course Coordinator:** Periklis Akrivos, Professor

**Tutors:**

**Periklis Akrivos, Professor**

Collaboration with students:

Communication: e-mail ([akrivos@chem.auth.gr](mailto:akrivos@chem.auth.gr))

**Dionysia Papagiannopoulou, Assistant Professor**

Room 423a, 4th floor Biology/Pharmacy building.

Collaboration with students: Every day.

Communication: 2310-998680, email ([papagd@pharm.auth.gr](mailto:papagd@pharm.auth.gr))

**Eleni Pontiki, Assistant Professor**

Room 410, 4th floor Biology/Pharmacy building.

Collaboration with students: Every day 11-12.

Communication: e-mail ([epontiki@pharm.auth.gr](mailto:epontiki@pharm.auth.gr))

**Assisting personnel:**

**Aims of the course:** A. Understanding of basic concepts of Chemistry and in particular: The understanding of current concepts on the atom and the formation of the chemical bond. Expansion of the quantum theory of the atomic structure to the molecular level. Basic principles on thermodynamics, kinetics and spectroscopy for structural characterization and reactivity of chemical compounds. Understanding of the periodic properties of the elements.

B. Understanding of the basic concepts of inorganic pharmaceutical chemistry, including chemical properties of elements (metals and metalloids) and the respective drug molecules, their interactions in the biological environment as well as their synthesis. Aims comprise knowledge and skill (capacity) of synthesis, qualitative control, characterization, quantitative control of pharmaceutical preparations which contain inorganic drugs, their mechanism of action at the molecular level as well as their use and side effects.

**Skills:** Understanding of structure and ability to predict the reactivity of small and medium size molecules. Gain the ability to predict the variance of simple physical and chemical properties. To organize, perform and assess the experimental data with respect to the basic principles of the solutions of chemical compounds. Familiarity with basic knowledge: a) biological activity of metals-metalloids b) biological activity of inorganic compounds of pharmaceutical interest, c) their interaction with biological targets and d) their characterization –qualitative/quantitative control.

### **Teaching methods:**

Lectures and Laboratory work.

### **Contents of the course:**

The atomic model. Periodic properties of the elements. Description of the chemical bond. Metal Compounds. Principles of molecular spectroscopy. Description of the gas phase. Principles of Thermodynamics. Chemical properties of the elements categorized in groups (s, p, d). Inspection of elements in respect with Chemistry-Pharmacological/Toxicological activity, biological activity of metals-metalloids, inorganic compounds of pharmaceutical interest: synthesis/origin, quality/quantity control, properties, uses, side effects and their chemical explanation. The given knowledge contains inorganic drugs that are still in used. Inorganic drugs that are no longer in use are also presented from a historical perspective. The categories of drugs discussed include antipsychotics, antiseptics, antacids, electrolytes, diagnostic, etc.

Content of the laboratory experiments:

Laboratory conduct and safety. Categories of chemical reactions. Chemical equilibrium of reactions in solution. Weak electrolytes equilibria, determination of pK. Indicators and their use in the determination of pH of aqueous solutions. Preparation of buffer solutions. Principles of oxidation and reduction. Oxidative and reductive properties of the compounds. Principles of Spectroscopy. Visible spectroscopy and its use in the identification and quantitative analysis of chemical compounds. Principles of titration-oximetry, alkalimetry and compleximetric titration.

### **Proposed Literature:**

1. Στοιχεία Γενικής Χημείας. Θεωρία και Πειράματα. Π. Ακριβος, Α. Χατζηδημητρίου. Εκδόσεις ΖΗΤΗ, Θεσσαλονίκη, 2012, 1<sup>η</sup> έκδοση, ISBN 978-960-456-333-3, Κωδικός στο σύστημα «Εύδοξος» 22766674.
2. Lecture notes (D. Papagiannopoulou and E. Pontiki)
3. Remington's:Pharmaceutical Sciences 14 Ed.Mac.Publishing Co., Easton, 1970.
4. National Formulary, National Drug Organization 2007

### **Educational activities:**

Lectures and laboratory work.

### **Evaluation process and methods:**

Evaluation of the students on theory based on the lectures in a written exam at the end of the semester (80%) and evaluation of the students on the laboratory practice (20%) and in particular their lab conduct and the results obtained during the lab experiments. Examination is based on some questions which should be answered according to the obtained knowledge during semester as well as to the ability to combine knowledge with information and the critical thought of the students.

Exams at the end of semester take place on date and hours as well as in auditoriums announced by the Department, with duration of 3 hours.

**Use of TIC / Electronic distribution of the lectures:**

**Teaching:**

a) Lectures. The lectures take place according to the announced semester program. Inorganic Chemistry Laboratories.