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INTERDISCIPLINARY INTEGRATION IN STUDYING OF PHARMACEUTICAL CHEMISTRY BY THE STUDENTS AT THE FACULTY OF PHARMACY

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Abstract

At the moment of time one of the most important strategic tasks of modernization of the system of education in Ukraine is the education of high quality providing to the pharmacists in order to satisfy the needs. Therefore the improvement of higher education system and formatting of new directions of its development on the basis of analytical marking and strategic approaches are necessary for studying of pharmaceutical courses, namely Pharmaceutical Chemistry. Countries facing similar healthcare problems. Medicine develops new methods for treatment, and pharmaceutical companies invent more efficient products. These technological advances are, however, putting a double-strain on public healthcare spending: the cost of sophisticated treatment is increasing, and improved healthcare allows patients to live longer, thus requiring more treatment. These challenges, however, require government to restrict expenditure. These challenges have to be solved in the context of existing public healthcare systems, which are well established and purpose of this work is the implementation of new pedagogical, psychological, statistical, analytical, biochemical methods into the studying of Pharmaceutical Chemistry in the Bologna System in Ukraine. One of the most important components of credit-modular educational process is the development of interdisciplinary integration that allows not only to check but also to systematize students' knowledge obtained throughout the whole educational period.

Keywords: pharmaceutical chemistry, interdisciplinary integration, credit-modular system, Bologna System.

Introduction.

One of the most important components of credit-modular system in an educational process is the development of interdisciplinary integration that allows not only to check but also to systematize knowledge obtained throughout the whole educational period [1-5].

One of the important aspects of students' studying under conditions of credit-modular system is a control and monitoring tool used for the assessment of students' activities - their knowledge is checked by related courses that help to master the course of Pharmaceutical Chemistry.

The aim of this paper is the creation of understanding of benefits and necessity in the implementation of interdisciplinary integration during studying of chemicals courses, i.e. Pharmaceutical Chemistry, in the educational period at the Faculty of Pharmacy.

Materials and Methods.

The subjects of studies are theoretical questions, case studies, teaching materials being used for the development of didactic materials on the basis of interdisciplinary integration of Pharmaceutical Chemistry to optimize students' knowledge.

Discussion.

The specific line of pharmaceutical graduates' preparing is a complex approach used for the teaching of special courses. The necessity in such complex approach used for educating at special courses is defined by taking a mandatory interdisciplinary exam during a governmental attestation caused by the fact that future professional activities of specialists-pharmacists will deal with issues related to all mentioned courses. That's why the graduates should be able to analyze and synthesize all knowledge gained at special courses aimed at the solving of situational problems in a working process.

Intercomprehensive qualitative preparing the students will be able to adapt quickly to the changing conditions of problems solving in the future.

Interdisciplinary relations implementation could be a high level of generalization. Interdisciplinary understanding of integrity, compactness of the obtained knowledge, this is a

skill to reach the targets set and accept challenges being the main goal of interdisciplinary goal is reached by specific well-prepared work of professor with the students and by interdisciplinary synthesis supported by multidirectional interdisciplinary relations set around and concepts of the course studied together with key ideas of the course and the science at

The high scientific and systematic level, mobility and potential perception of students largely dependent on the ability to focus their attention properly on the establishing of interdisciplinary

As a result of purposeful activity of professor students are provided with the course-oriented skills and understanding of the whole subject idea, together with the development for the proper organization of a scientific studying the materials to correspond pivotal concepts the course on the basis of interdisciplinary relations.

Pharmaceutical Chemistry is a basic course studied by the students at the Faculty of Pharmacy of the Faculty of Pharmacy of Medical (Pharmaceutical) University is defined by the specificity of Pharmaceutical Chemistry which provide the formation of professional competence of pharmacists when they will work in pharmacies and in the authorities of medicines quality assurance.

The integration plays an essential role in such process, i.e. the implementation of interdisciplinary (cross-related) programs supporting the transfer of methods from one knowledge to another. All sections of Pharmaceutical Chemistry are essential for learning of chemical, special and biological sciences. Such integration promotes creation of students' professional competences [8, 9]. Organic and Analytical Chemistry are basic courses which create a basis for Pharmaceutical Chemistry. Toxicological Chemistry is studied at 4th and 5th years at the Faculty of Pharmacy being a course that summarizes the knowledge of all the chemical sciences and pharmacology studied previously.

For example, studying "Alkaloids – purin's derivatives" topic of Pharmaceutical Chemistry the students can rely on their knowledge gained before when they studied:

- Organic Chemistry (classification of heterocyclic compounds, nomenclature, synthesis, physical and chemical characteristics of xanthene's derivatives);
- Pharmacognosy (natural sources of purin's alkaloids - xanthene's derivatives: theophylline, theobromine, methods isolation of purine alkaloids from plants);
- Pharmacology (pharmacokinetics and pharmacodynamics of biologically active compounds of purine alkaloids and drugs based on them; dosage, concentrations, adverse effects).

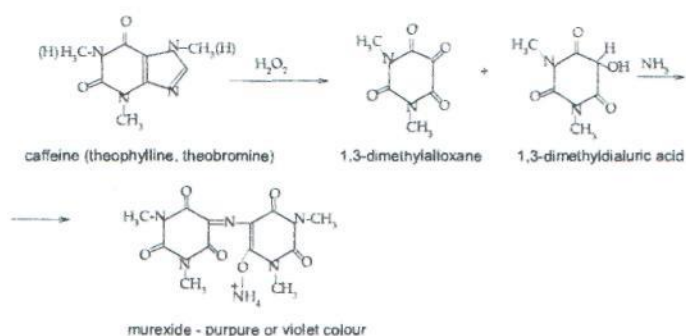
The knowledge obtained during Pharmaceutical Chemistry studying is a basis for a comprehensive mastering of this topic for the discipline of Toxicological Chemistry (Table 1):

Alkaloids – purin's derivatives: caffeine, theophylline, theobromine

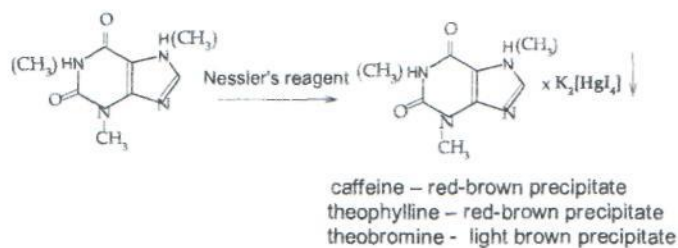
Organic Chemistry	Pharmaceutical Chemistry	Toxicological Chemistry
classification of heterocyclic compounds	classification of medications – alkaloids group	classification of toxic and harmful compounds – purin's derivatives (xanthine)
methods of synthesis	natural sources of alkaloids synthetically derived from uric acid	methods of alkaloids isolation objects of studies (biological, cadaveric material, other objects of studies)
physical and chemical characteristics	physical and chemical characteristics, identification reactions, specific reactions, qualitative definition (acidimetric, iodimetry)	objects isolation methods, detection reaction (the most sensitive), physico-chemical methods, the quantitative detection for the objects of studies and their extracts
–	medicines storage	storage of studies objects containing purine alkaloids
–	–	toxicokinetics, toxicodynamics transportation mechanisms and absorption concentration
–	–	metabolic processes' influence results of chemical-toxicological tests results interpretation
–	–	biotransformation

For example, studying Pharmaceutical Chemistry and Toxicological Chemistry courses the following qualitative reactions are studied:

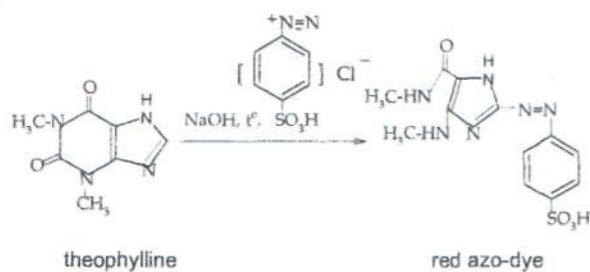
- Coloring reaction (caffeine, theophylline, theobromine) – murexide test:



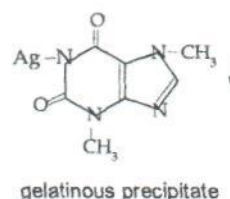
Reactions with reagents of group deposition: Dragendorff's reagent (caffeine, theobromine - crystalline precipitates of orange or red orange colors); Sonnenstein's reagent (caffeine – amorphous white precipitate); Scheibler's reagent (caffeine – amorphous white precipitate) with Nessler's reagent (caffeine, theophylline, theobromine):



Specific reaction with diazotized sulfonic acid (theophylline):



Specific reaction to theobromine – Argentum salt formation:



Quantitative determination of purin's derivatives (xanthine) in the chemical-toxicology performed by physicochemical methods: spectral (UV, IR spectrophotometry); chromatography (GLC, LC).

Thus, it is observed that within the main sections such as classification, methodological physical and chemical characteristics, purine alkaloids are studied comprehensively at the courses. While specificities of medicines and objects storage, biotransformation, toxicodynamics, features of tests results interpretation, as well as other areas, are detailed in educational courses Pharmaceutical Chemistry and Toxicological Chemistry.

Conclusion.

Comprehensive approach used during studying each section of Organic Chemistry enables the students to increase their knowledge in the future studying Pharmaceutical Chemistry and Toxicological Chemistry.

But note, it is the only one example discussed, while considering the syllabus of the course of Pharmaceutical Chemistry allows to identify more numerous and multifaceted relations between chemistry and interdisciplinary integration.

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