



SUBJECT DATASHEET

Semester:	2010/11/1
Subject:	Chemistry of medicines and the design of organic syntheses
Code:	VEMKOT4244A
Responsible department:	Department of Organic Chemistry
Responsible department code:	MKOK
Responsible lecturer:	Dr. Szilárd Tőrös

Educational objectives:

Educational Objectives: Introduction to drug research and development. Discussion of the synthesis of different drug types and molecules. Introduction to theoretical and practical aspects of organic synthesis design.

Detailed content of the subject:

Contents: 1. Basic knowledges of drug chemistry. The process of drug research, synthesis of biologically active, new molecules. Licensing of new compounds. Knowledges of industrial legal remedy. 2. Grouping of drugs according to their acting mechanism. Compounds acting on the central nervous system, their characterization through examples. 3. General anaesthetics, hypnotics, minor and major tranquilizers, their synthesis and applications. 4. Analgesics and antipyretics, natural and half-synthetic morphine derivatives. Psychostimulants, psychoenergetics, hallucinogens. 5. Local anaesthetics, antispasmodics, muscular relaxants, paralyzers of the moving end organs. Compounds acting on blood circulation, breathing and digestion. 6. Compounds acting on metabolism, role of the vitamins, the steroid hormone household. 7. Chemotherapeutics, the effect of antibiotics and main representatives. 8. Case study: in which way can be an antibiotic obtained starting from benzene? 9. Basic knowledges of toxicology: drug industry wastes, processing of byproducts. 10. The essence of synthesis design: „from the slightly determined requirement to the satisfied consumer”. The hierarchy of design, cost distribution, realization probability on different design levels. 11. Literature and patent situation. The specific and external characteristics of the process. The limits of the process. Laboratory and industrial processes. 12. Molecule construction: the synthon theory. basic molecule. Reactions of molecules with electrophile and nucleophile centers. Building-up of simple syntheses. Design of complex syntheses. Introduction and transformation of functional groups. Construction of carbon skeletons. 13. Working methods during the elaboration of a process: heuristics, expert system, logistics. Design of the structure of the process. Process evaluation: Wagner, Pattern systems, evaluation criteria. Industrial examples. 14. Criteria of reactor choice. Experiment design. Factorial experiment design: total and one factor analysis, restricted analysis, Plackett-Butman method, their evaluation. Optimization: simplex method. Levels of kinetic description and mechanism study, random sampling. 15. Types of experimental plants: „miniplant”, „pilot plant”, their scopes, dimensions, scale increasing, costs, construction rules. Security precautions.

Requirements:

Requirements: The students will work out the possible synthesis paths of a drug or an organic intermediate and will evaluate them critically.



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Required and suggested references:

Felhasznált tankönyvek: Knoll József: Gyógyszertan, Medicina Könyvkiadó Rt., Bp, 1993. Dr. Heiszman József: Szerves kémiai technológia, Tankönyvkiadó, Budapest, 1991. R.K. Mackie, D.M. Smith: Szerves kémiai szintézisek, Műszaki Kiadó, Bp., 1986. J.M.Douglas: Conceptual Design of Chemical Processes, McGraw Hill, NY.1989. M.S. Peters, K.D. Timmerhaus: Plant Design and Economics for Chemical Engineers, McGraw Hill, NY, 1991.