Organic Chemistry Concepts

LOKT.09.051

Introduction

The main textbook

Roos, G, Roos, C, Organic Chemistry Concepts, Academic Press 2015, TÜR

Includs texts, questions and solutions

Supplementary textbook

Hanson, JR, Functional Group Chemistry, The Royal Society of Chemistry, 2001, TÜR

Additional literature

- Solomons TWG, Organic Chemistry, Wiley 2000, TÜR and Chemicum
- Smith, M., B., March, J. Advanced Organic Chmistry. John Wiley & Sons, Inc. New York, Chicherster, Weinheim, Brisbane, Singapore, Toronto, 2001 (and older books)
- Carey, F.A., Sundberg, R.J. Advanced Organic Chemistry. Part B Third Edition., Plenum Press 1990.
- Grossman, R.B., The Art of Writing Reasonable Organic Reaction Mechanisms. Springer Verlag, New York, Berlin, Heidelberg, 2002.

- Why “**organic**” chemistry

  This name was introduced to distinguish compounds of living world from compounds originating from inorganic world. *Vitalism*

End of *vitalism* in 1828

Synthesis of urea from inorganic compounds by Friedrich Wöhler

$$Pb(OCN)_2 + 2NH_3 + H_2O = Pb(OH)_2 + 2H_2NCONH_2$$

Friedrich Wöhler
By Rudolf Hoffmann, 1856

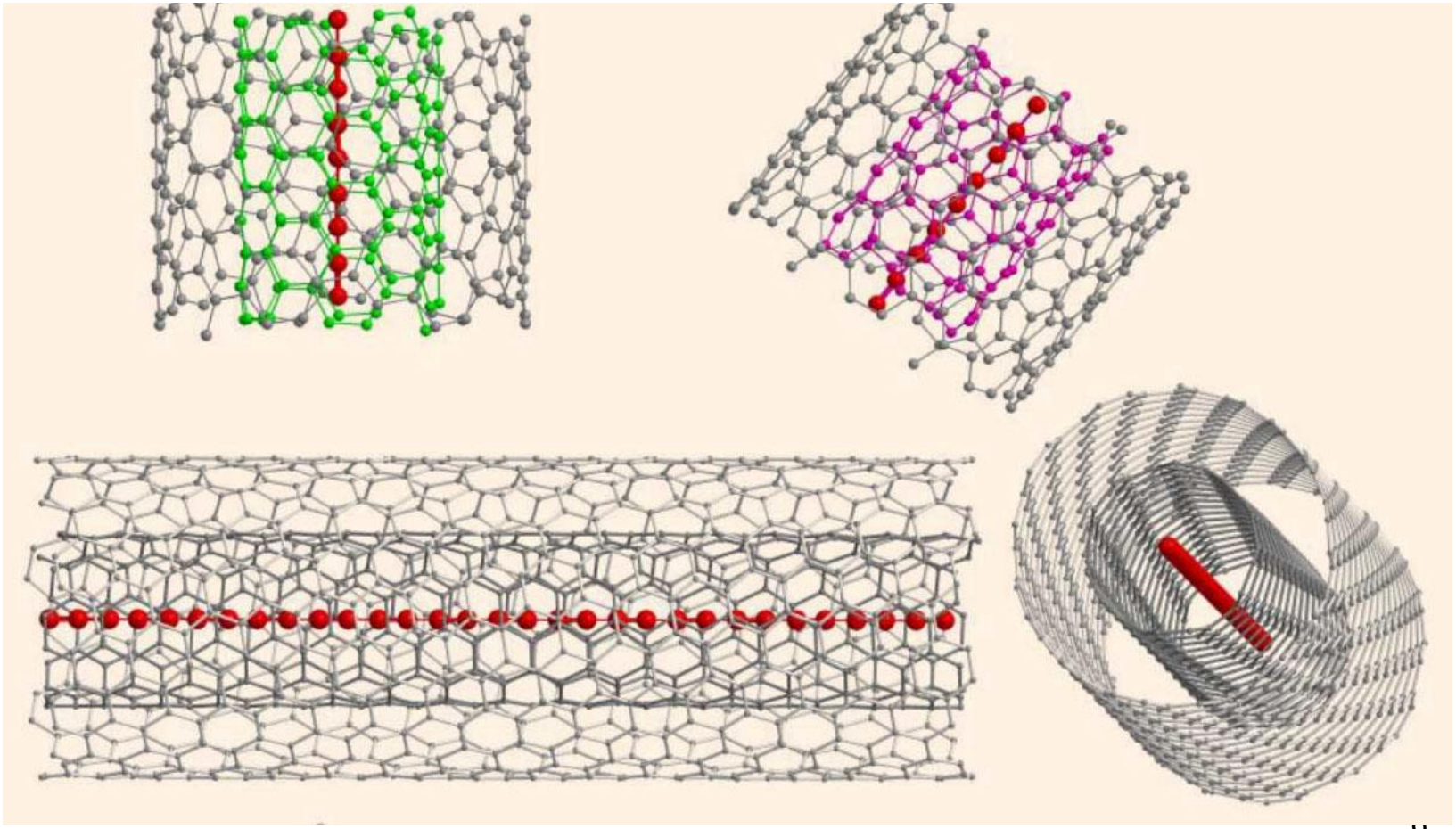
Some important features of organic chemistry

•Limited number of elements in organic compounds. Commonly **C, H, O, N**, and also F, Cl, Br, I, S, P, Si, and etc.

•About 10 million organic compounds are known. This huge number of organic compounds is based on special properties of carbon atom, which can form **carbon-carbon bonds**.

6000 carbon atoms in line

April 4, 2016 in: *Nature Materials*



Organic molecules

- **Molecule**: atomic composition, size and structure (topology).
- **Molecular structure**: sequence of atoms, connected with bonds.
- **Chemical bond**: attraction between two atoms.
- **Covalent bond**: attraction through sharing of (two) electrons, belonging to two atoms.
- **Chapter 1, the main textbook. Prepare for test.**

Importance of structure in organic chemistry

- **Molecule** is described by atomic composition, size and structure (topology).
- **Molecular structure** is described by sequence of atoms, connected with bonds.
- **Chemical bond** is attraction between two atoms.
- **Covalent bond** is attraction through sharing of (two) electrons, which belong to two atoms.

Representation of Organic Compounds

- Complete structural formula
- Condensed structural formula: use brackets
- Bond-line structural formula (with functional groups)
- 3D structural formula
- Molecular model

Naming of organic molecules

- One-to-one interrelationship between molecular structure and name of this molecule (compound).
- Rules to name organic compounds: **IUPAC**

www.chem.uiuc.edu/GenChemReferences/nomenclature_rules.html

- **Naming and structure. Chapters 2 and 3 in the main textbook. Prepare for test.**

Carbon chain coding

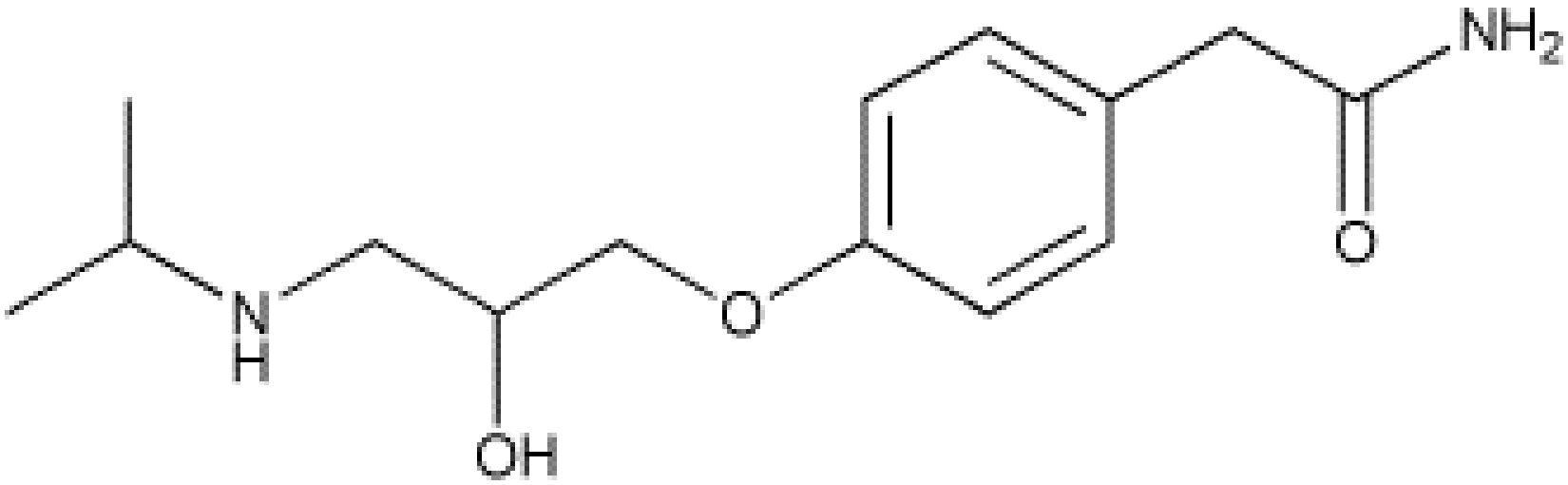
Number of C atoms in chain	code
1	meth
2	eth
3	prop
4	but
5	pent
6	hex

Organic chemistry = organic reactions

- Reactivity is the only chemical property
- **Organic reactivity is determined by structure of reacting molecules**

Goals of this course

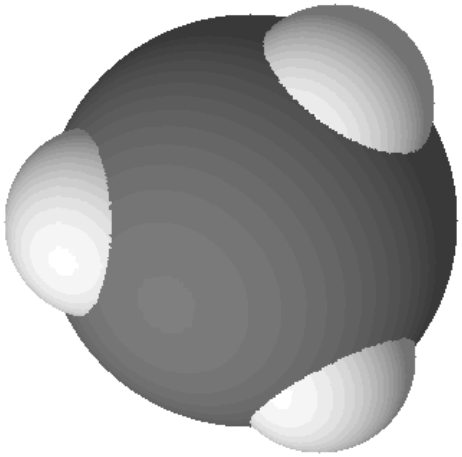
- **Understanding organic structures (textbook)**
- **Understanding reactions (lecture): products, intermediates (= mechanism)**

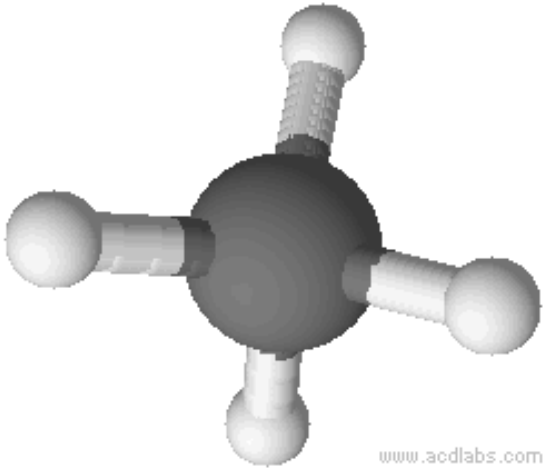


Chemical Formula: $C_{14}H_{22}N_2O_3$

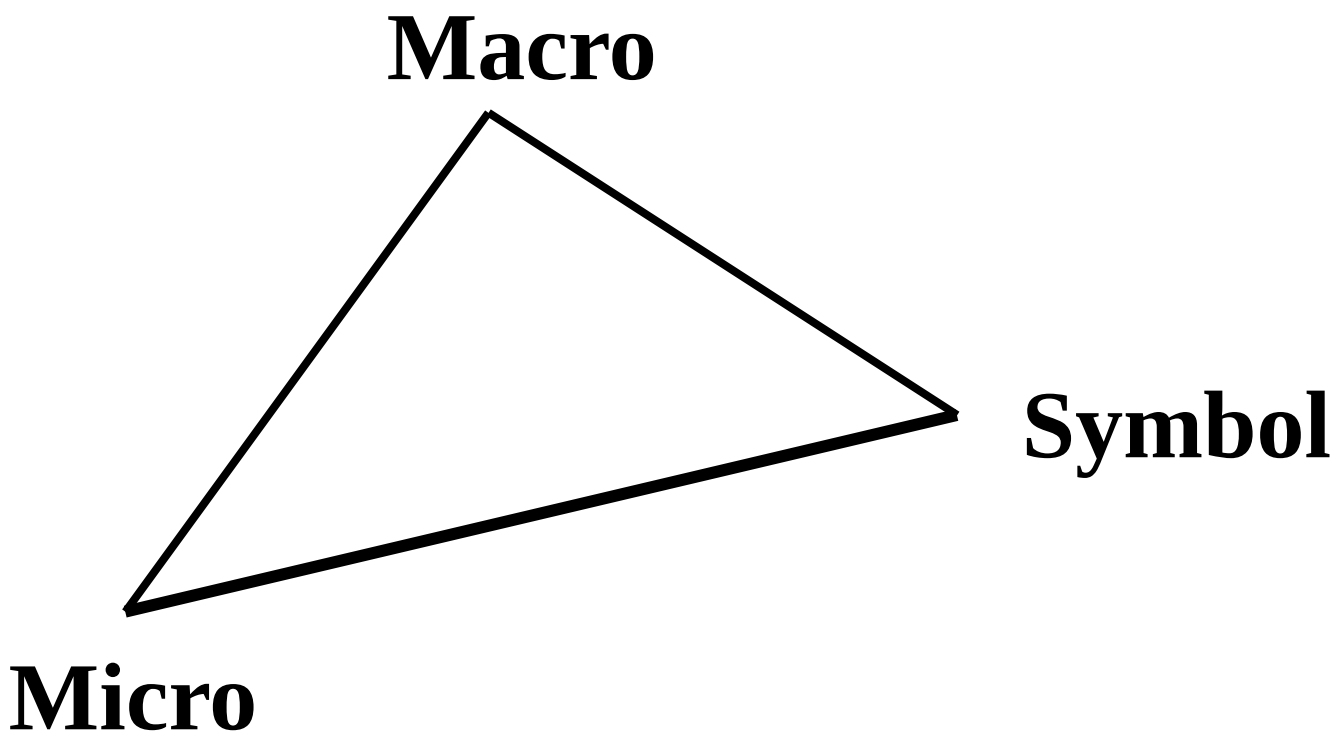
Who has ever seen a molecule?

CH_4





René Magritte, 1928-1929


Macro
Symbol
Micro

Digital tool (free) made for this course:

https//molecule.barn.ee

Free software for drawing molecules

http://www.acdlabs.com/products/draw_nom/draw/chemsketch/

HOMEWORK

CHAPTERS 1, 2, 3

ROOS, G, ROOS, C, ORGANIC CHEMISTRY CONCEPTS, ACADEMIC PRESS 2015,