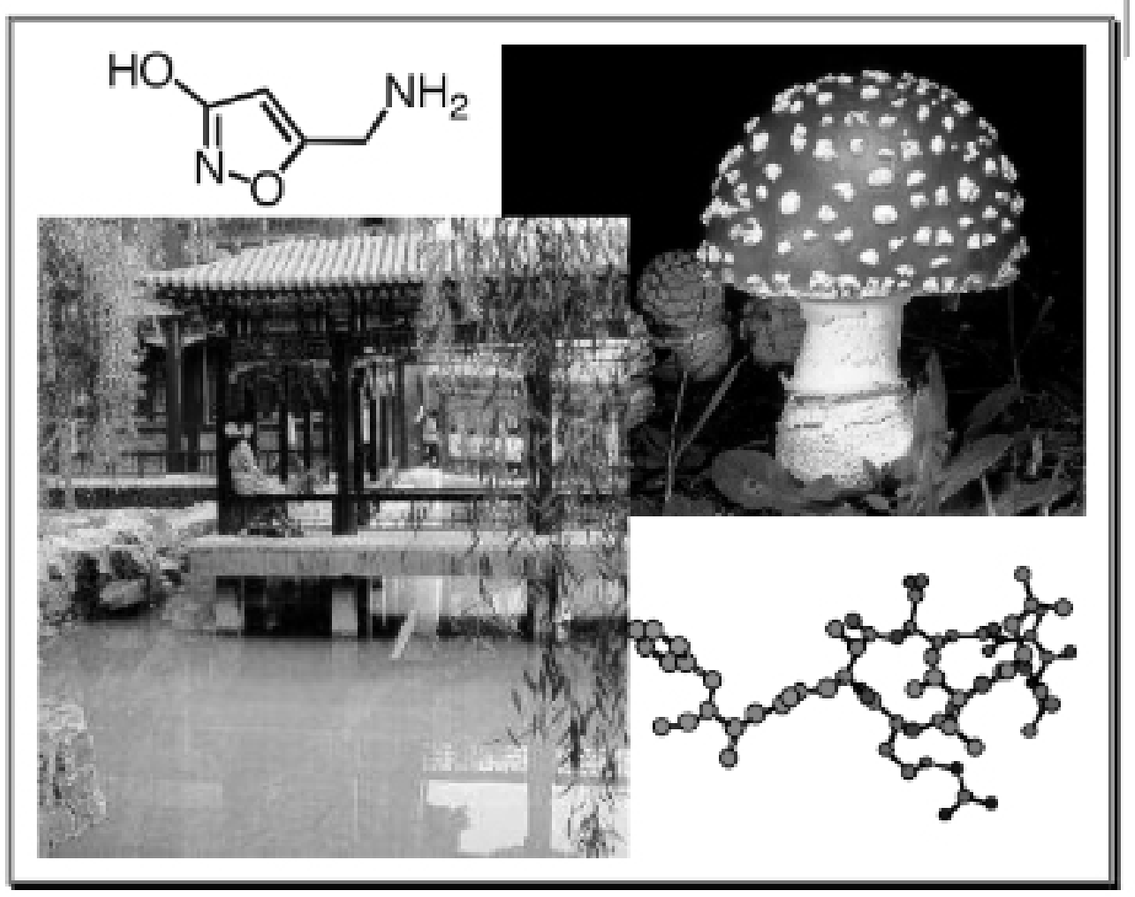
II. Special Topics

Possible Topics:

- heterocyclic chemistry
- pericyclic chemistry [Woodward-Hoffmann Rules]
- medicinal chemistry
- organometallic chemistry
- combinatorial chemistry
- microwave chemistry

II-A. HETEROCYCLIC CHEMISTRY



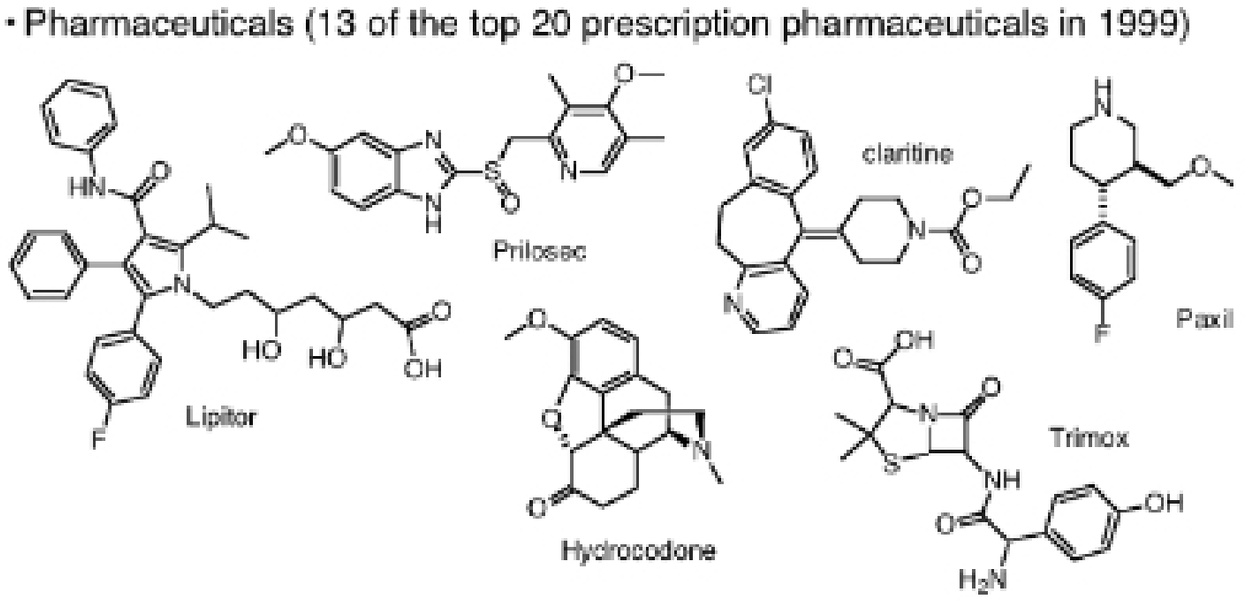
Introduction

Classification

If the ring system is made up of carbons and at least one other element, the compound can be considered as **heterocyclic**. About 50% of all known organic compounds are heterocyclic. About 55% of organic chemistry publications are dedicated to this field.

Uses of heterocyclic compounds

• Pharmaceuticals (13 of the top 20 prescription pharmaceuticals in 1999)



- Agrochemicals
- Veterinary products
- Dyes and pigments, fluorescent agents
- Antioxidants and food additives
- Corrosion inhibitors
- Intermediates in organic synthesis
- Biological functions (pKa, metal binding, hydrogen bonding, hydrophilicity,
- Fire retardant
- Photographic materials
- Organic conductors

cf.: - Pozharskii, A. F.; Soldatenkov, A. T.; Katritzky, A. R. *Heterocycles in life and society*; Wiley: Chichester, 1997.

Aromaticity

Quantitative measurement of aromaticity from heats of combustion and hydrogenation:

	combustion (kcal/mol)	hydrogenation (kcal/mol)
benzene	36-37	36
pyridine	23-43	
thiophene	24-31	29
furan	16-23	22
pyrrole	14-31	
pyrazine		8-24
pyridazine		12
pyrimidine		8

see also: Katritzky, A. R.; Jug, K.; Oniciu, D. C., "Quantitative measures of aromaticity for mono-, bi, and tricyclic penta- and hexaatomic heteroaromatic ring systems and their interrelationships." *Chem. Rev.* **2001**, *101*, 1421-1449.

Nomenclature

The widely used **Hantzsch-Widman** nomenclature system specifies the ring size and the nature, type, and position of the heteroatom(s).