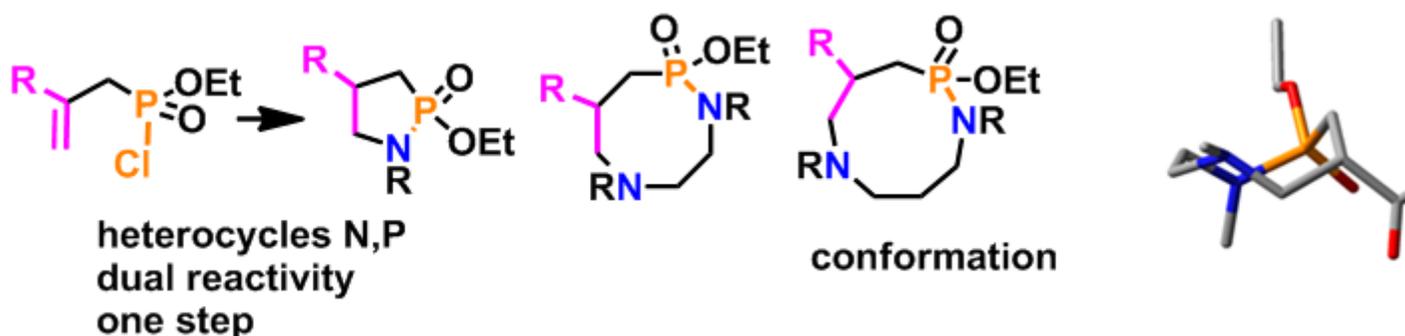


# HETEROCYCLES

Heterocyclic chemistry is a very active theme within the laboratory, especially for the exploration of little-studied heterocyclic systems, either in the area of small strained rings, polyheteroaromatic compounds containing oxygen, nitrogen and phosphorous, or complex polycyclic structures. Experimental results have been compared and explained by DFT modelling, and by specific NMR studies. Two complementary approaches have been taken towards the development of methods for the construction of (poly)heterocyclic systems and the preparation of target heterocycles for catalytic systems or for molecular materials.

## Synthesis, reactivity and applications of N,O,S,P heterocycles

The synthesis and reactivity studies of saturated nitrogen heterocycles is a major part of our work. Several aspects of the varied reactivity of azetidines have been explored. New pathways to obtain tetrahydro-pyrans and -pyridines (currently undergoing biological testing), by a Prins cyclisation, or of phospho-nitrogen heterocycles of variable size (from 5 to 9 members) by the creation of an N-P bond followed by an aza-Michael type cyclisation have been developed. For some of these synthetic paths, the methodology has been completed by conformational space studies by NMR and by DFT calculations. In the aromatic series, the functionalisation of furans and thiophenes by a halogenation-Sonogashira sequence followed by intramolecular cyclisation, gave the targeted fused tricyclic compounds with a central oxazepine-type core.



## Recent publications

*RSC Adv.*, **2017**, 7, 18211 (link)

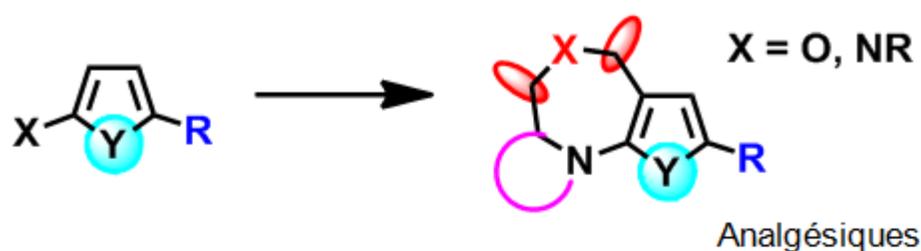
*J. Org. Chem.*, **2016**, 81, 2899 (link)

*Org. Chem. Front.*, **2015**, 2, 492 (link)

*Eur. J. Org. Chem.*, **2014**, 31, 7000 (link)

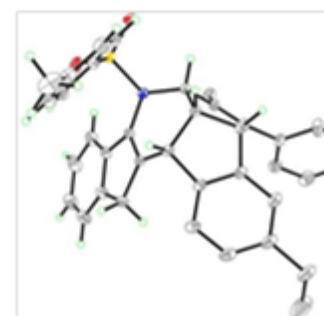
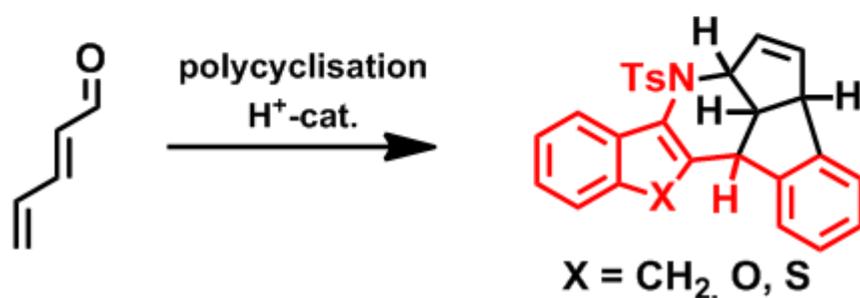
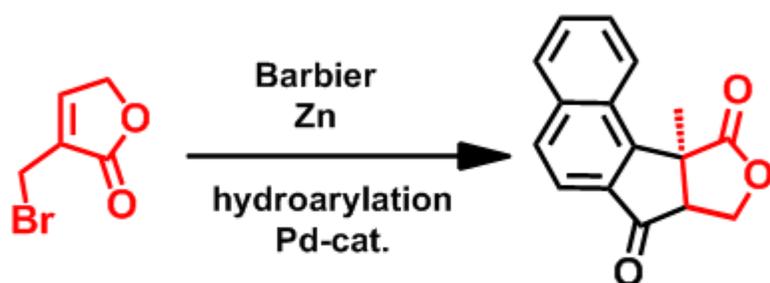
### Construction of novel complex hetero(poly)cyclic compounds

We have shown that complex polyheterocyclic compounds may be rapidly obtained by a cascade of polycyclisations discovered in our laboratory. These three-dimensional heterocyclic structures are present in many interesting molecular architectures and have a wide field of biological applications.



Modulations

Azepane core  
Substituents on the h  
Nature of the 3<sup>rd</sup> fuse



## Recent publications

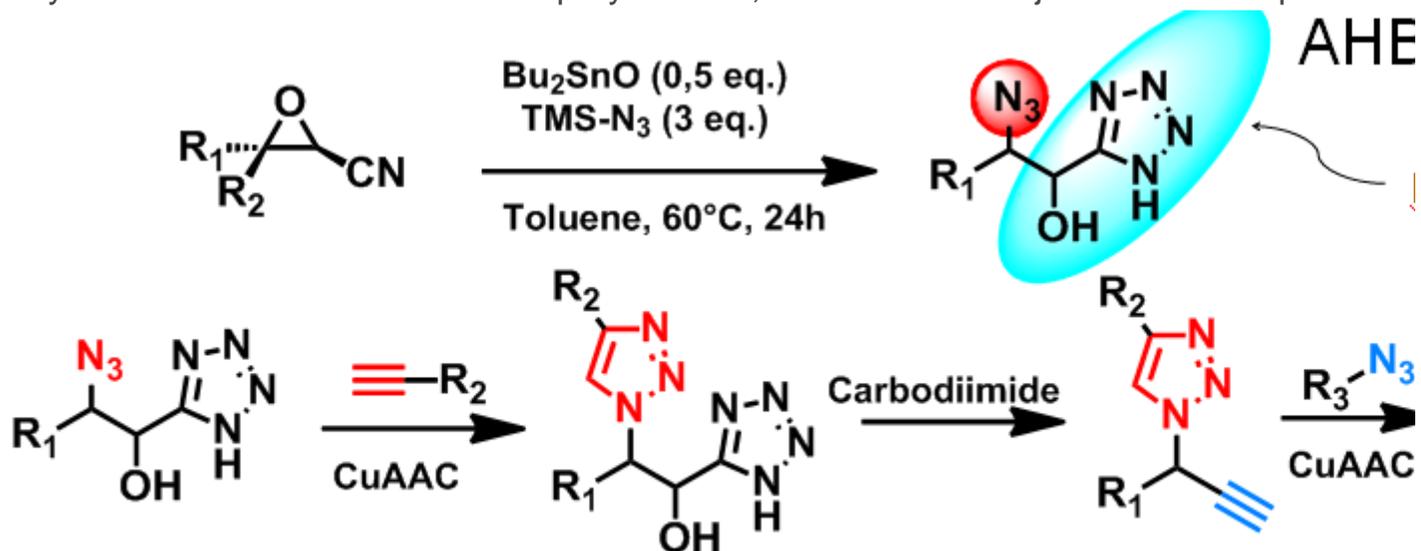
*Org. Lett.*, **2015**, 17, 3674 (link)

*Org. Lett.*, **2016**, 18, 5296 (link)

### Triazoles from a single or double CuAAC reaction sequence

A novel reaction sequence which allows an easy access to triazole or bis-triazole compounds was recently developed. This strategy allows the synthesis of triazoles and

bis-triazoles by two sequential CuAAC ligation steps. The two CuAAC reactions are independent and completely orthogonal. This sequential double ligation sequence, which may be iterative to form a polytriazole, was the subject of two patents.



## Recent publications

*Chem. commun.*, 2017, 53, 321 (link)