

Katalüüsist ja sidemetest (kovalentsetest, mittekovalentsetest, elulistest)

Tõnis Kanger
Tallinna Tehnikaülikool

“Catalysis is the acceleration of a slow-running chemical reaction via the presence of a foreing substance.”

W. Ostwald, *Zeitschrift für Physikalische Chemie*, **1894**, 15, 705.

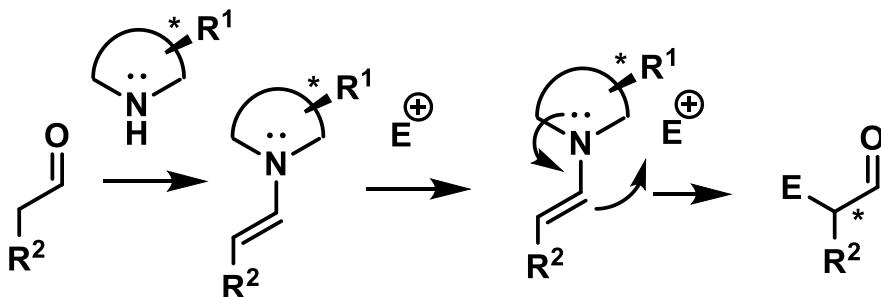
...dass man später Fermente oder **organische Katalysatoren** auffinden
Wird, welche auch höhere Temperaturen vertragen.

W. Ostwald, *Zeitschrift für Physikalische Chemie* , **1900**, 34, 510

ORGANOKATALÜÜS

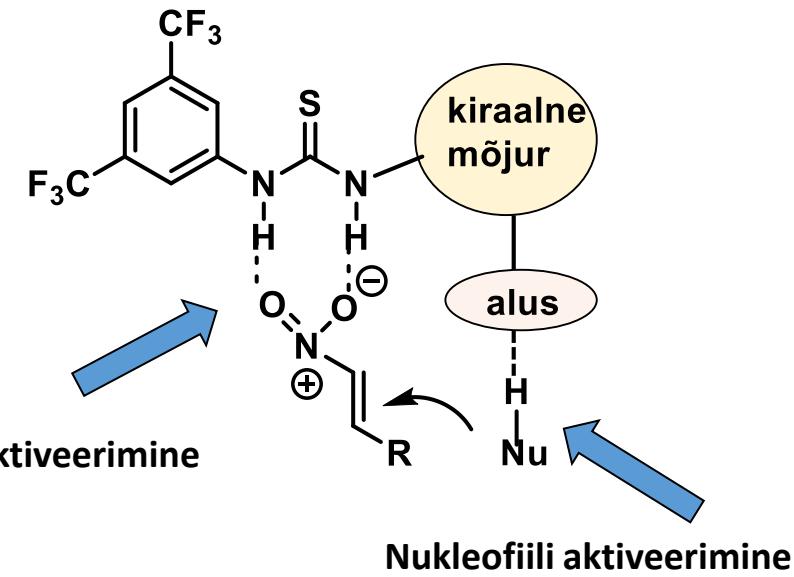
KOVALENTE

MITTEKOVALENTNE



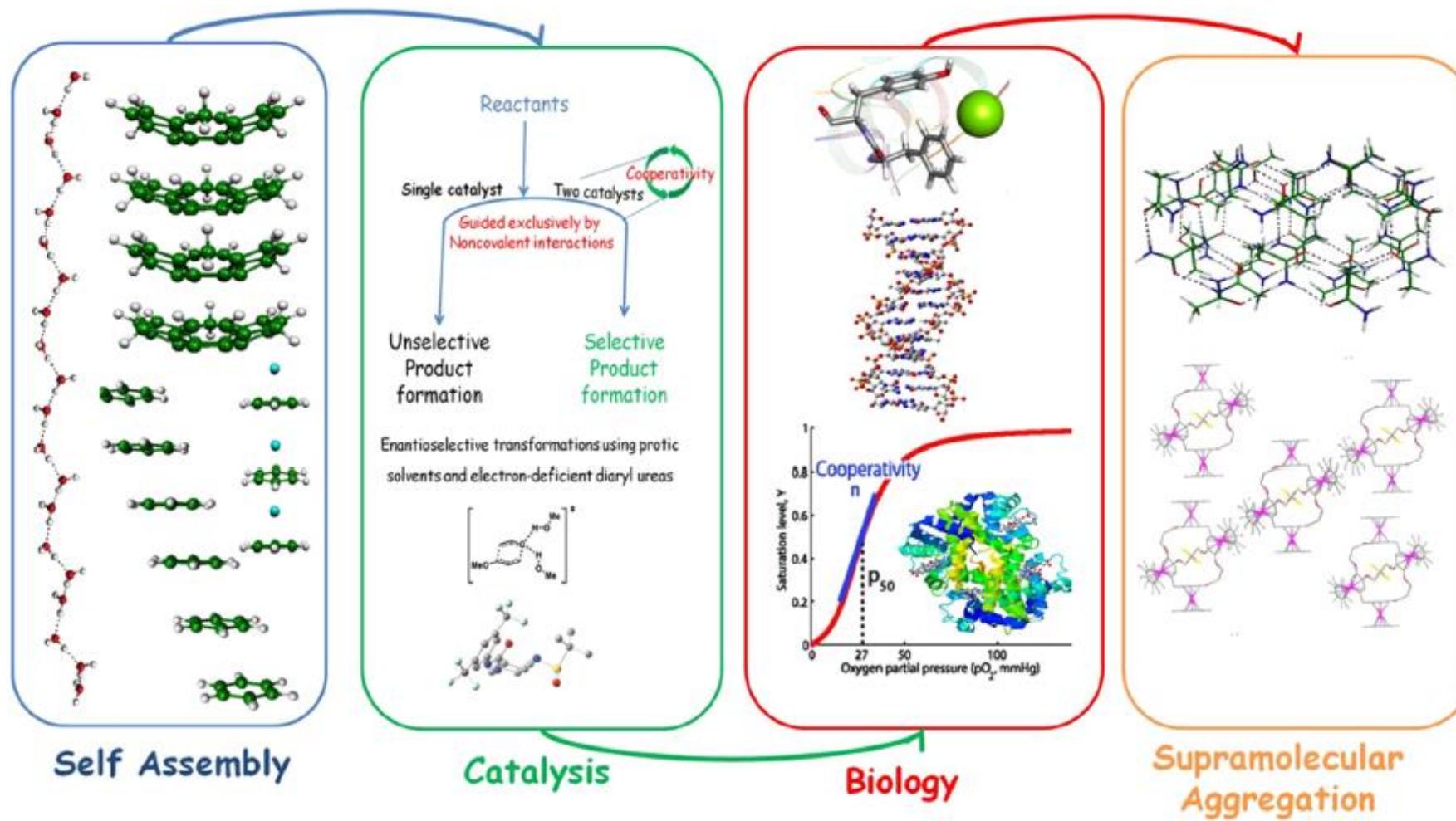
Nukleofiili aktiveerimine

Elektrofiili aktiveerimine

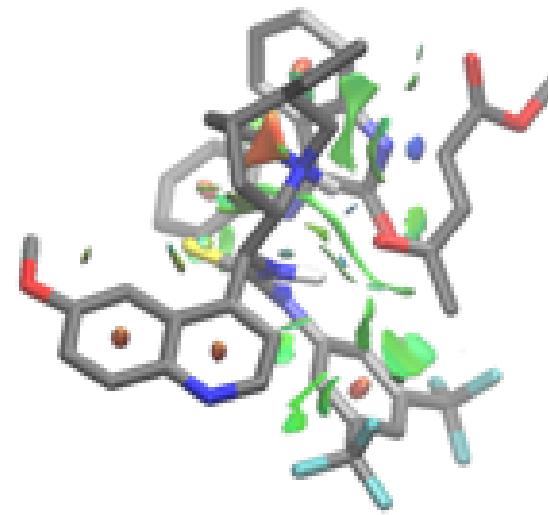
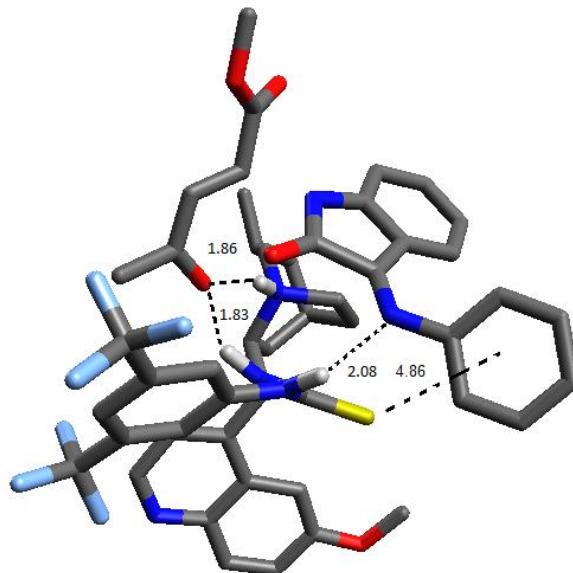
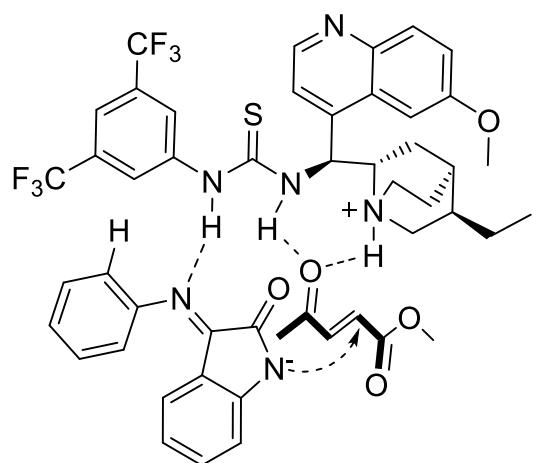
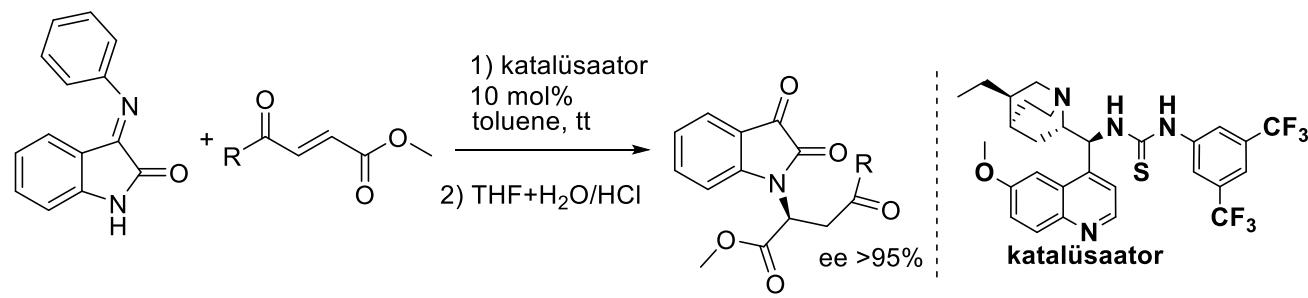


Nukleofiili aktiveerimine

Mittekovalentsed interaktsioonid

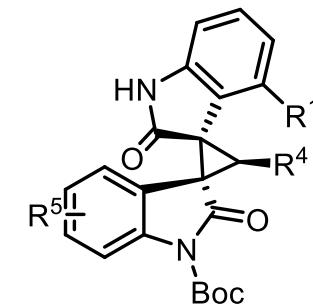
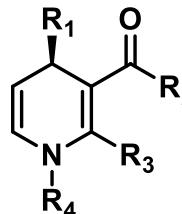


A. S. Mahadevi, G. N. Sastry, *Chem. Rev.* **2016**, *116*, 2775.

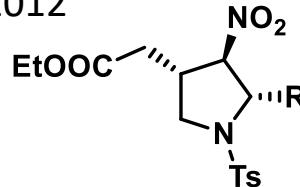


Kaksikkaskaadid

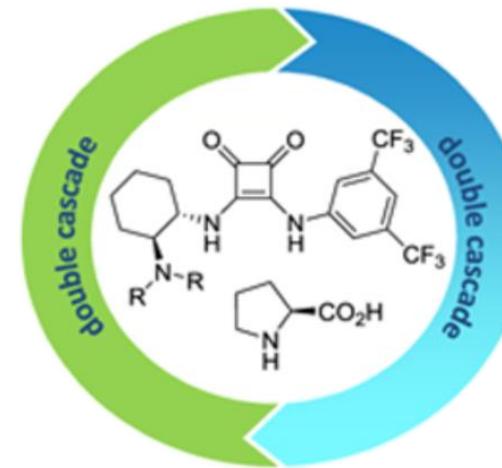
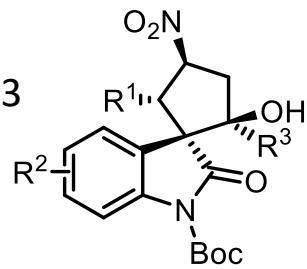
J. Org. Chem. 2011



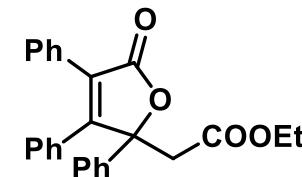
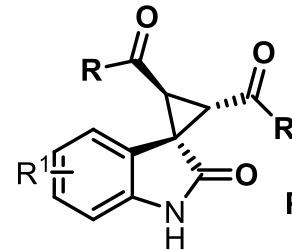
Adv. Synth. Cat. 2013



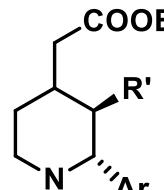
J. Org. Chem. 2013



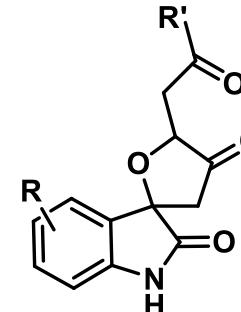
Eur. J. Org. Chem. 2014



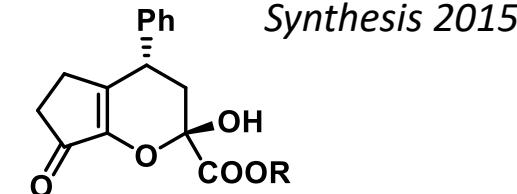
Chem. Heterocycl. Comp. 2018



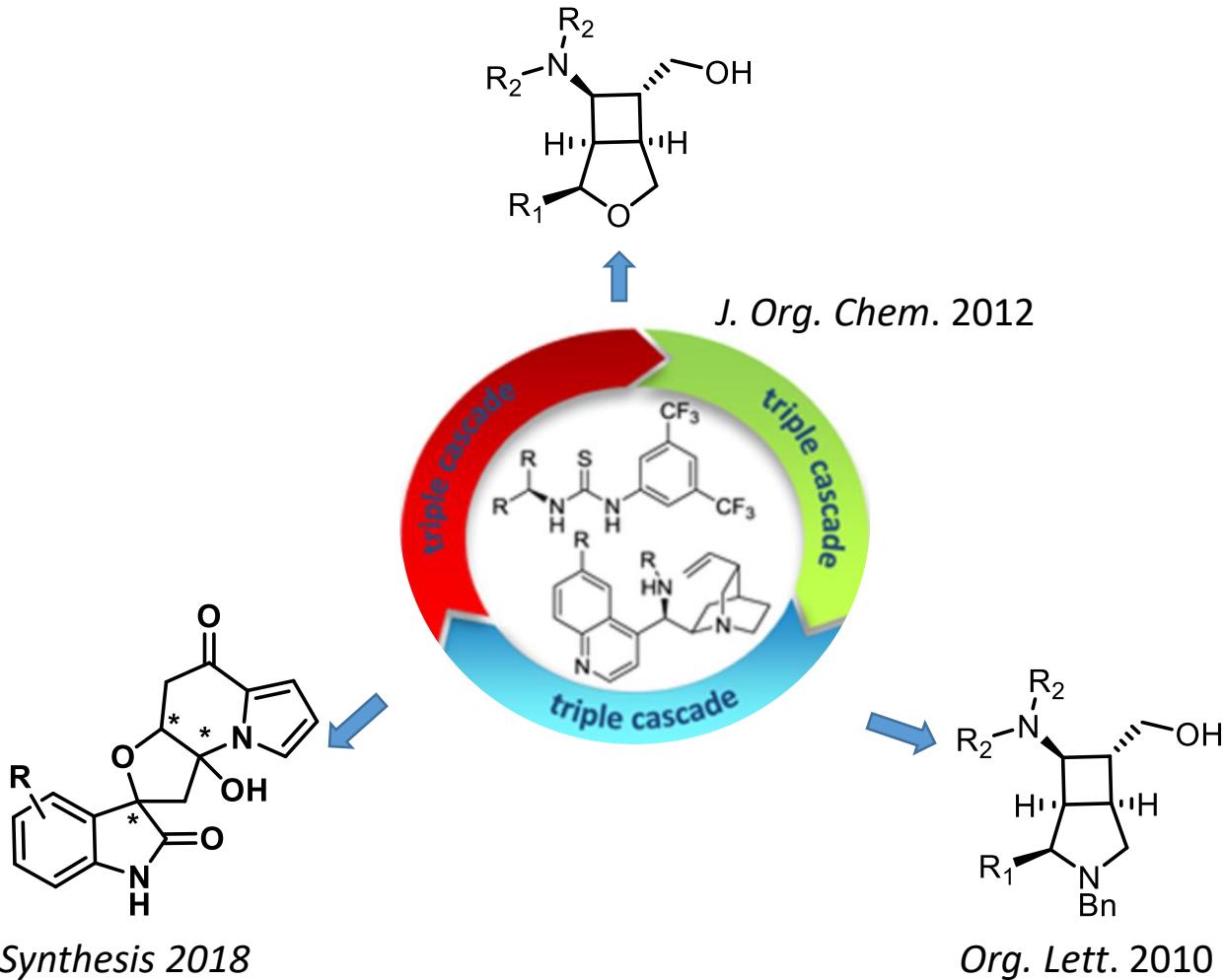
Synthesis 2017



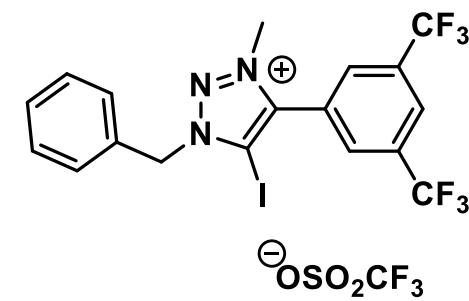
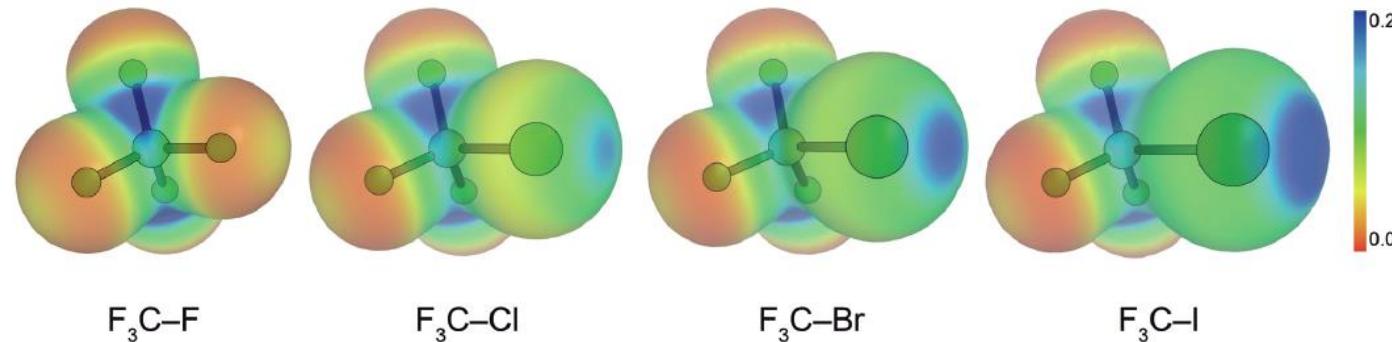
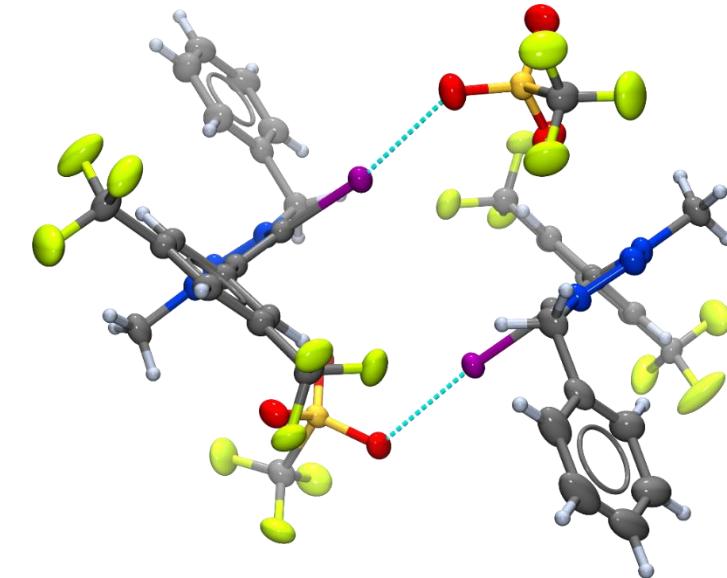
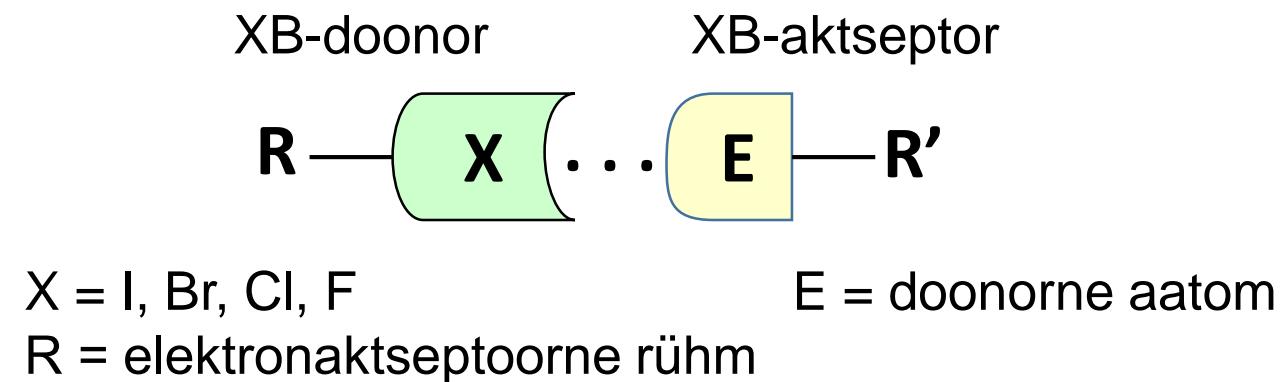
Synthesis 2018



Kolmikkaskaadid



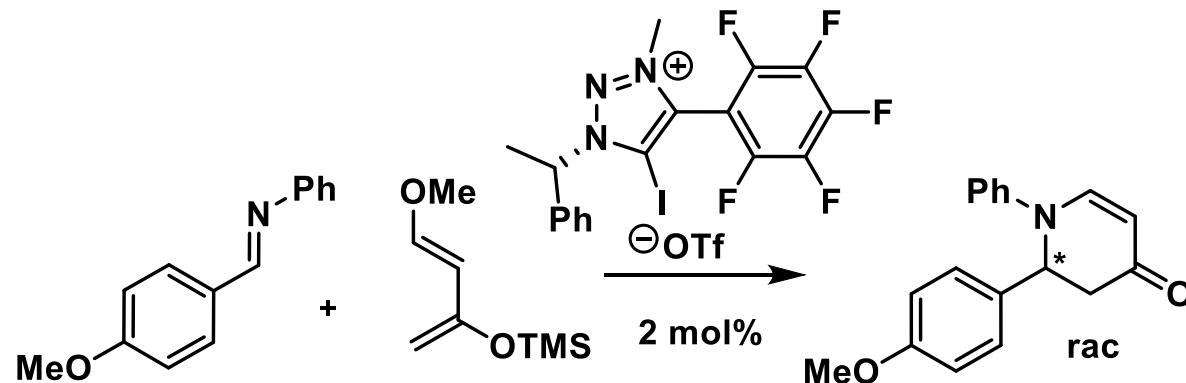
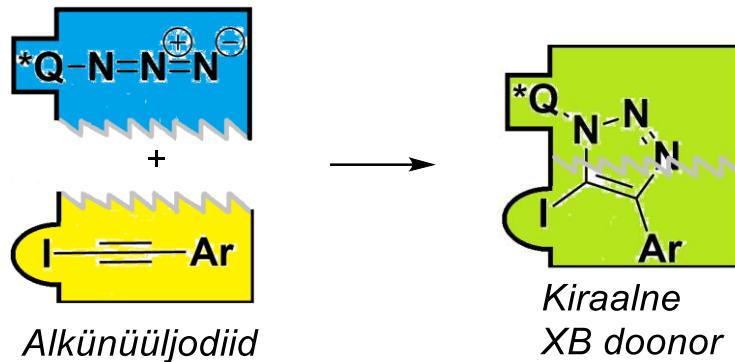
Halogeensideme (XB) katalüüs



M. Breugst et al. *Synthesis* 2017; 49, 3224

Haloogensideme doonorite süntees ja kasutamine katalüsaatoritena

Kiraalne asiid



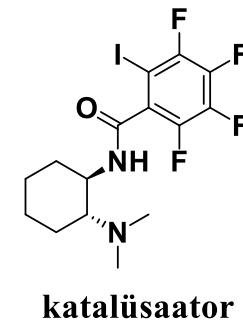
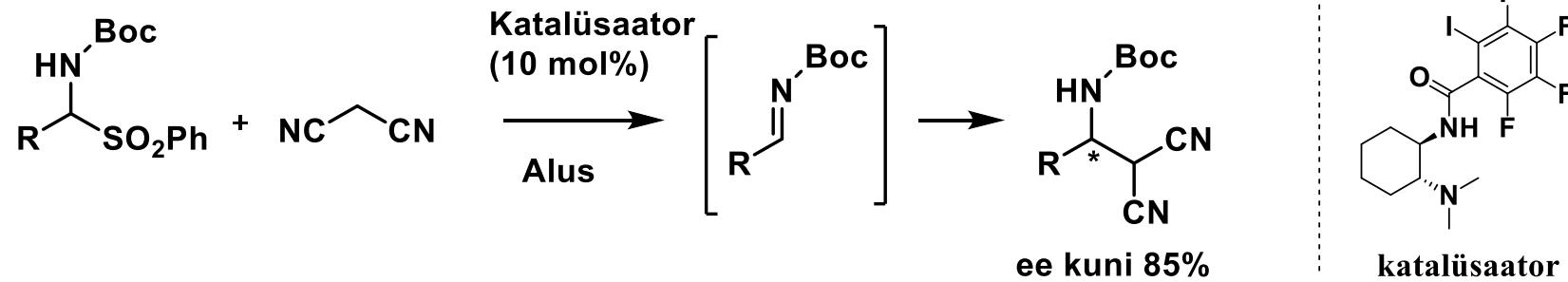
M. Kaasik et al *Chem. Eur. J.* **2017**, 23, 7337.

M. Kaasik et al *J. Org. Chem.* **2019**, 84, 4294.

M. Kaasik et al *Synthesis*, **2019**, 51, 2128.

A. Peterson et al *RSC Advances*, **2019**, 9, 11718

Halogeensideme kasutamine katalüsaatoritena



Group 1	Group 2	Groups 3 → 12	Group 13	Group 14	Group 15	Group 16	Group 17	Group 18
Hydrogen bond (HB)	Alkaline earth metal bond (AeB)		Triel bond (TrB)	Tetrel bond (TtB)	Pnictogen bond (PnB)	Chalcogen bond (ChB)	Halogen bond (HaB)	Noble gases bond (NgB)
H Hydrogen			B Boron	C Carbon	N Nitrogen	O Oxygen	F Fluorine	He Helium
Li Lithium	Be Beryllium		Al Aluminum	Si Silicon	P Phosphorus	S Sulfur	Cl Chlorine	Ne Neon
Na Sodium	Mg Magnesium		Ga Gallium	Ge Germanium	As Arsenic	Se Selenium	Br Bromine	Ar Argon
K Potassium	Ca Calcium		In Indium	Sn Tin	Sb Antimony	Te Tellurium	I Iodine	Kr Krypton
Rb Rubidium	Sr Strontium		Tl Thallium	Pb Lead	Bi Bismuth	Po Polonium	At Astatine	Xe Xenon
Cs Caesium	Ba Barium		Nh Nihonium	Fl Flerovium	Mc Moscovium	Lv Livermorium	Ts Tennessine	Rn Radon
Fr Francium	Ra Radium							Og Oganesson
Alkali metal bond (AkB)								



Term recommended by IUPAC



The term is used in the literature consistent with the proposed classification



Other cases



Experimental and theoretical evidences are reported for the formation of non-covalent adducts wherein the element is the electrophile



The electrophilic character of the element has been predicted by modelling or can be anticipated by analogy. The assigned color code for the elements is provisional; a comprehensive search of the literature may enable for a change from light green to green

