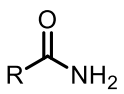
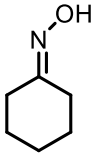
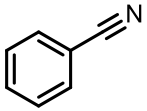
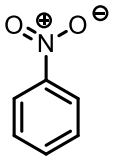
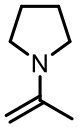
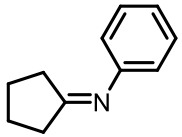
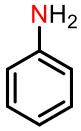
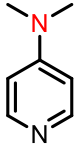
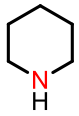
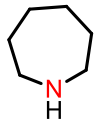
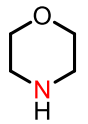








piperidina

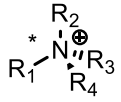
pirrolidina

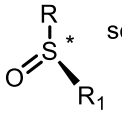
azetidina

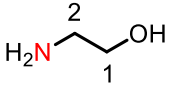
aziridina

azepina

morfolina


inversione
piramidale all'N
6 Kcal.mol-1

N composti azotati non amminici
N ammine


ammonio IV° chirale


solfossido chirale


2-ammino etanolo

il gruppo amminico ha bassa priorità secondo IUPAC

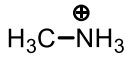
$$\frac{[RNH_3^{\oplus}]\,[OH^{\ominus}]}{[RNH_2]} = K_B$$

$K_B \times K_{BH} = K_W$

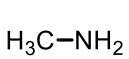
$$pK_B + pK_{BH} = 14$$

$$\frac{[RNH_2]\,[H_3O^{\oplus}]}{[RNH_3^{\oplus}]} = K_{BH}$$

$pK_B + pK_{BH} = 14$



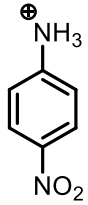
$pK_{BH} = 10,64$



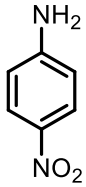
$pK_B = 3,36$

base forte

Le ammine aromatiche sono basi più deboli rispetto alle ammine alifatiche



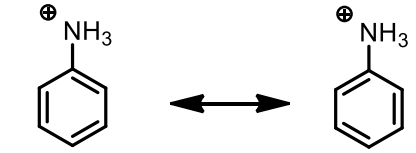
$pK_{BH} = 1$



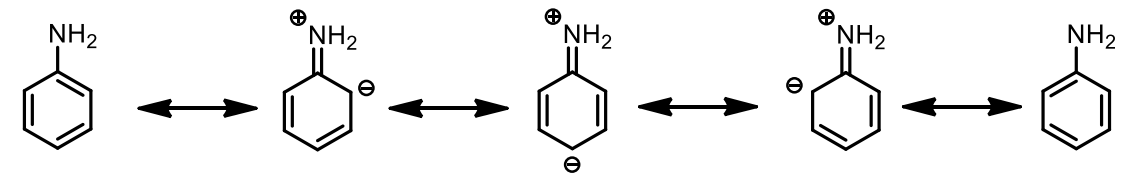
$pK_B = 13$

base molto debole

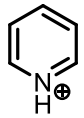
base debole



$pK_{BH} = 4,63$



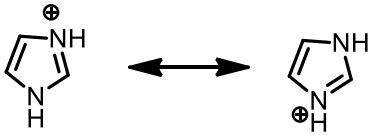
$pK_B = 9,37$



$pK_{BH\ piridinio} = 5,25$

$pK_{Bpiridina} = 8,75$

N ibrido sp2 abbassa basicità

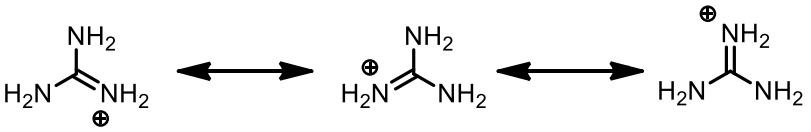


$pK_{BHimidazolio} = 6,95$

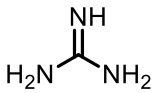
$pK_{Bimidazolo} = 7,05$

in imidazolio la risonanza delocalizza la carica positiva

$H_3O^{\oplus}$ $pK_a = -1{,}74$ H_2O $pK_{BH} = 15{,}74$ $^{\ominus}OH$ $pK_B = -1{,}74$



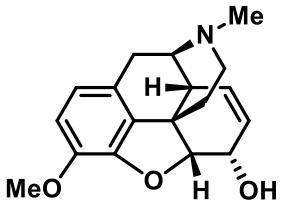
$pK_{BH} = 13{,}6$



$pK_B = 0{,}4$

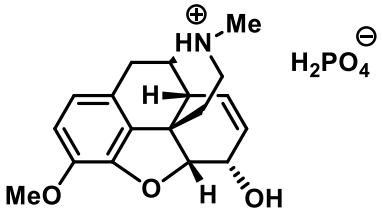
Guanidina
base di forza comparabile
a NaOH

analgesico-antitussivo



codeina

poco solubile in acqua

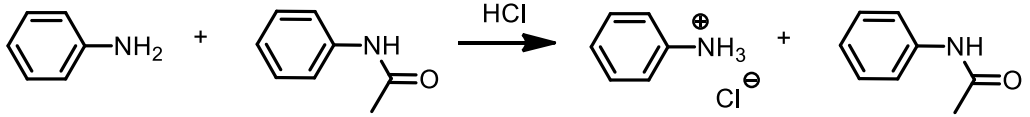


codeina fosfato

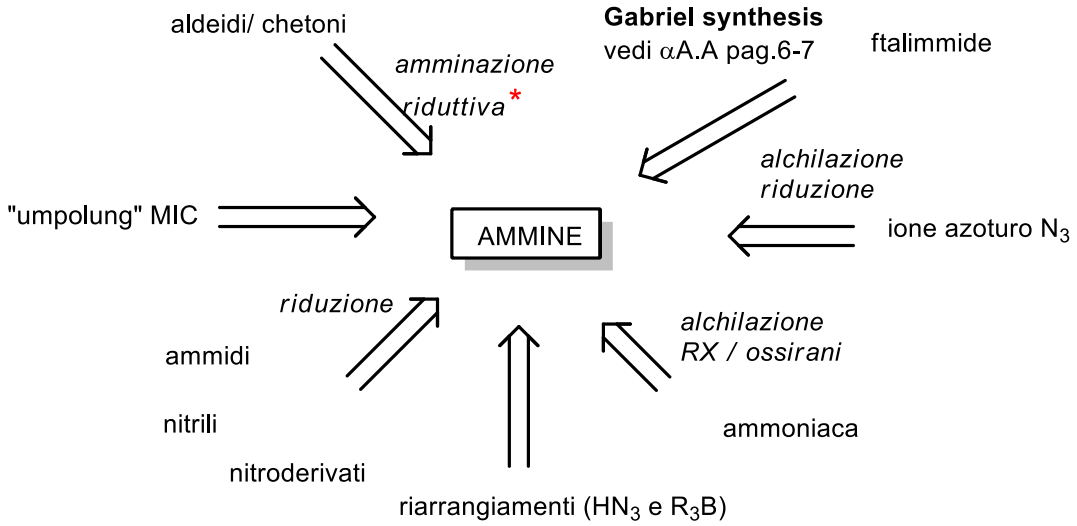
solubile

la salificazione
rende le ammine più solubili in acqua

solubile in acqua insolubile in acqua



questo diverso comportamente
può essere sfruttato per separare
composti organici basici da non basici
in miscela

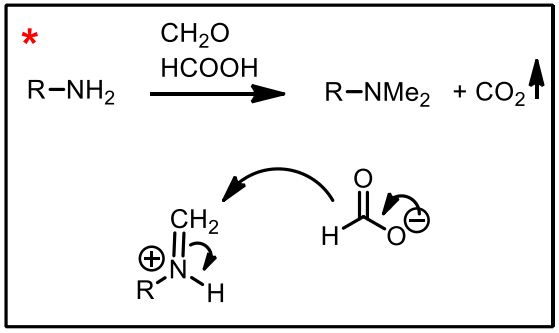


Wilhelm Eschweiler
1 December 1860 - 21 March 1936
German, b. Euskirchen, Germany

Hans Thacher Clarke
27 December 1887 - 21 October 1927
British, b. Harrow, England

Eschweiler, W., Chem. Ber. 1905, 38, 880
Clarke, H.T.; Gillespie, H.B.; Weisshaus, S.Z,
J. Am. Chem. Soc. 1933, 55, 4571

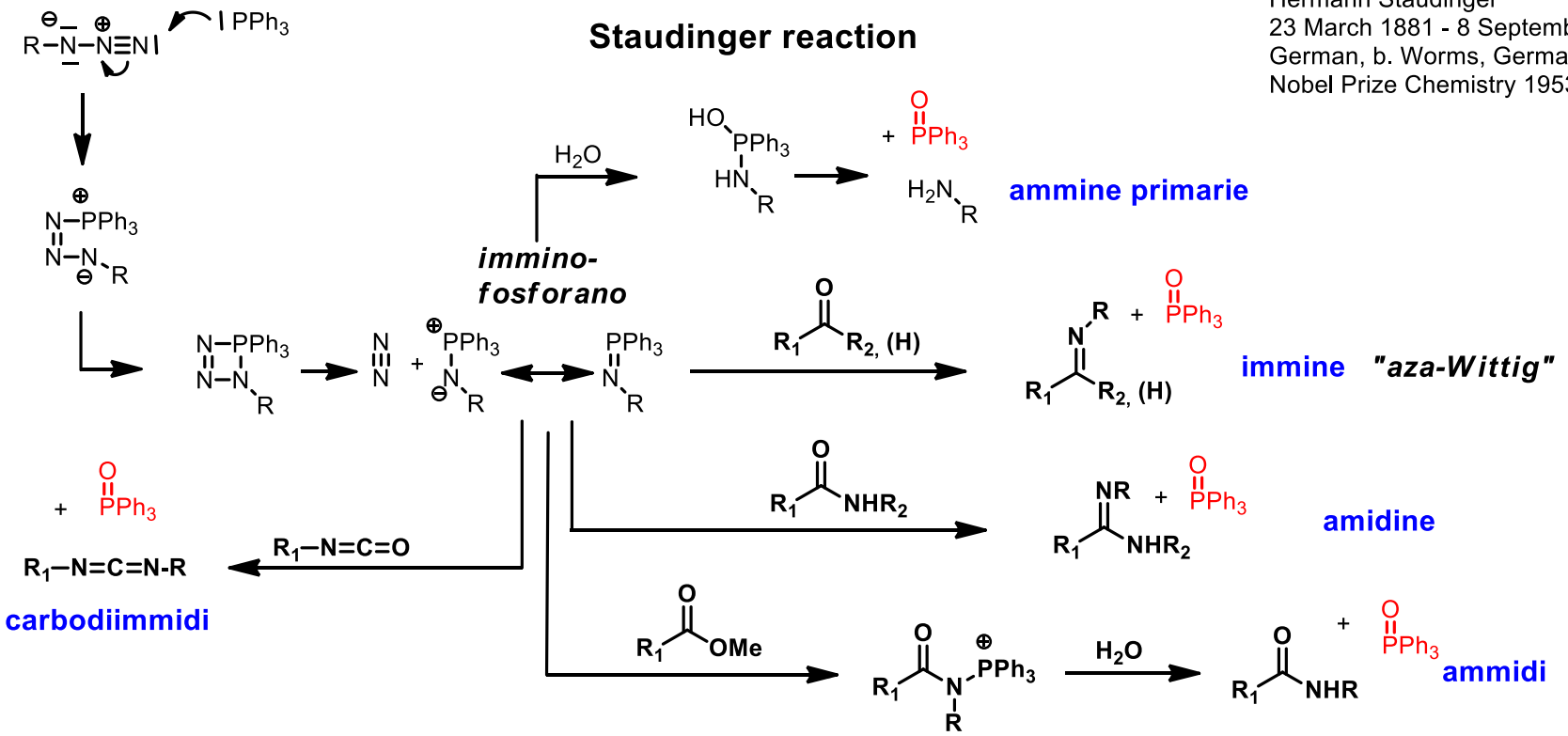
***Eschweiler-Clarke reaction**



Staudinger, H.; Meyer, J., Helv. Chim. Acta 1919, 2, 635

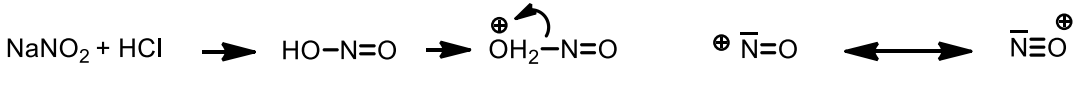
Staudinger reaction

Hermann Staudinger
23 March 1881 - 8 September 1965
German, b. Worms, Germany
Nobel Prize Chemistry 1953

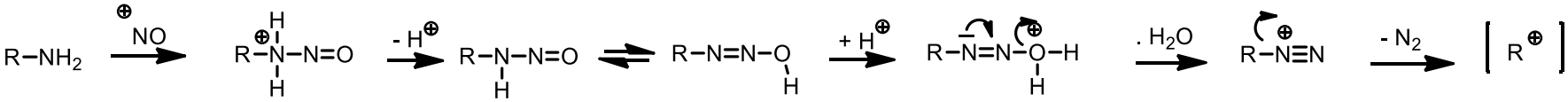


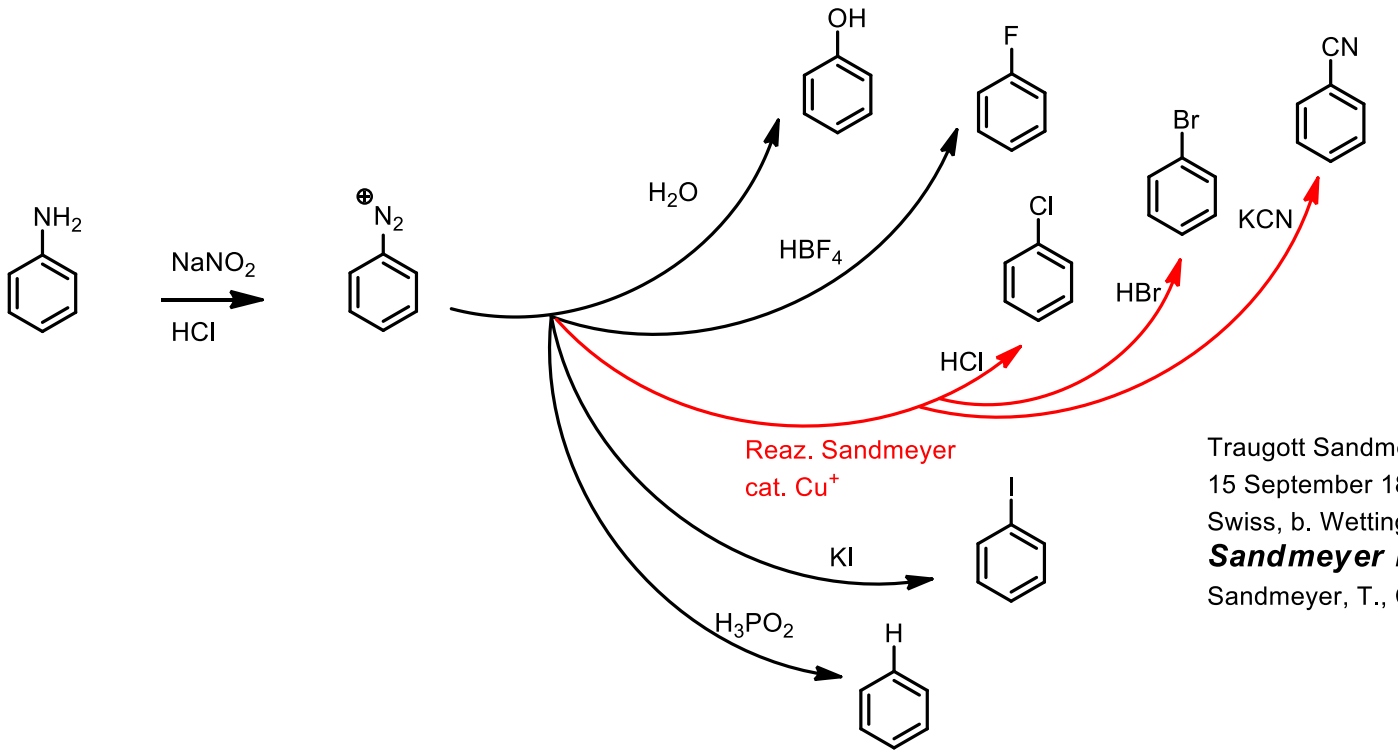
Nitrosazione ammine alifatiche e aromatiche

ione nitrosile
modesto elettrofilo



vedi Tiffeneau-Demjanov
e Arndt-Eistert





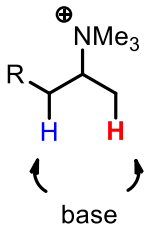
Traugott Sandmeyer
15 September 1854 - 9 April 1922
Swiss, b. Wettingen, near Zurich, Switzerland

Sandmeyer reaction

Sandmeyer, T., Chem. Ber. 1884, 17, 1633

Eliminazione: sali di ammonio quaternario

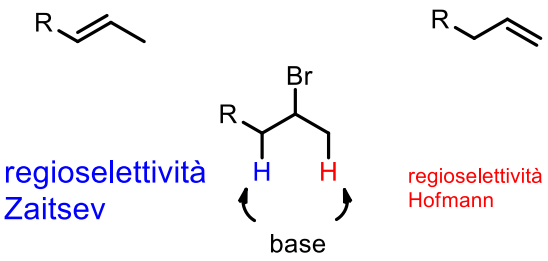
sale ammonico IV°



Me_3N
gruppo uscente neutro
base ingombrata

regioselettività Zaitsev

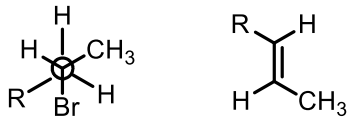
regioselettività Hofmann



regioselettività Zaitsev

regioselettività Hofmann

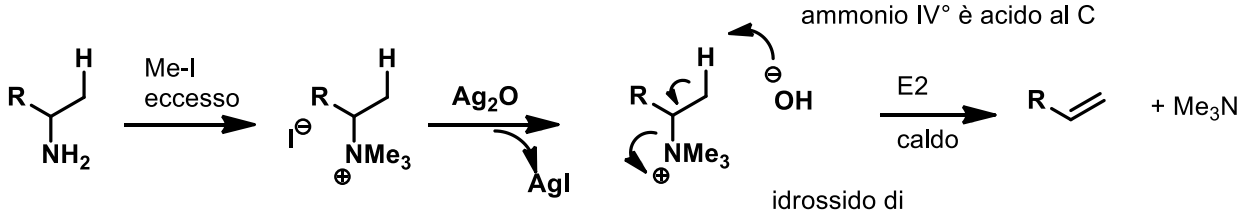
stereoselettività Zaitsev



$NH_3 + H_2O \rightleftharpoons NH_4^+ OH^-$

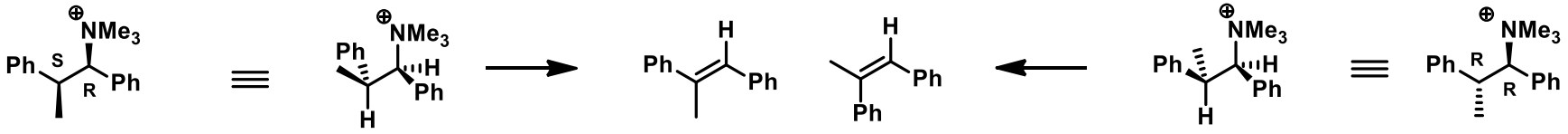
idrossido di ammonio è base debole
NH_4^+ è acido debole

ammonio IV° è acido al C



idrossido di ammonio IV° è base forte

Eliminazione di HOFMANN
E2 stereospecifica



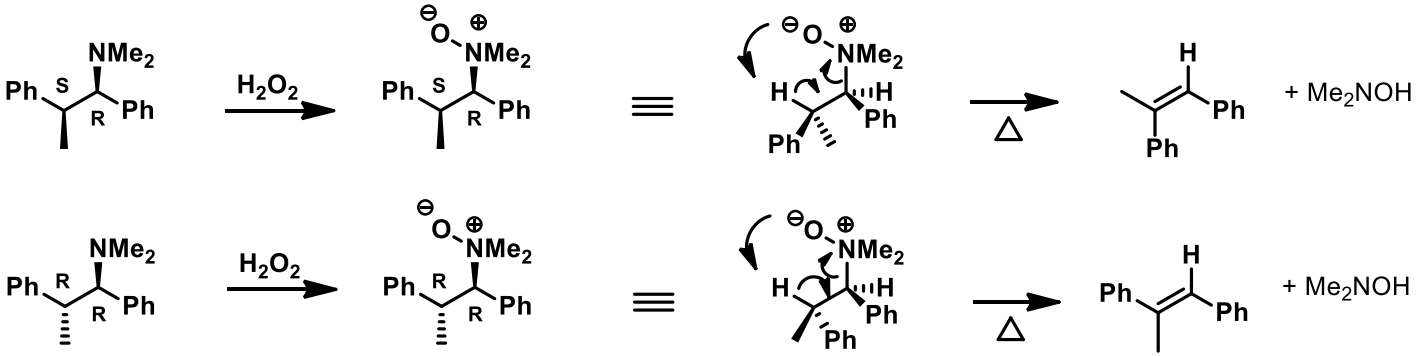
geometria E

geometria Z

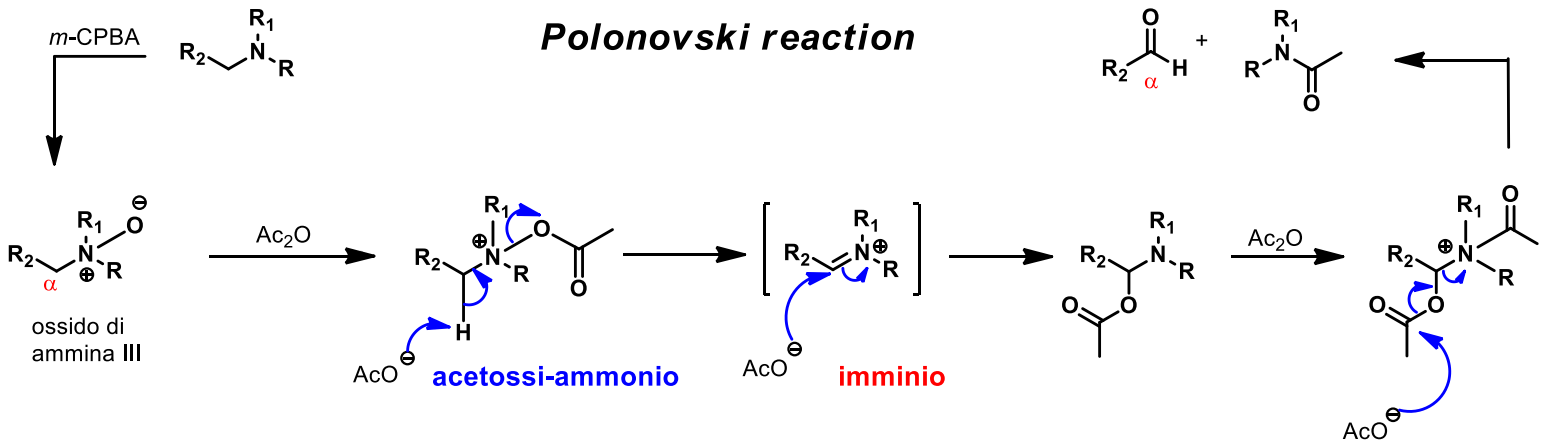
Arthur Clay Cope
27 June 1909 - 4 June 1966
American, b. Dunreith, Indiana, USA

Cope elimination

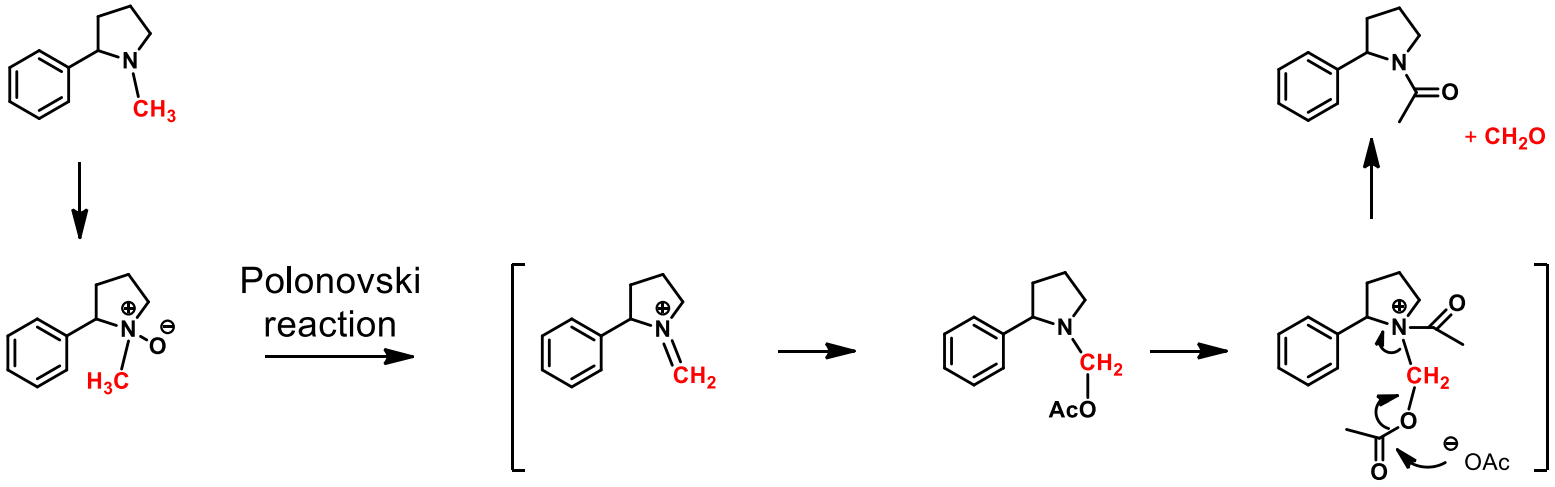
Cope, A.C.; Foster, T.T.; Toule, P.H., J. Am. Chem. Soc. 1949, 71, 3929

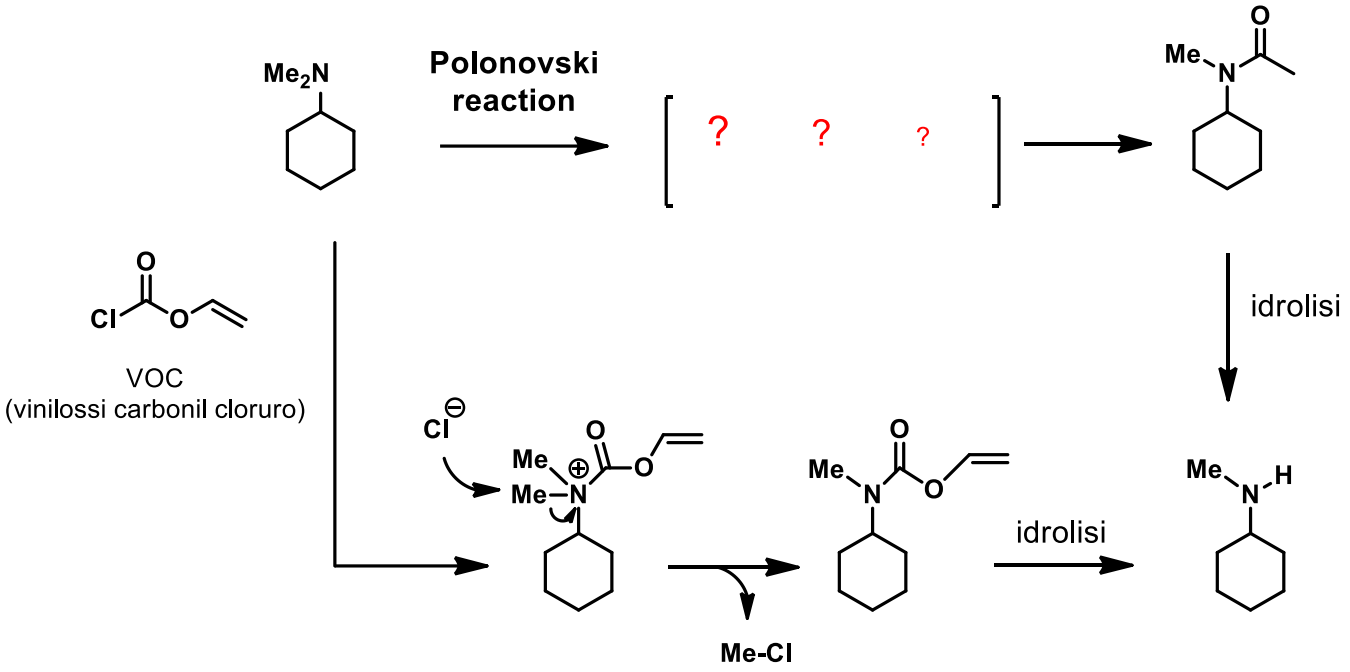


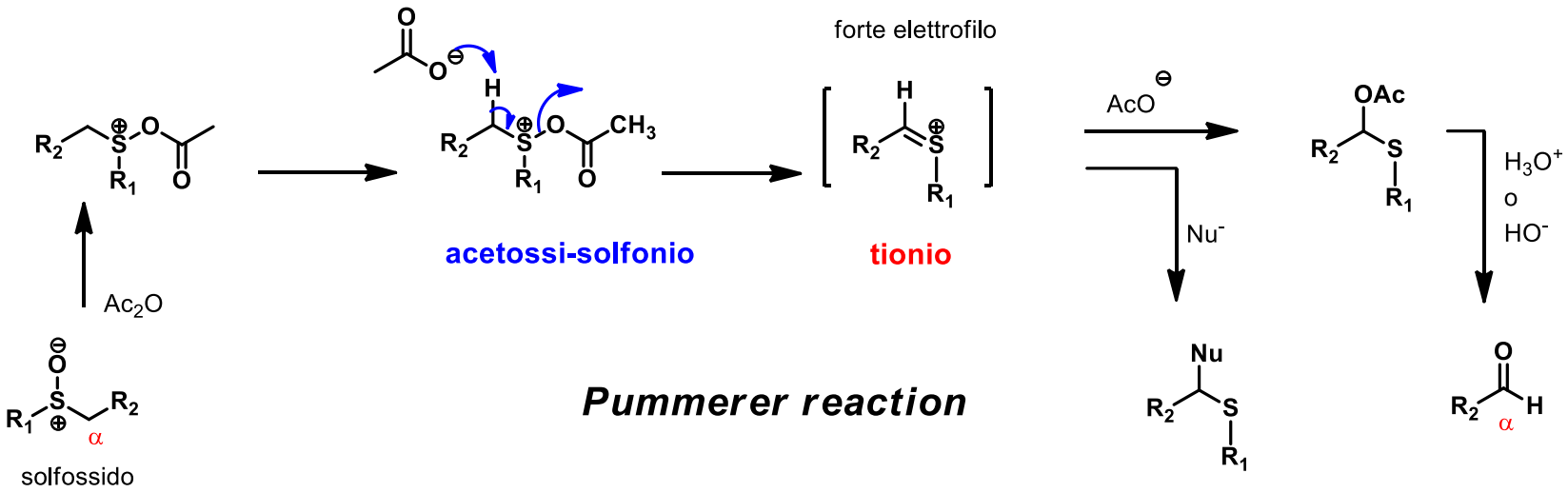
Eliminazione di COPE
stato di transizione SIN coplanare stereospecifica
come per solfossidi e selenossidi (vedi cap. enolati)

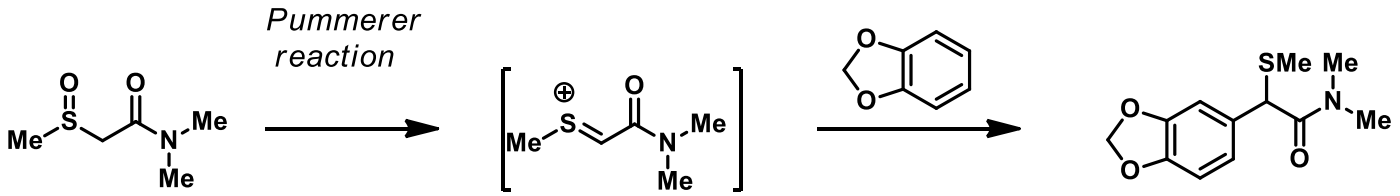


...l'eteroatomo si riduce e il C-α si ossida




Me2N
Polonovski reaction
? ? ?
Me N O
idrolisi
Cl O O
VOC
(vinilossi carbonil cloruro)
Cl⊖
Me
Me N ⊕
O O
Me N O
Me N H
idrolisi
Me-Cl


forte elettrofilo
acetossi-solfonio
tionio
Ac2O
solfossido
α
Pummerer reaction
AcO
Nu-
H3O+
o
HO-
OAc
Nu


Pummerer
reaction
SMe
Me
N
Me
O
S