

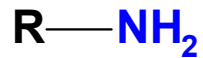
1.8. Aliphatische Amine

Funktionelle Gruppe - Aminogruppe: -NH_2

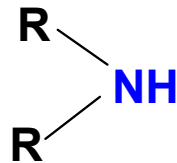
Alkylderivate des Ammoniaks

Nomenklatur

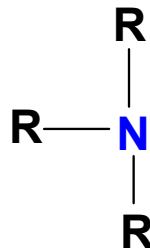
Primäres Amin



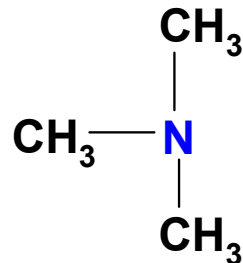
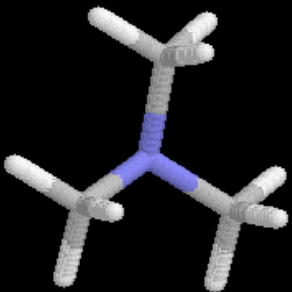
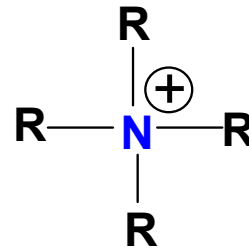
Sekundäres Amin



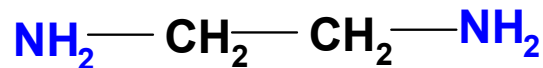
Tertiäres Amin



Quartäre Ammoniumsalze

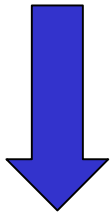


Trimethylamin

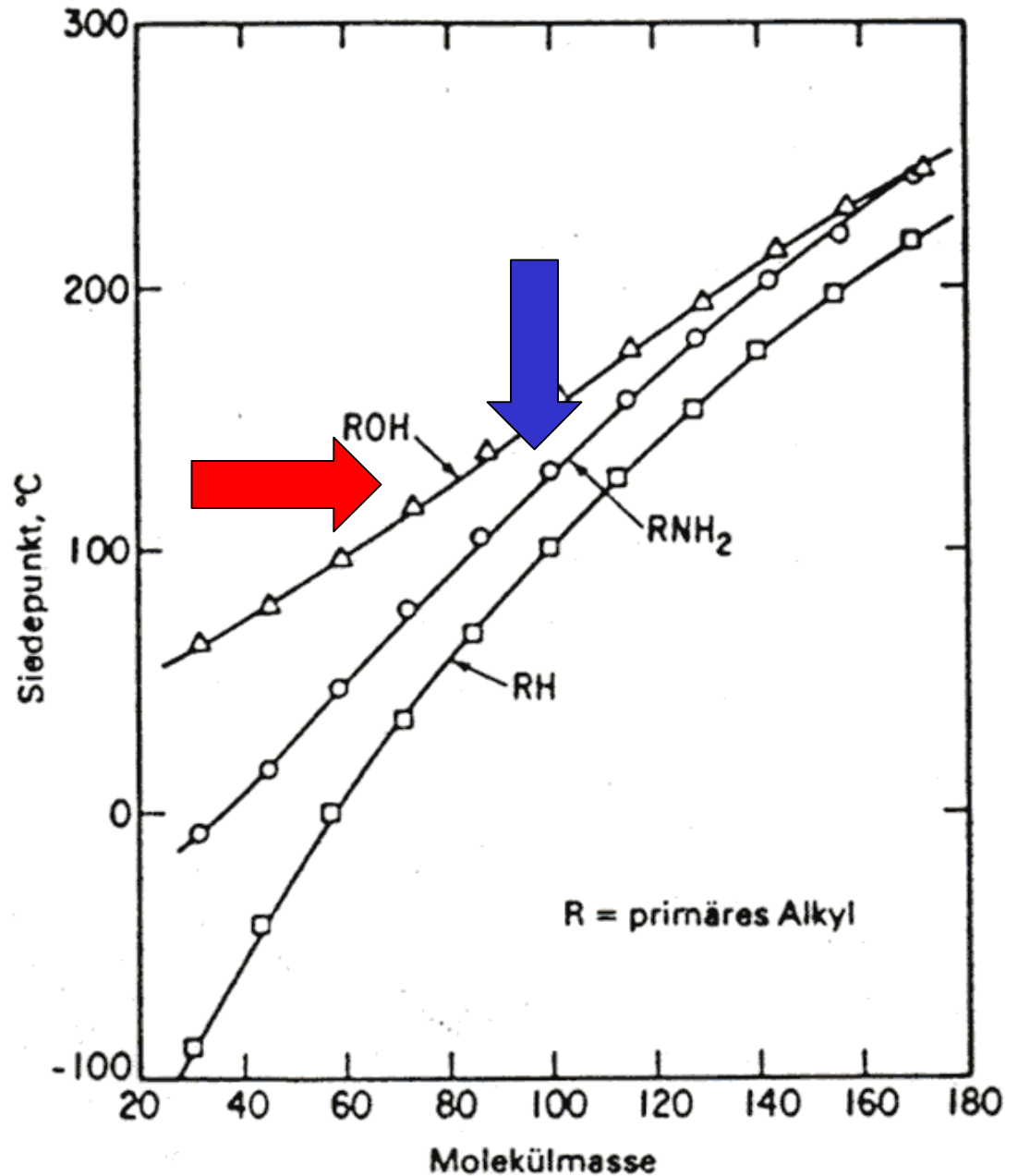


1,2-Diaminoethan

N-H Bindung:
Polarität geringer
als O-H Bindung

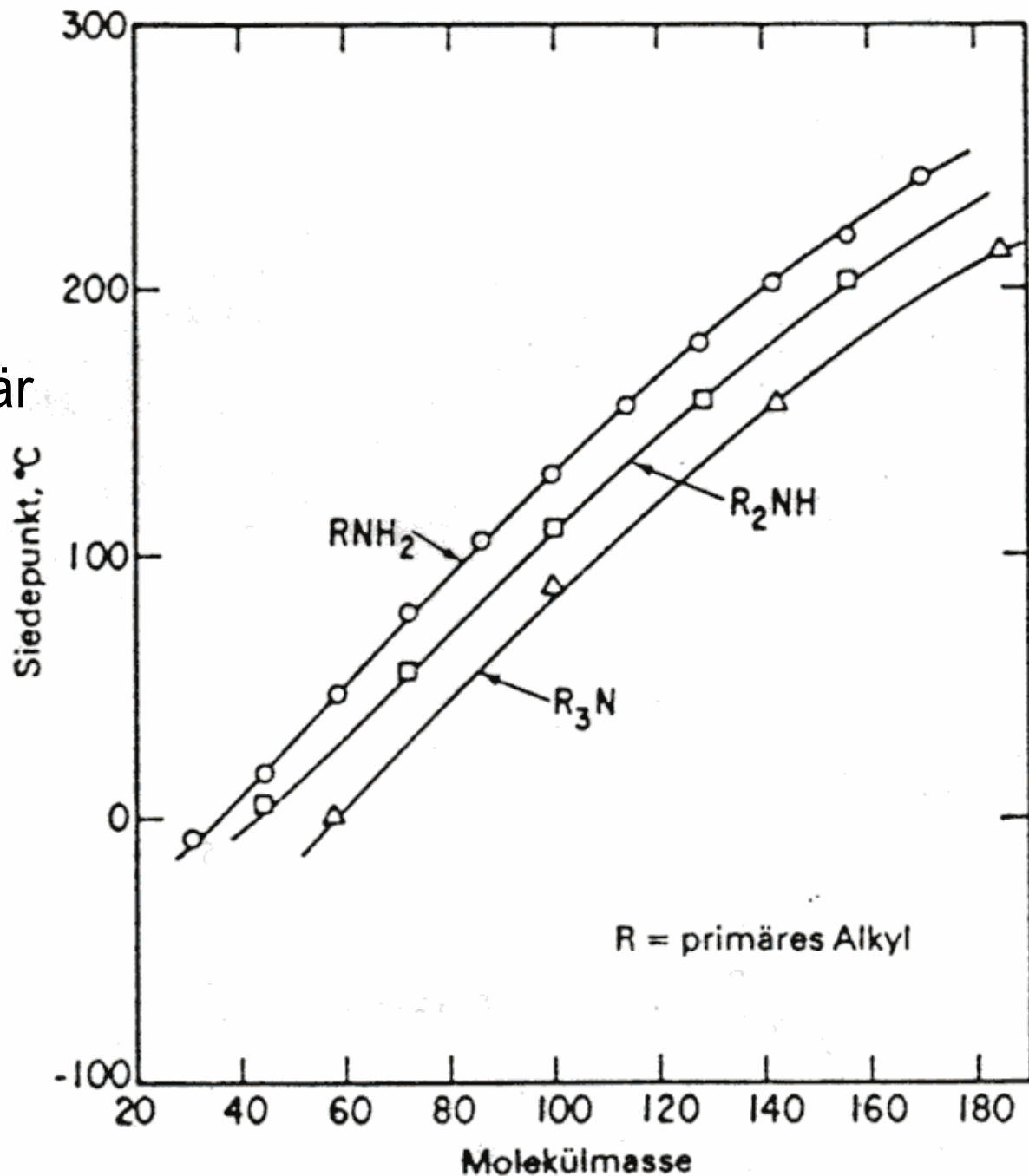


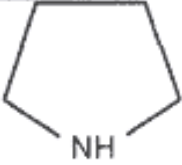

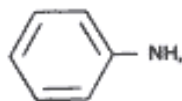
Niedrigere Siedepunkte
als Alkohole
Wasserlöslichkeit



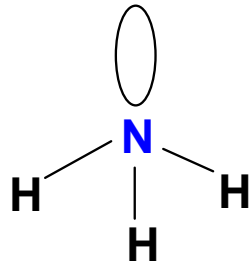
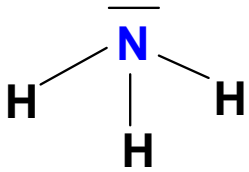
Abhängigkeit der
Siedepunkte von der
Anzahl der N-H
Bindungen:

Primär > sekundär > tertiär



Klasse	Formel	Name	Schmelzp °C Fp	Siedep. °C Kp	Löslichkt g/100g H ₂ O	Basizitäts konstante K _b 10 ⁻⁴
aliphatische Mono- amine	H ₃ C-NH ₂	Methylamin	-92	-7,5	-	4,4
	(H ₃ C) ₂ NH	Dimethylamin	-96	7,5	-	5,1
	(H ₃ C) ₃ N	Trimethylamin	-117	3	91	0,6
Mono- amine	H ₅ C ₂ -NH ₂	Ethylamin	-80	17	-	4,7
	(H ₅ C ₂) ₂ NH	Diethylamin	-39	55	löslich	9,5
	(H ₅ C ₂) ₃ N	Triethylamin	-115	89	-	5,5
Stickstoff- Heteroali- cyclen		Pyrrolidin		88,5	-	
		Piperidin	-9	106	-	
aliphatische Diamine	H ₂ N-(CH ₂) ₂ -NH ₂	Ethylendiamin (1,2-Diamino- ethan)	8,5	117	löslich	
	H ₂ N-(CH ₂) ₆ -NH ₂	Hexamethylen- diamin (1,6-Diamino- hexan)	39	195	löslich	
aromat- ische Mono- amine		Anilin	-6	184	3,7	4,2 10 ⁻¹⁰

Basenstärke

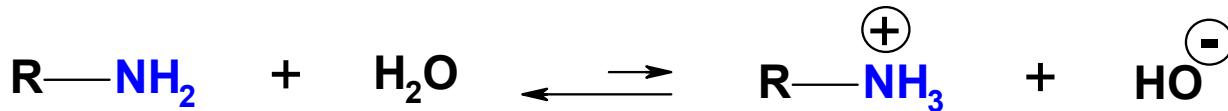
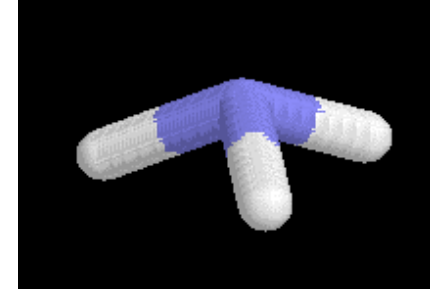


Freies Elektronenpaar

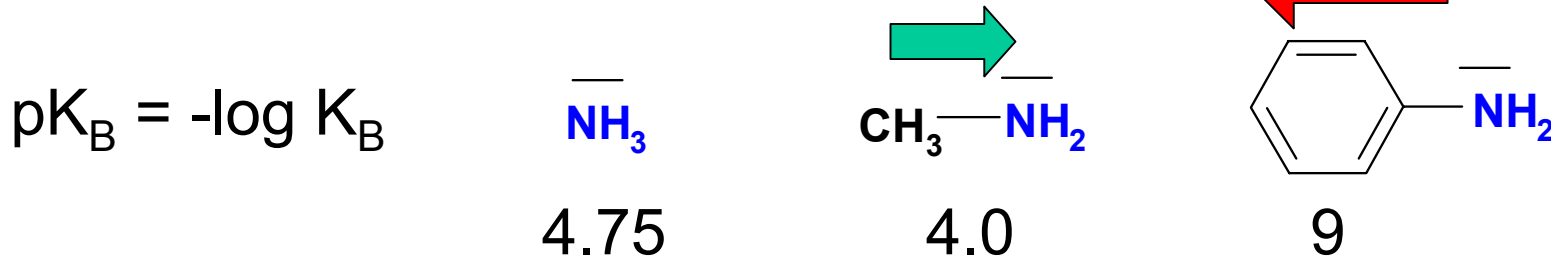
Basencharakter

Nukleophile

Tetraedrisch: 107 °, sp³



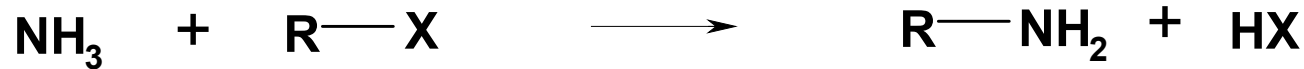
$$K_B = \frac{[\text{R}-\text{NH}_3^{\oplus}] \cdot [\text{HO}^{\ominus}]}{[\text{R}-\text{NH}_2]}$$



Aliphatische Amine sind **schwache** Basen, aromatische Amine sind **sehr schwache** Basen

Herstellung von Aminen

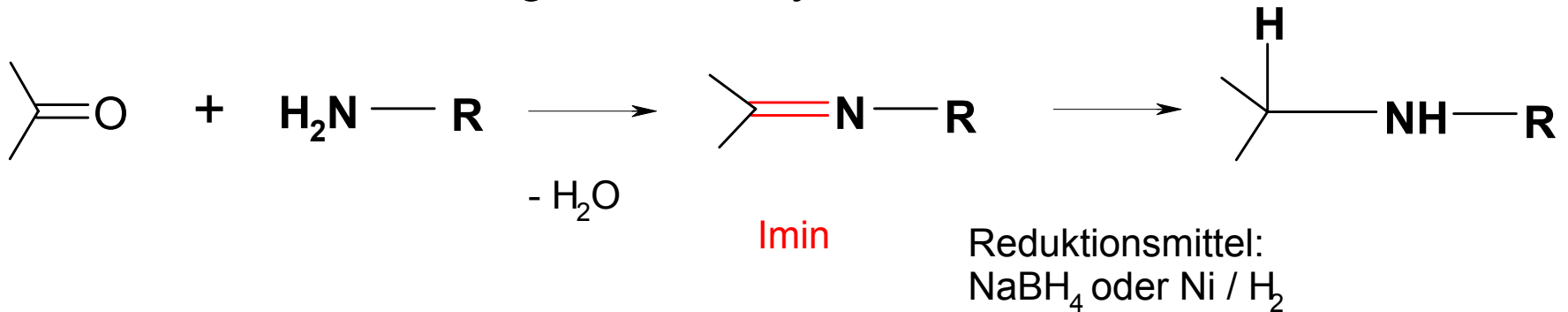
1. Aus Halogenalkanen (S_N -Reaktion)



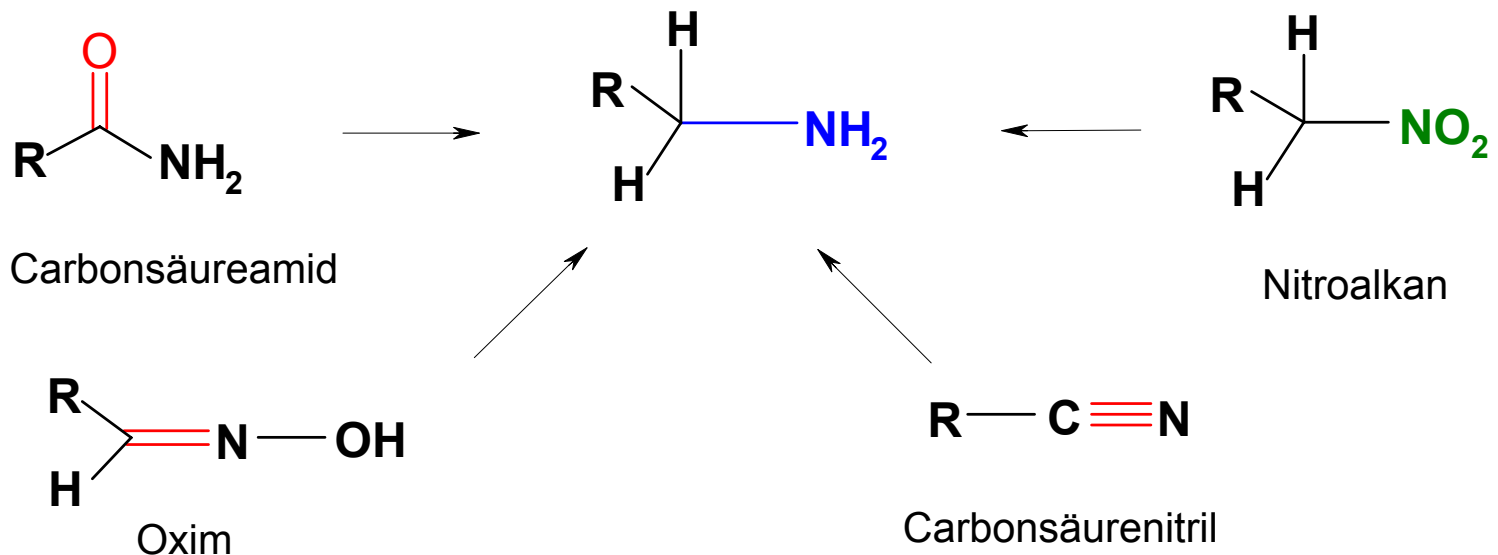
X = Cl, Br, I

Produktgemische

2. Reduktive Aminierung von Aldehyden und Ketonen

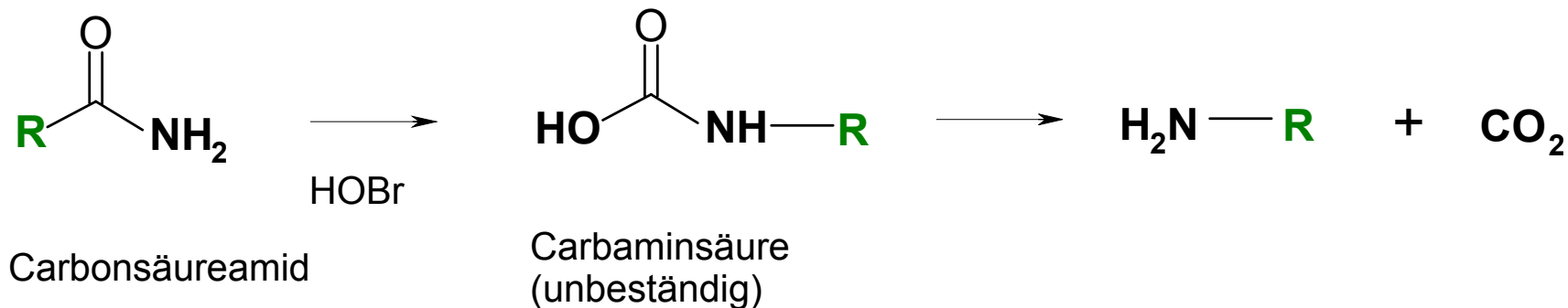


3. Reduktion von Stickstoffderivaten



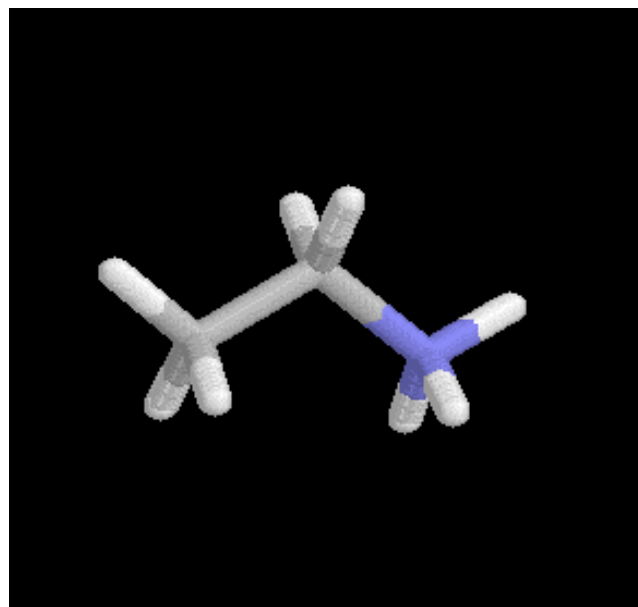
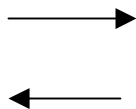
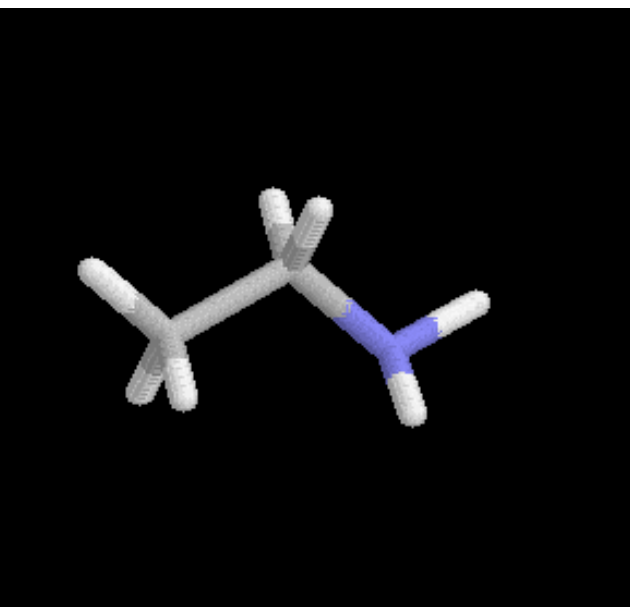
Reduktionsmittel: H_2 / Katalysator, H / Metall, Na / Ethanol, LiAlH_4

4. Hofmann-Abbau von Säureamiden

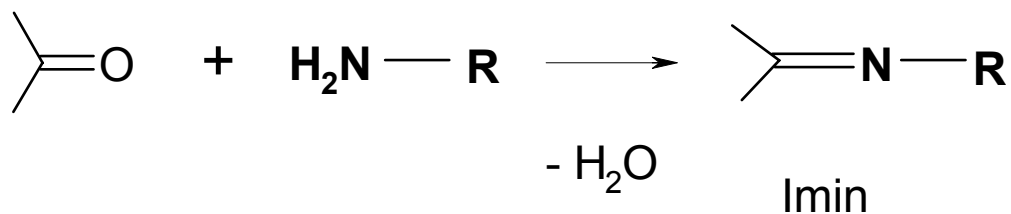


Wichtige Reaktionen von Aminen

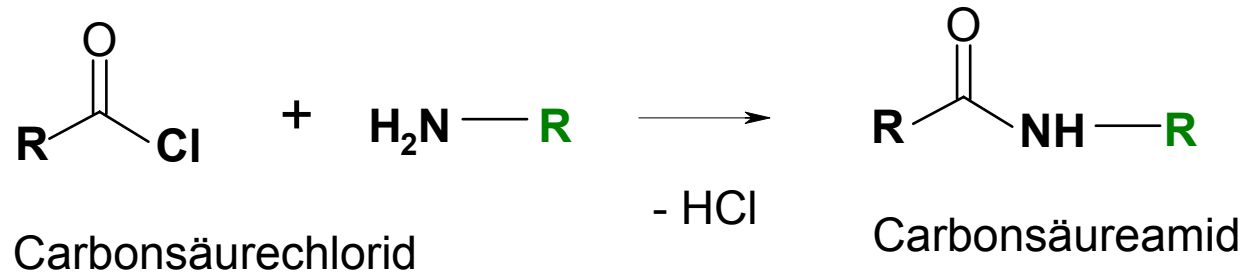
1. Salzbildung



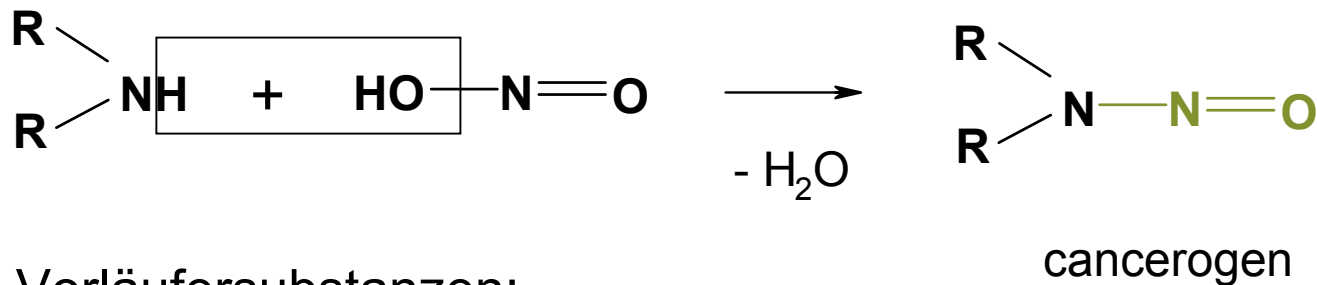
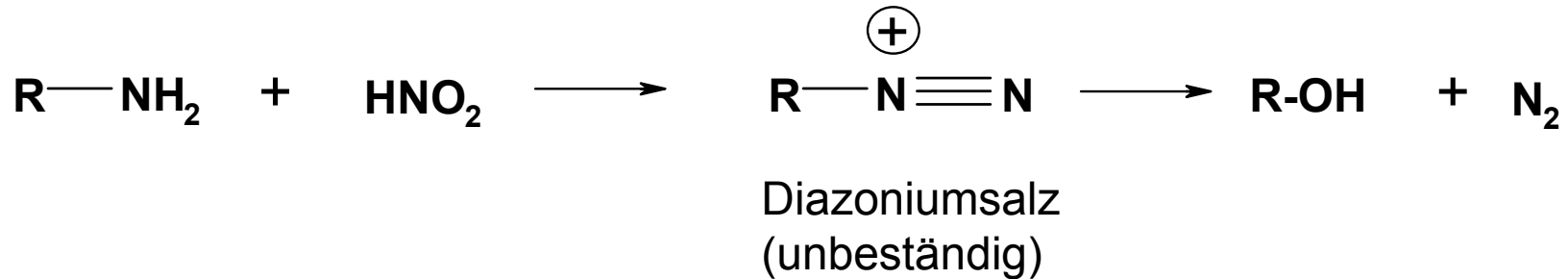
2. Reaktion mit Aldehyden und Ketonen



3. Reaktion mit Carbonsäurederivaten zu Amiden



4. Reaktionen mit Salpetriger Säure

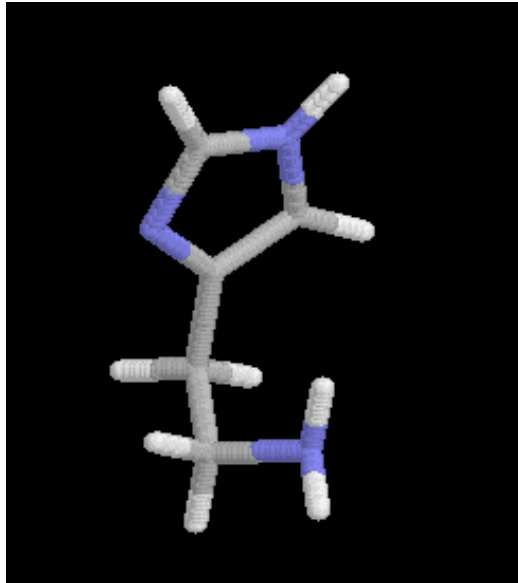
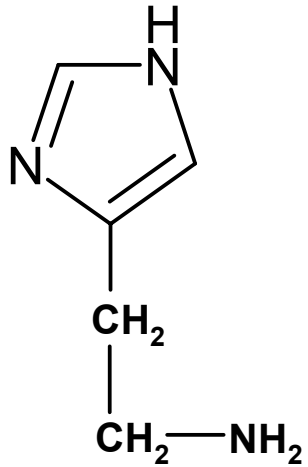
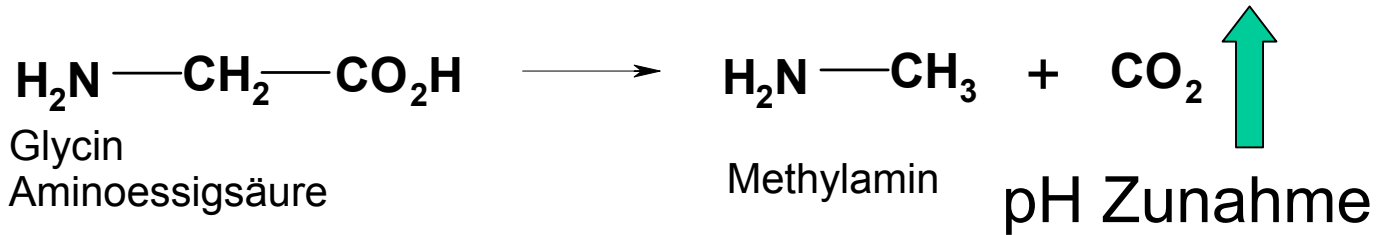


Vorläufersubstanzen:
Pökelsalz, Nitrat, Amine

Nitrosamine

Biogene Amine

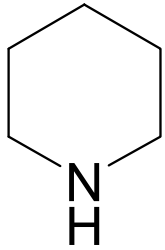
durch Abbau (Decarboxylierung) von Aminosäuren



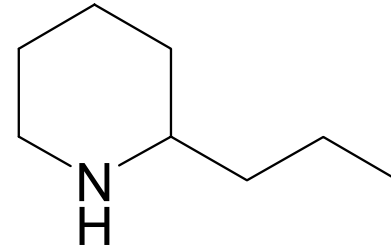
Histamin – allergieauslösend
Fisch, Wein, Käse, Salami

Alkaloide

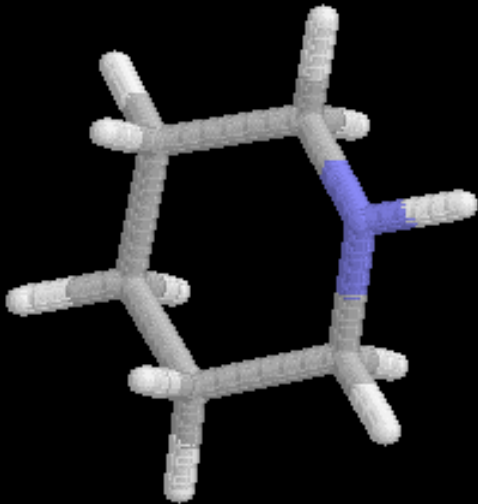
Sekundäre pflanzliche Stoffwechselprodukte
Basen (Amine!), wasserlöslich
Gifte, Pharmaka



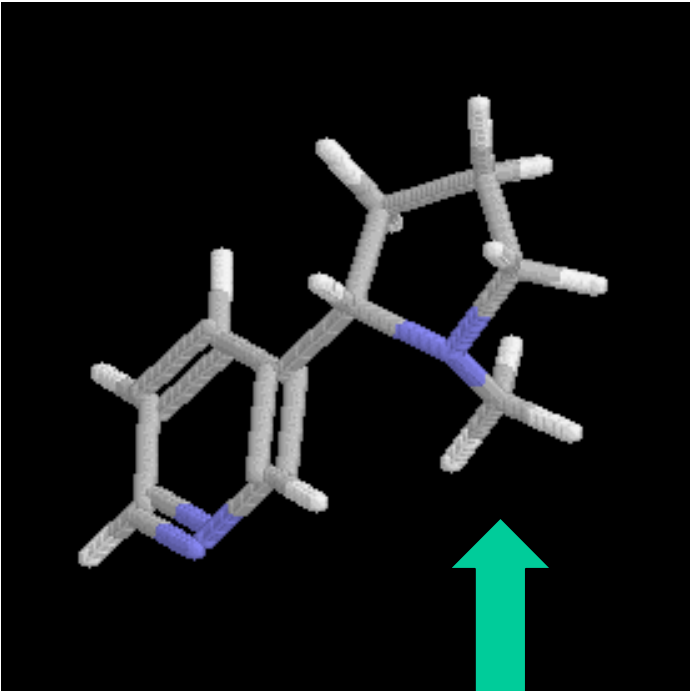
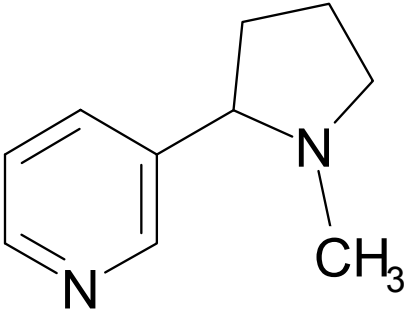
Piperidin aus Pfeffer



Coniin aus Schierling

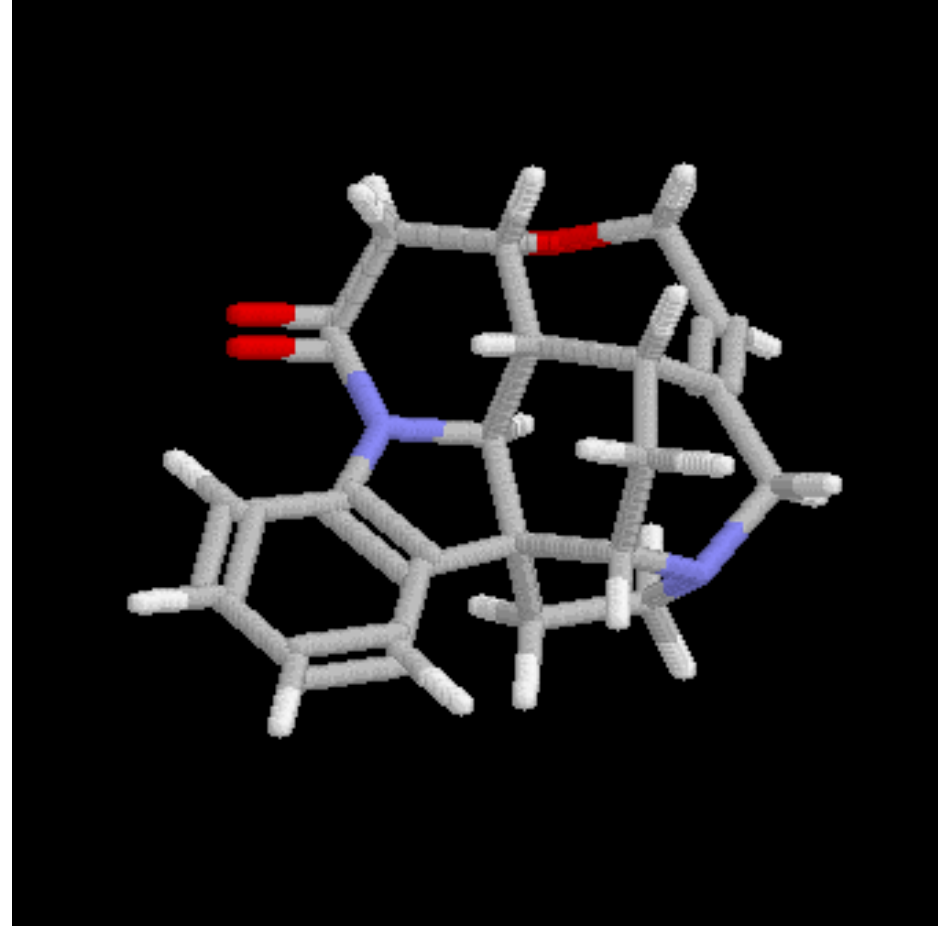
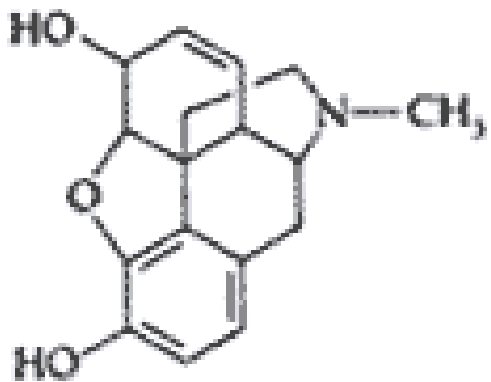


Nicotin





Morphin



Strychnin

Pilzgifte: Muscarin