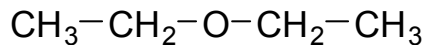


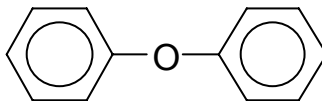
Ether: R-O-R, R-O-Ar, Ar-O-Ar

Nomenklatur

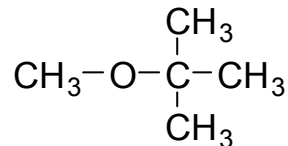


Diethylether

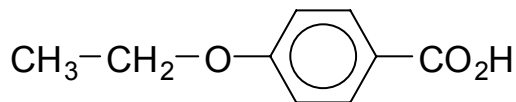
"Ether"



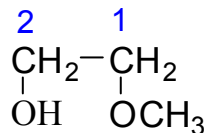
Diphenylether


 tert.-Butylmethylether
(MTBE)

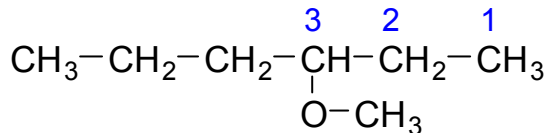
Bezeichnung der RO- als Alkoxy-Gruppe



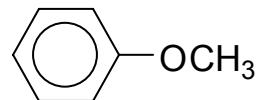
p-Ethoxybenzoesäure



2-Methoxyethanol



3-Methoxyhexan

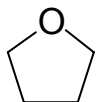
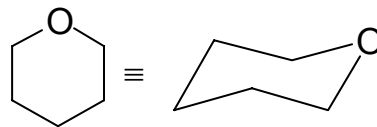
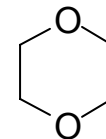


Anisol (Trivialname)

Cyclische Ether (Heterocyclen: ein oder mehrere Ringatome sind Heteroatome z.B. O, N, S, P etc.)

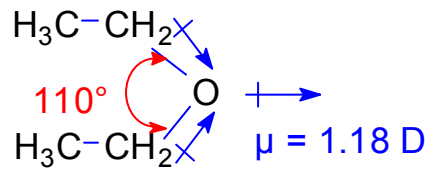


Oxiran

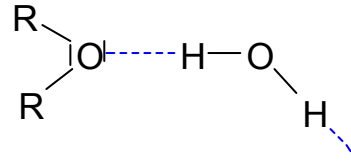
Tetrahydrofuran
(THF)Tetrahydropyran
(Grundgerüst der Glucose)

Dioxan

Physikalische Eigenschaften der Ether



Wasserstoffbrückenbindung zu protischen Lösungsmitteln



	Sdp. [°C]	Löslichkeit [g in 100 ml H ₂ O]
$\text{CH}_3-\text{CH}_2-\text{O}-\text{CH}_2-\text{CH}_3$ (C ₄ H ₁₀ O)	+34.6	ca. 8
$\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{OH}$ (C ₄ H ₁₀ O)	+118.0	ca. 8

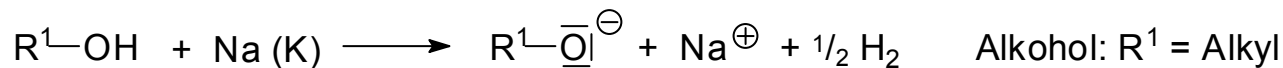
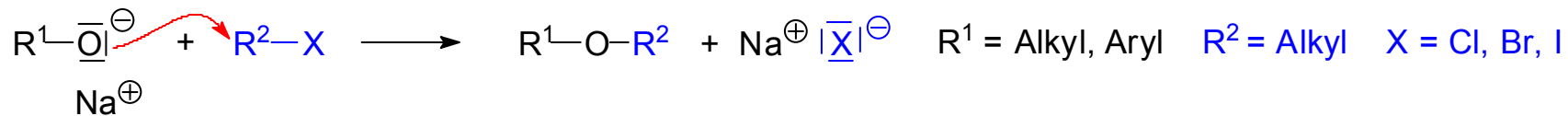
Industrielle Verwendung

Ether sind chemisch inert und werden als Lösungsmittel verwendet.

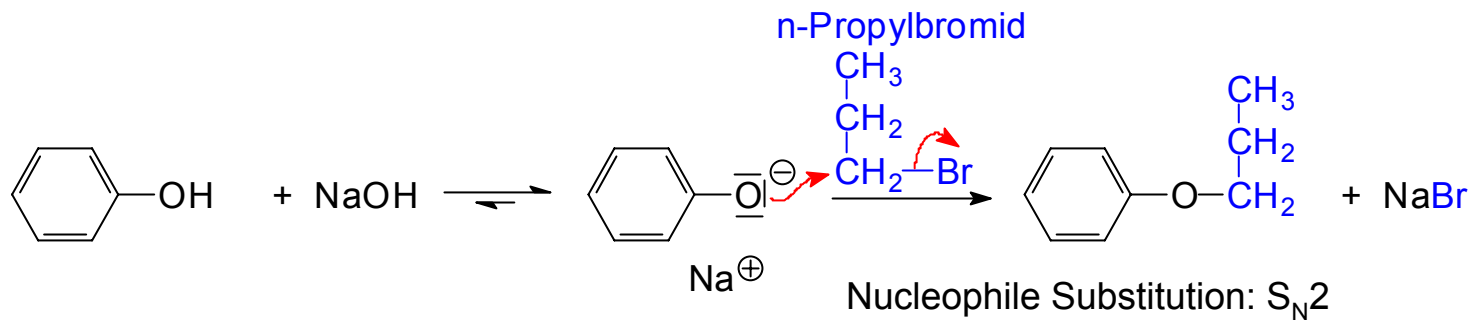
Beispiele:

Diethylether (auch Narkotikum) und MTBE (Verwendung auch als Kraftstoffadditiv, Antiklopffmittel)

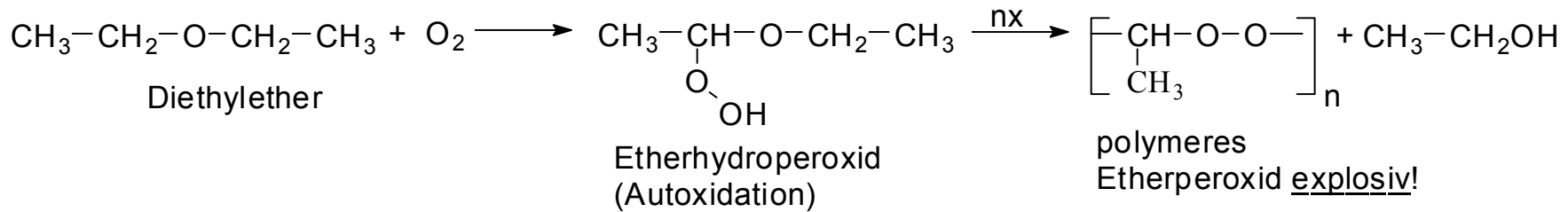
Williamson-Synthese von Ethern



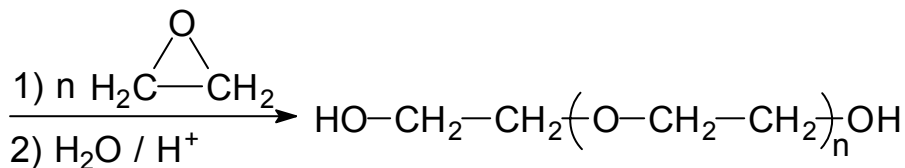
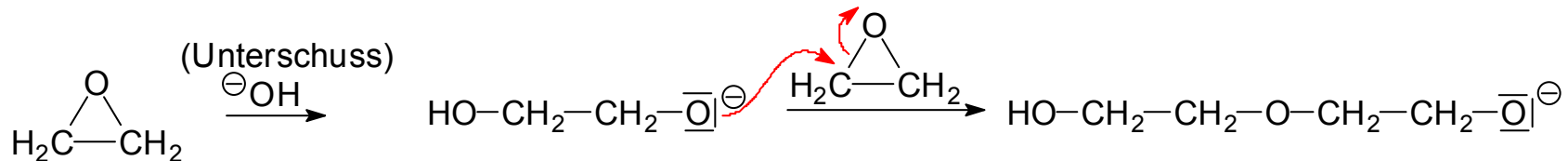
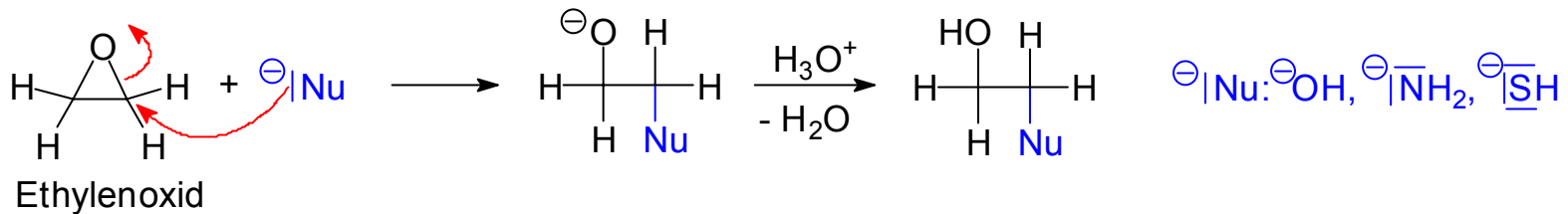
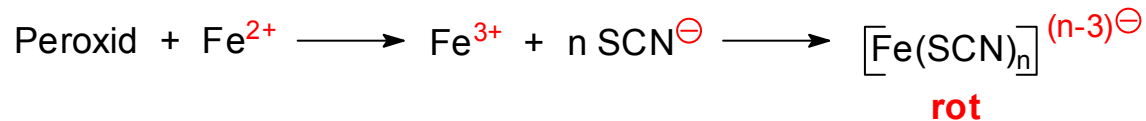
Beispiel:



Peroxid-Bildung (die zu heftigen Explosionen führen kann)

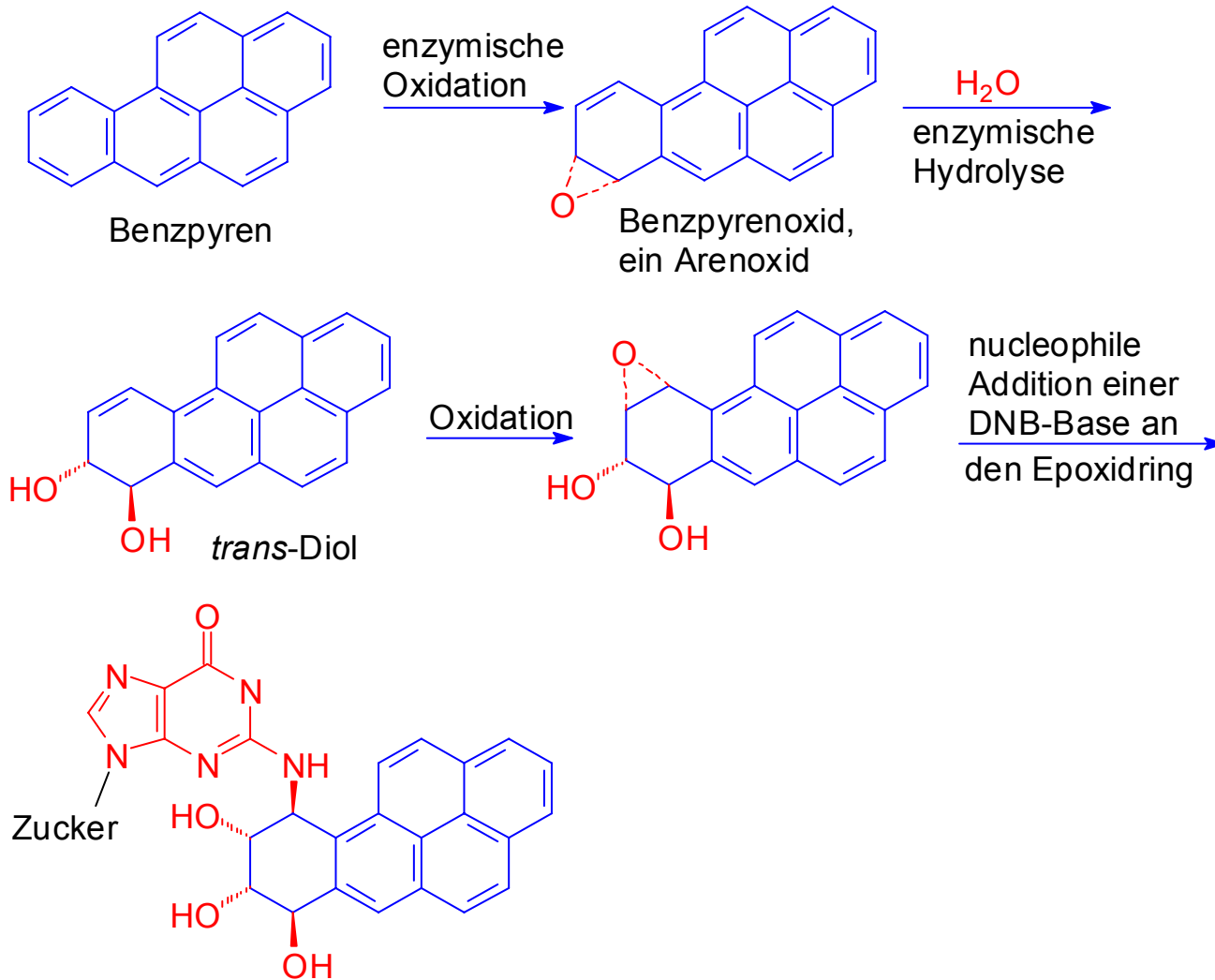


Eisenrhodenid-Probe zum Nachweis von Etherperoxiden

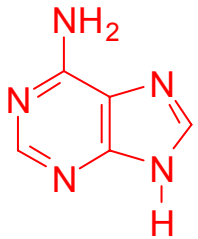


Polyethylenglykol (nichtionisches Detergens)

Abbau von Aromaten durch Epoxidierung und nucleophiler Addition an DNB-Basen



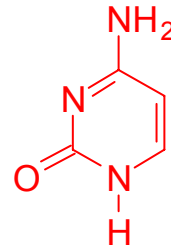
Basen, die in der **DNA** (**D**esoxyribo**n**ucleic **A**cid- Desoxyribonucleinsäure) vorkommen



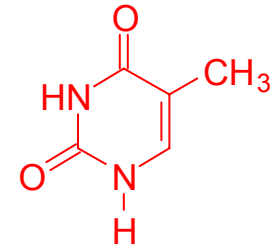
Adenin (A)



Guanin (G)

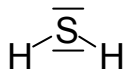


Cytosin (C)

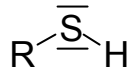


Thymin (T)

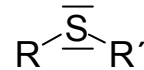
Thioalkohole, Thioether



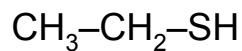
Schwefelwasserstoff



Thioalkohol
(Mercaptan)



Thioether
Dialkylsulfid (R, R' = Alkyl)
Diarylsulfid (R, R' = Aryl)

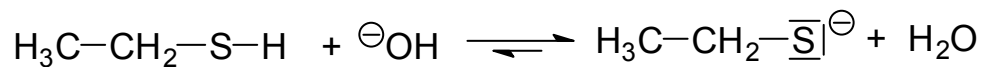


Sdp. 37°C (Ethanthiol, Ethylmercaptan)



Sdp. 78°C (Ethanol)

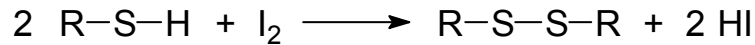
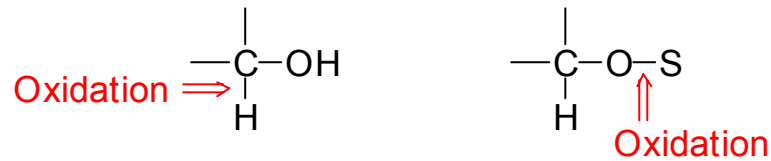
Acidität:



$$pK_S = 10.6$$

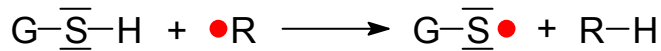
$$pK_S = 15.7$$

Reaktionen von Thiolen

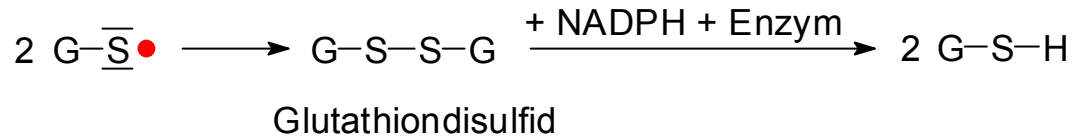


Thioalkohole sind gute Radikalfänger

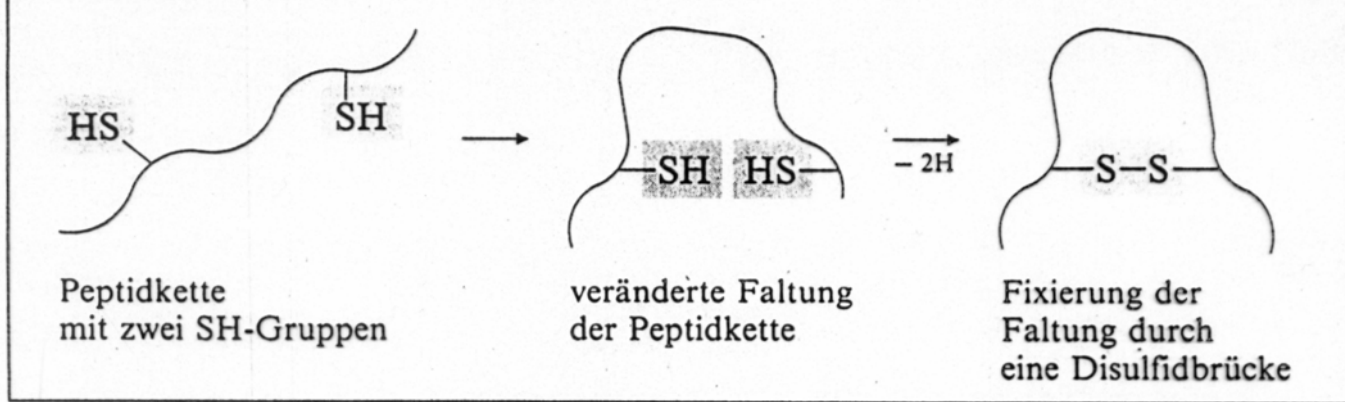
Glutathion



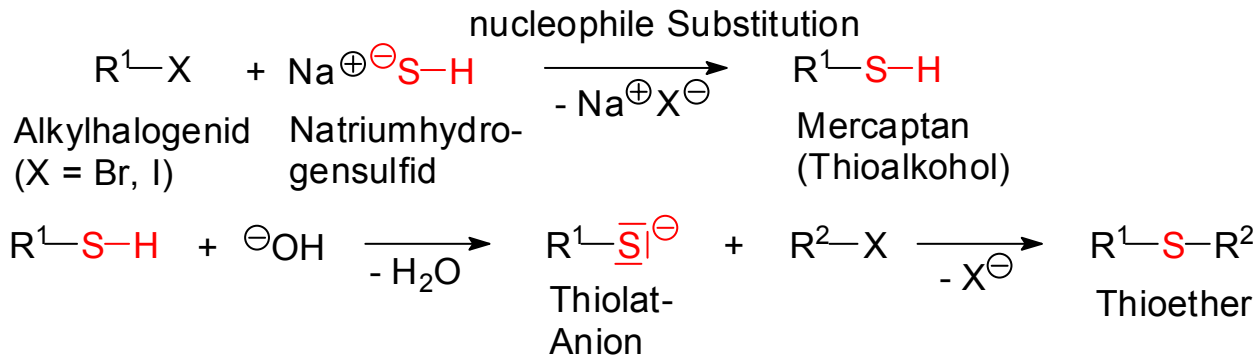
freies Radikal Weniger reaktiv,
(das z.B. bei der greift z.B. die DNA nicht an.
Strahlentherapie
von Krebs entsteht
und hochreaktiv ist.)



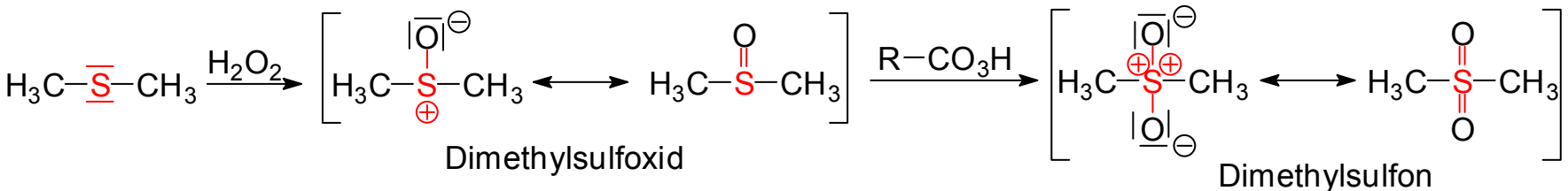
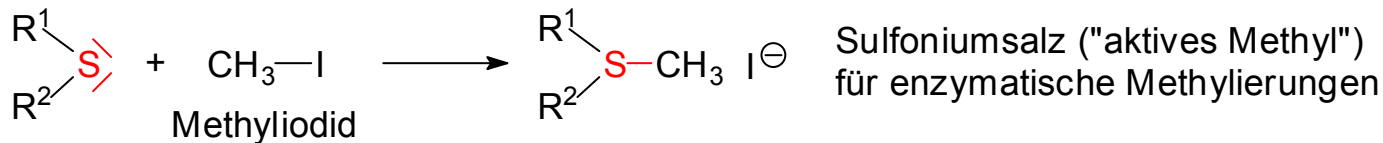
G - Tripeptid-Rest



Synthese von Thioalkoholen und Thioethern

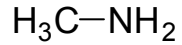


Bildung von Sulfoniumsalze und Oxidation von Thioethern

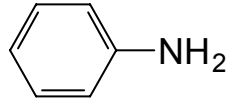


Amine

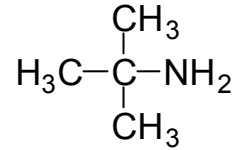
Primäre Amine [-NH₂]:



Methylamin



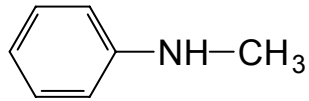
Anilin

*tert.*-Butylamin

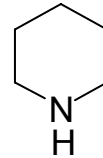
Sekundäre Amine [-NH-]:



Dimethylamin

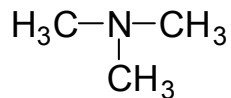


N-Methylanilin

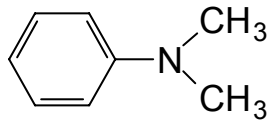


Piperidin

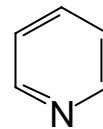
Tertiäre Amine [-N-]:



Trimethylamin

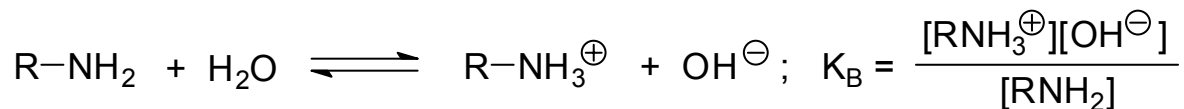


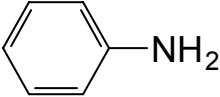
N,N-Dimethylanilin



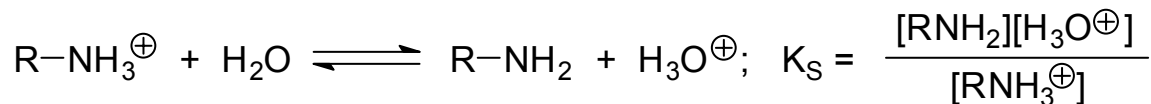
Pyridin

Basizität von Aminen



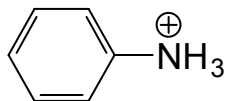
Amin	K_B	$\text{p}K_B$	$\text{p}K_B = -\log K_B$
NH_3	$1.8 \cdot 10^{-5}$	4.75	
$\text{H}_3\text{C-NH}_2$	$4.6 \cdot 10^{-4}$	3.34	
	$4.3 \cdot 10^{-10}$	9.37	

Acidität des korrespondierenden Ammoniumsalzes

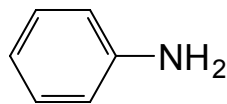


$$\text{p}K_S = 14 - \text{p}K_B$$

z.B.

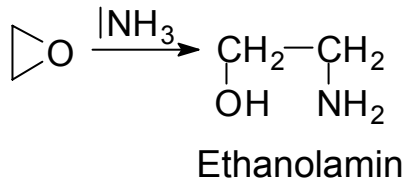


relativ starke Säure
 $\text{p}K_S = 4.6$

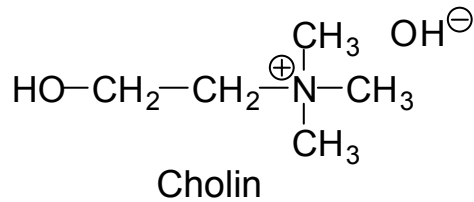


schwache Base

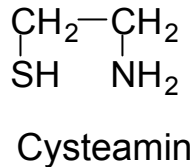
Wichtige Amine



Verwendung als Fettsäureester in Tensiden

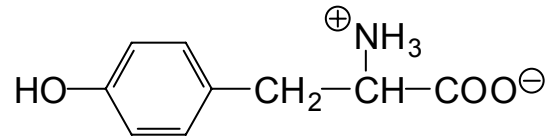


Bestandteil von Phospholipiden, die zum Aufbau von Zellmembranen dienen.



Im Organismus Bestandteil von Coenzym A.
Als Radikalfänger Einsatz bei Strahlenschäden.

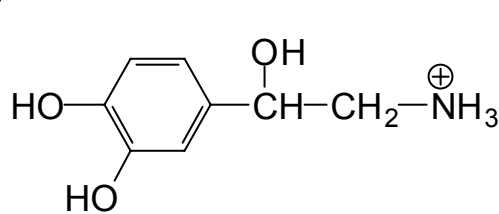
Wichtige Amine



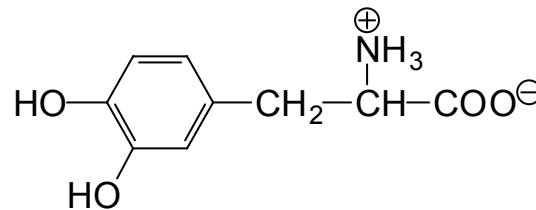
Tyrosin Aminosäure
(Ausgangsverbindung)

Aminhormone (Katecholamine): Neurotransmitter

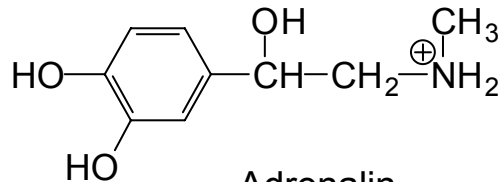
Werden im Nebennierenmark als Reaktion auf Signale aus dem Zentralnervensystem gebildet. Adrenalin Spiegel im Blut: ca. 10^{-10} mol/l. Wenn Sinnesreize den Organismus alarmieren steigt er auf das 1000fache.



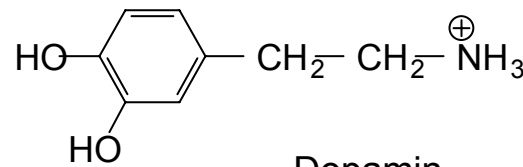
Noradrenalin



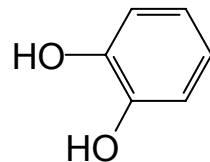
3,4-Dihydroxyphenylalanin
(L-DOPA)



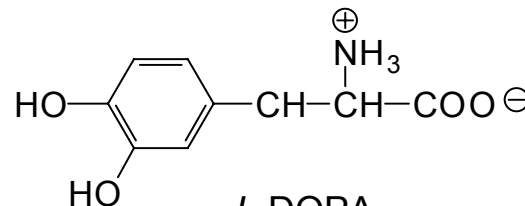
Adrenalin



Dopamin



Katechol
(1,2-Dihydroxybenzol)

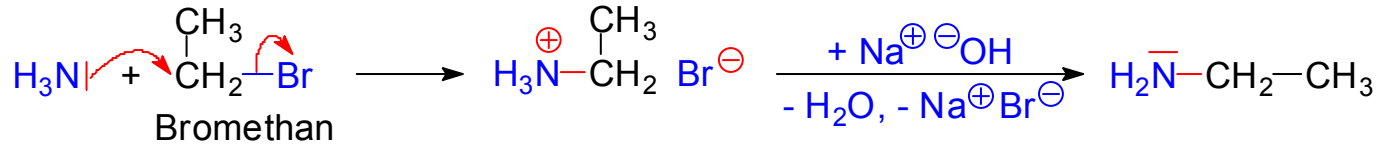


L-DOPA

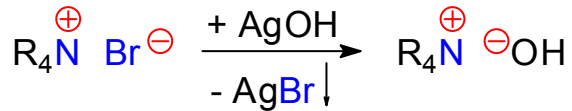
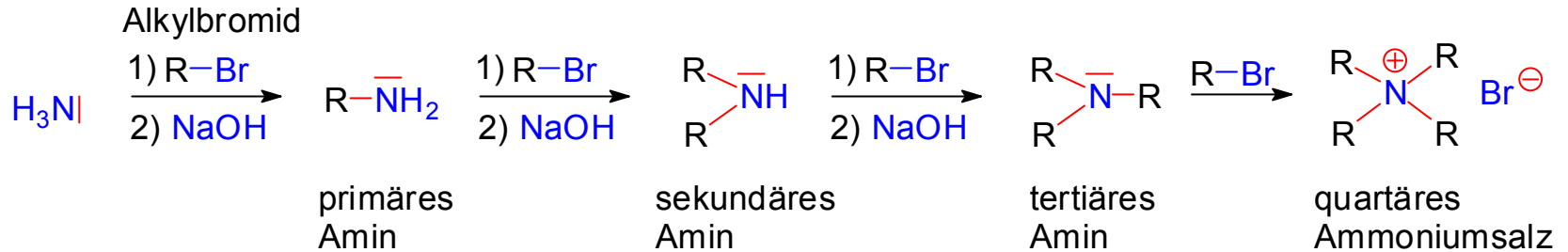
Parkinson-Krankheit (neurologische Erkrankung) beruht auf einer Unterproduktion von Dopamin und wurde durch Verabreichung von L-DOPA behandelt. Überproduktion von Dopamin \Rightarrow Schizophrenie

Synthese von Aminen

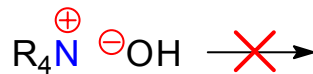
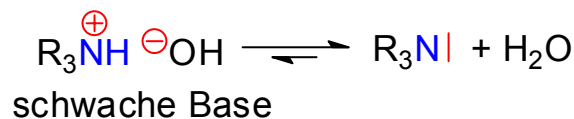
Nucleophile Substitution: Beispiel: Synthese von Ethylamin



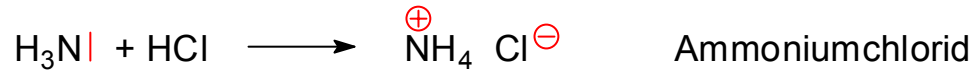
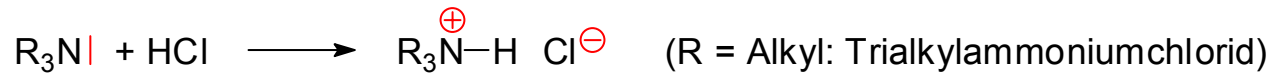
Allgemein:



starke Base vergleichbar mit Na^+OH^-
(vollständig dissoziiert)



Salzbildung der Amine mit starken Säuren vergleichbar mit Ammoniak



Verdrängung der schwachen Basen (Amine) aus Ammoniumsalzen mit einer starken Base

