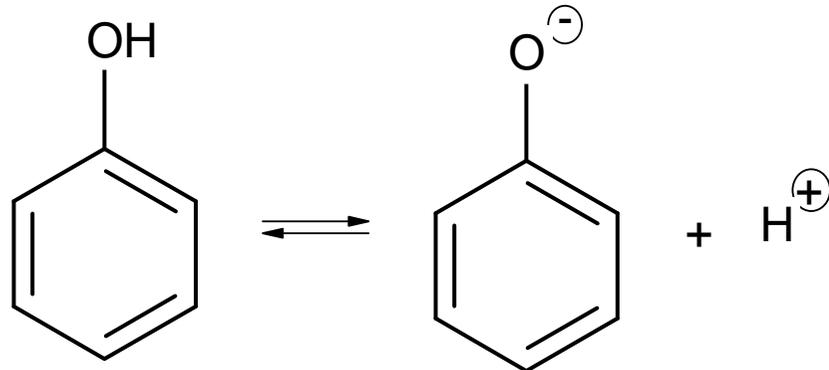
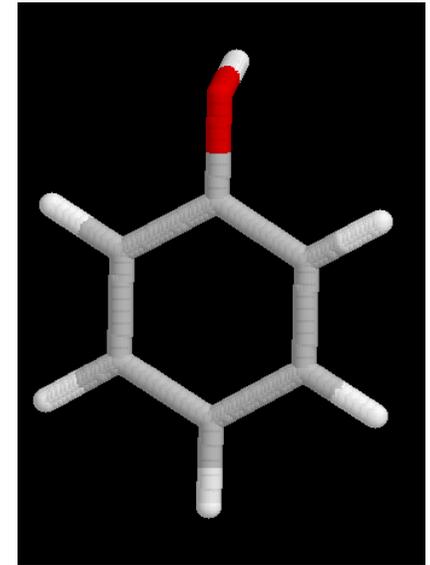
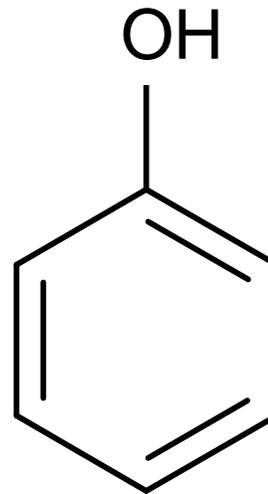


## 2. Phenole

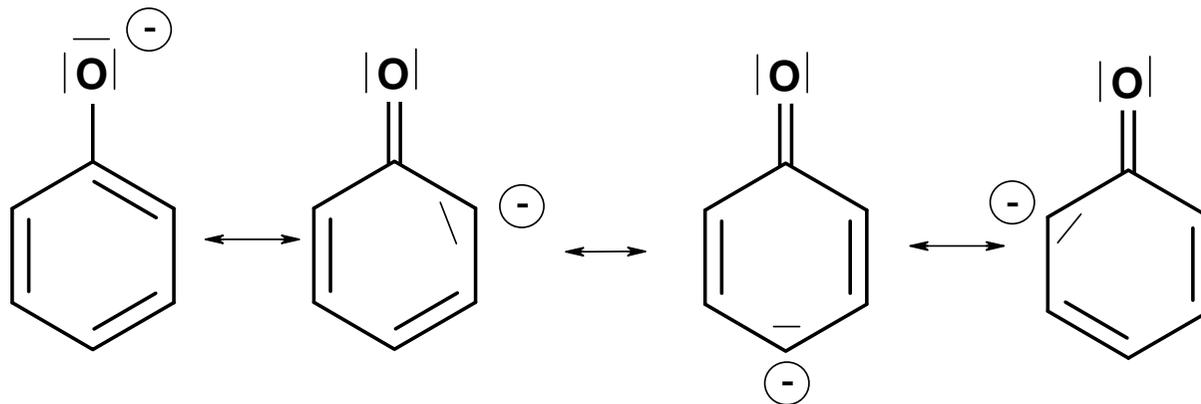
Aromatische Hydroxyverbindungen

Allgemeine Eigenschaften:  
Schwache Säuren  
pKs 9.9



Salzbildung mit starken Basen (NaOH)

Phenolat-Anion, wasserlöslich  
Mesomeriestabilisierung

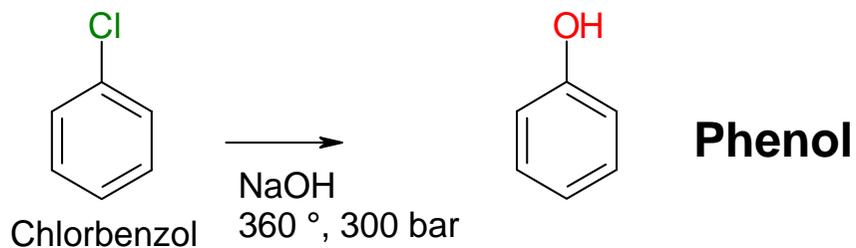


# Technische Synthesen

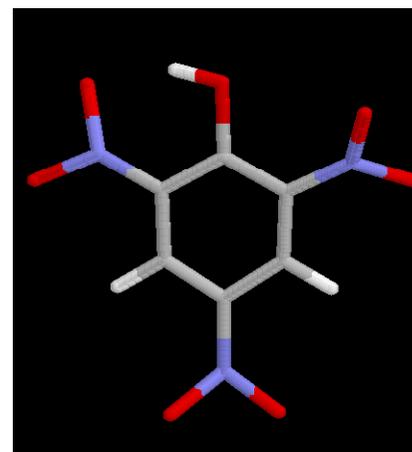
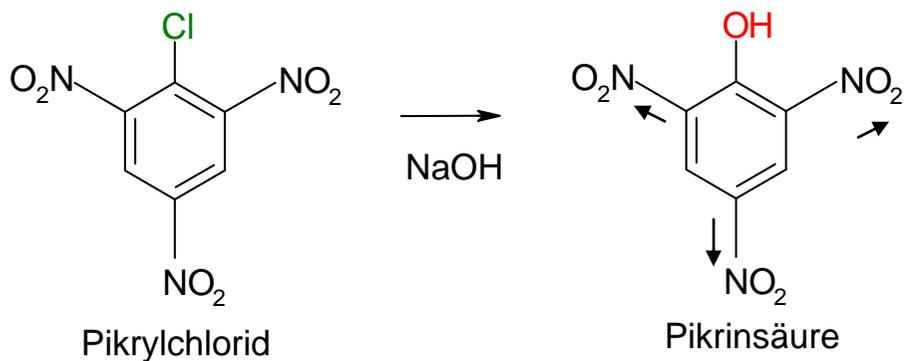
# Herstellung

## 1. Alkalische Extraktion von Steinkohlenteer

## 2. DOW-Verfahren

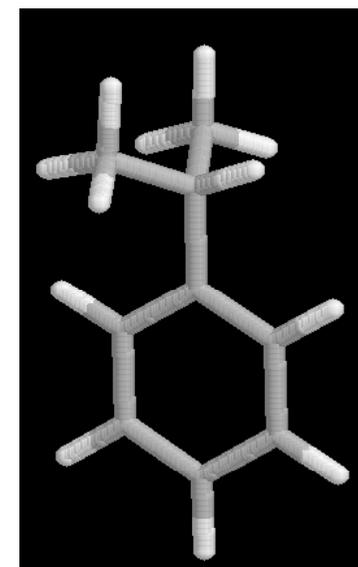
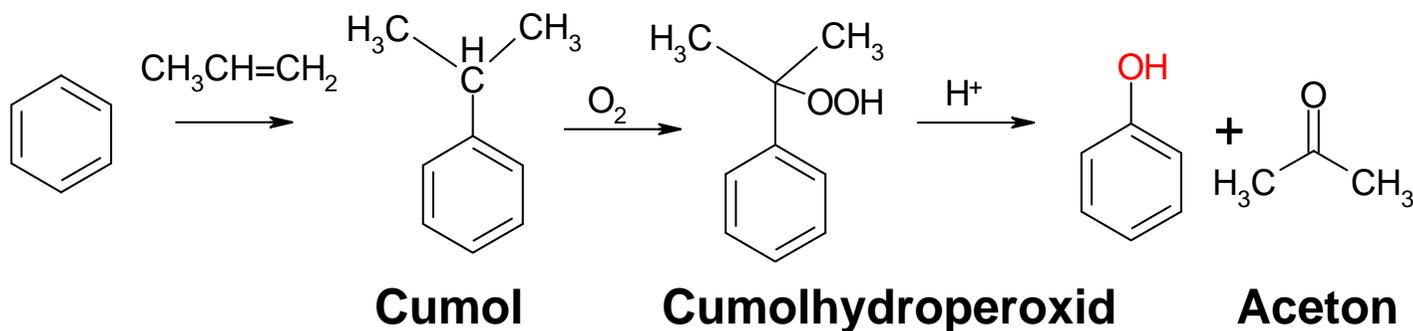


## Pikrinsäure:



**Pikrinsäure**  
pKs 0.4 !

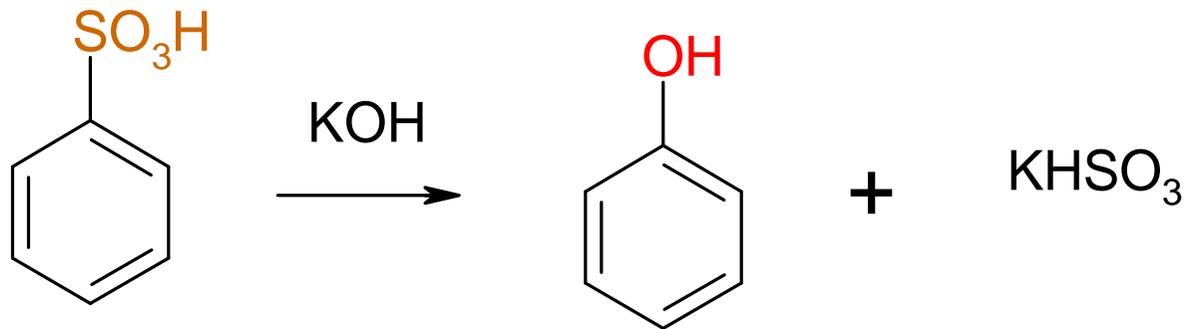
## 3. Cumolverfahren



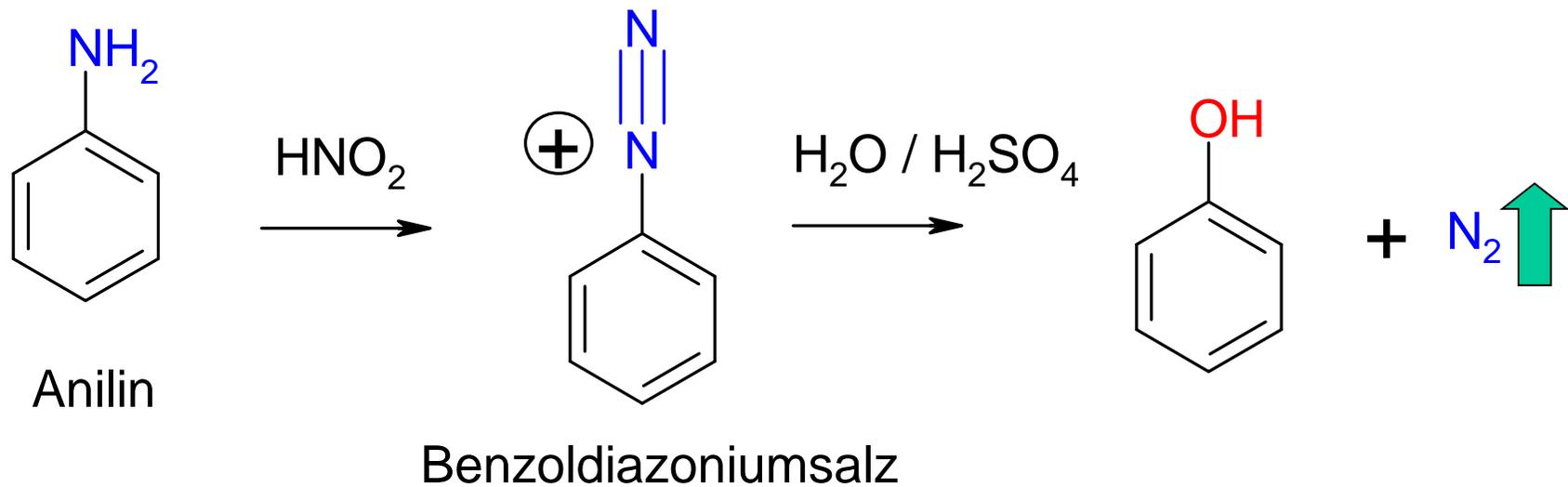
**Cumol**

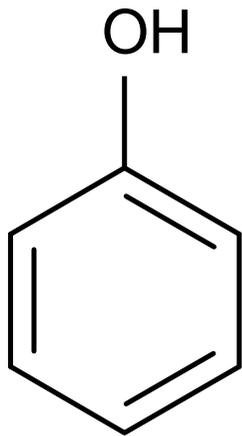
# Herstellung

## 4. Alkalischmelze von Sulfonaten



## 5. "Phenolverkochung" von Diazoniumsalzen



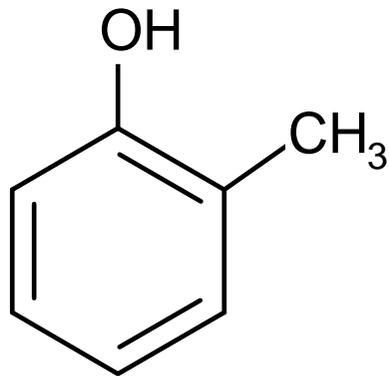
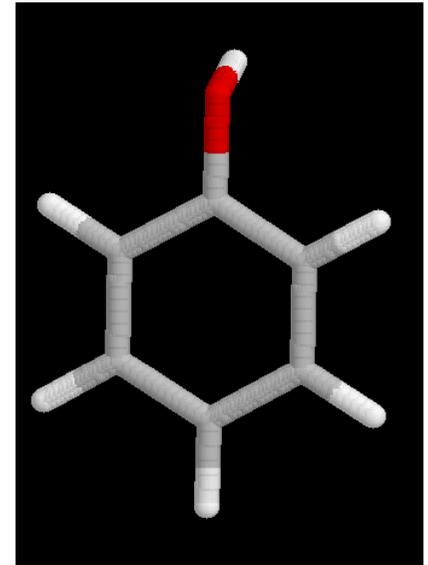


Phenol

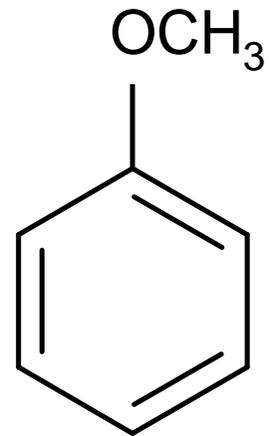
Fp.: 43 °, Kp.: 183 °

Ätzend, giftig: 1 g 

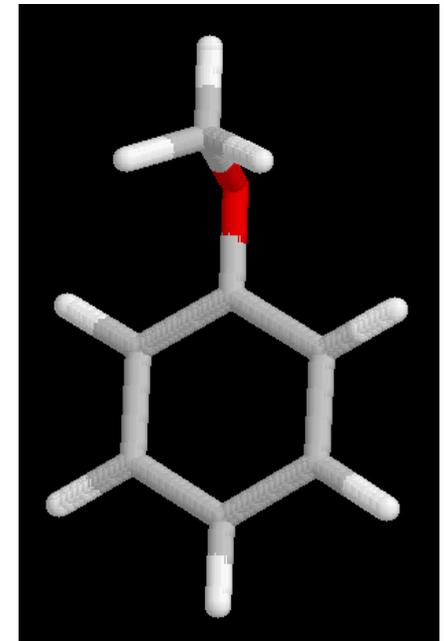
Verwendung:  
Phenoplaste



o-Kresol  
Raumdesinfektion



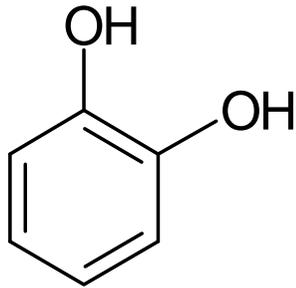
Phenolether:  
Methoxyphenol  
Anisol



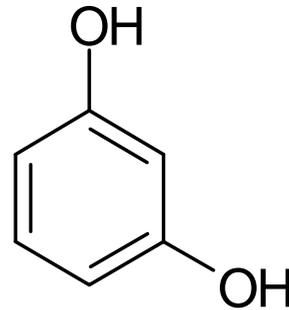
# Mehrwertige Phenole

Zweiwertige Phenole

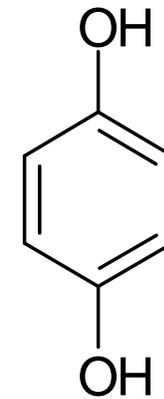
Licht-, Luft-, Schwermetallempfindlich



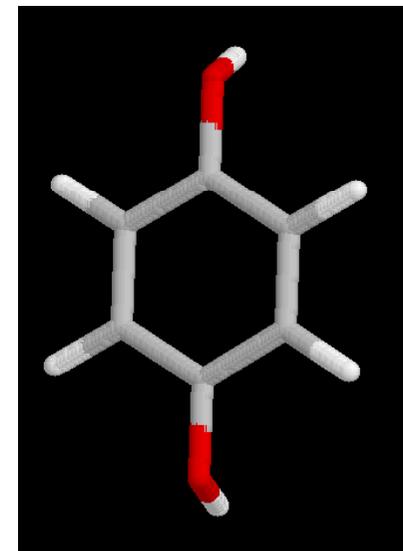
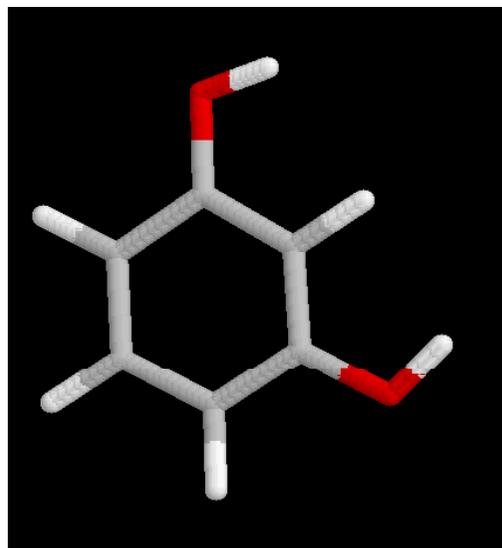
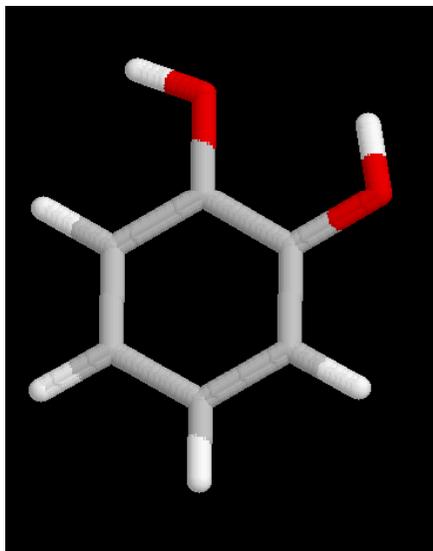
**Brenzcatechin**  
1,2-Dihydroxybenzol



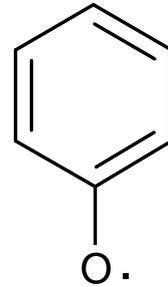
**Resorcin**  
1,3-Dihydroxybenzol



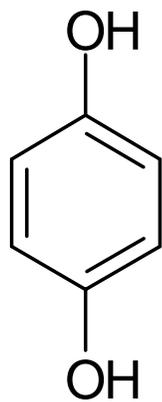
**Hydrochinon**  
1,4-Dihydroxybenzol



Enzymatische Bräunung:  
Radikalreaktion durch  
Phenoloxidasen

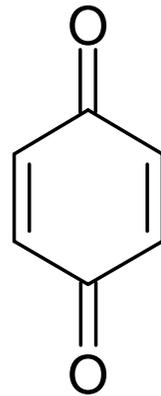
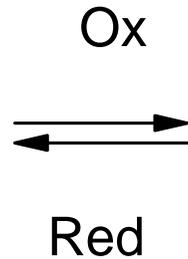


Phenoxyradikal



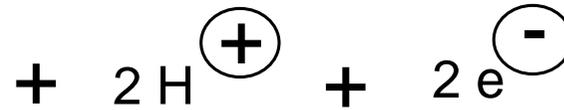
**Hydrochinon**

Wirkt reduzierend  
(Antioxidans)

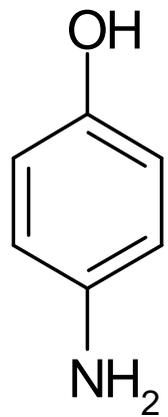


**Chinon**

Nicht aromatisch  
(konjugiertes Keton)  
Chromophor

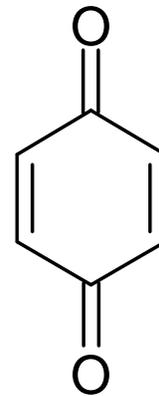
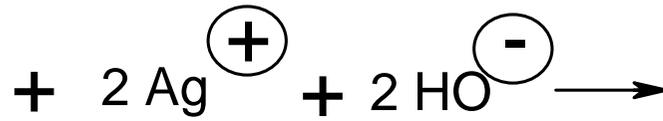


Bestandteil von Coenzymen der Atmungskette:  
Ubichinon  
Plastochinon

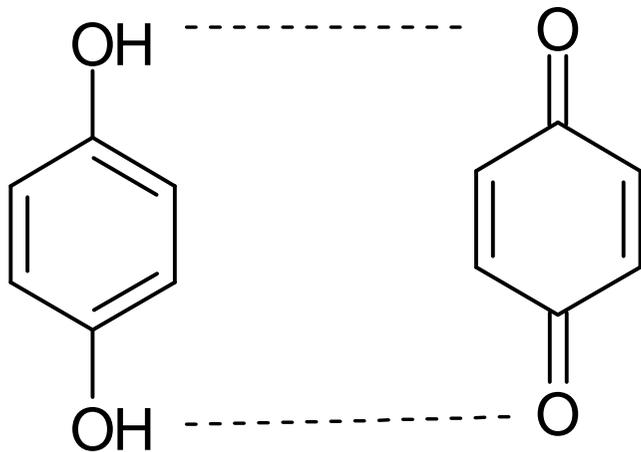
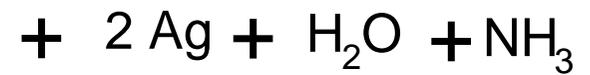


***p*-Aminophenol**

Photographische Entwickler

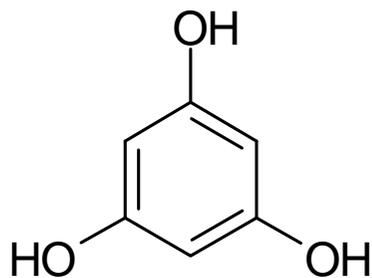


**Chinon**

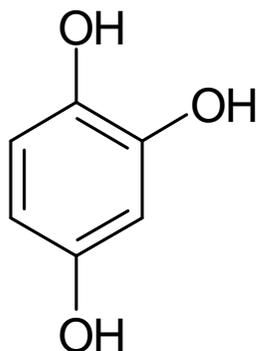


**Chinhydron**

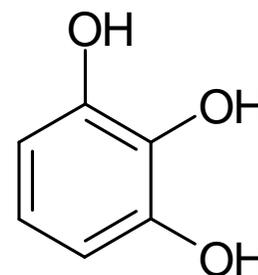
## Dreiwertige Phenole



**Phloroglucin**  
1,3,5-Trihydroxybenzol

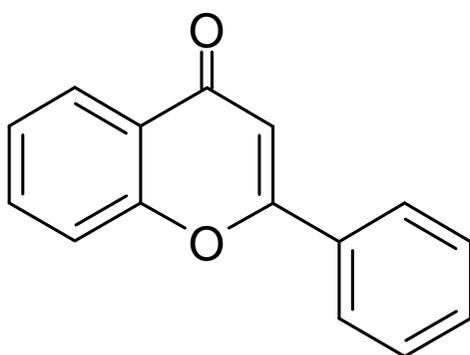


**Oxyhydrochinon**  
1,2,4-Trihydroxybenzol

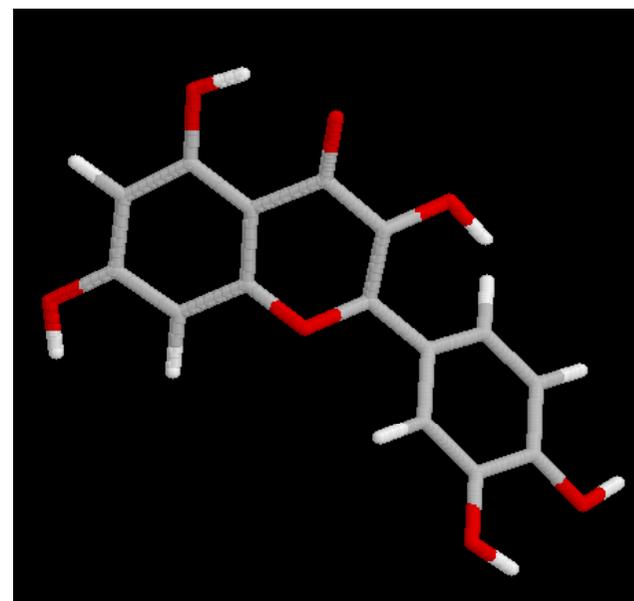


**Pyrogallol**  
1,2,3-Trihydroxybenzol

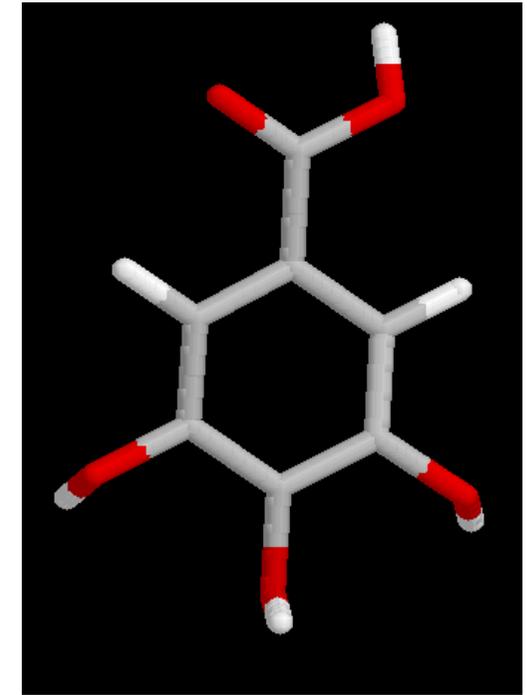
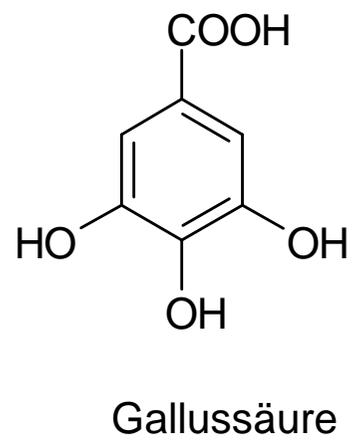
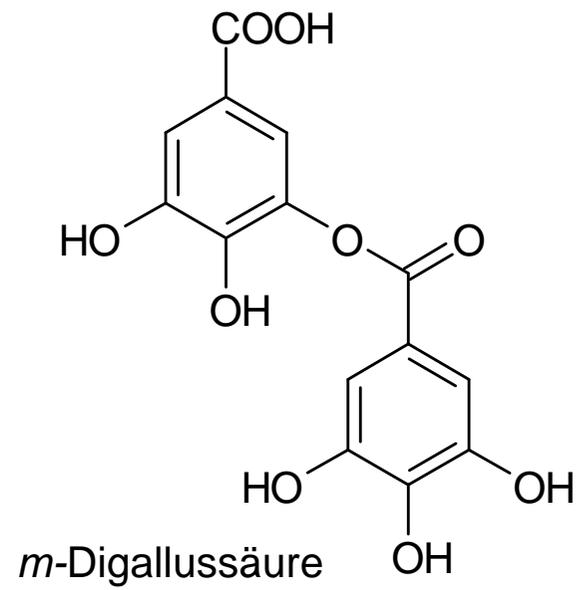
Vorkommen in Gerbstoffen, Flavonen, Anthocyanen



**Grundstruktur der Flavone**

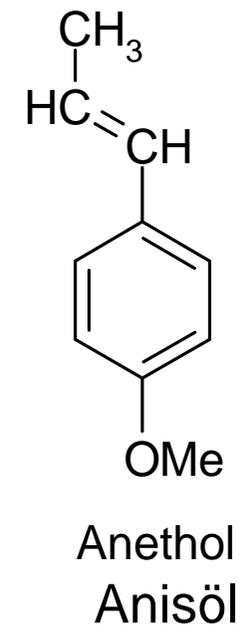
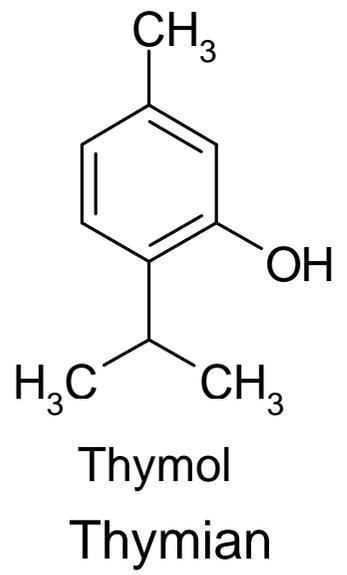
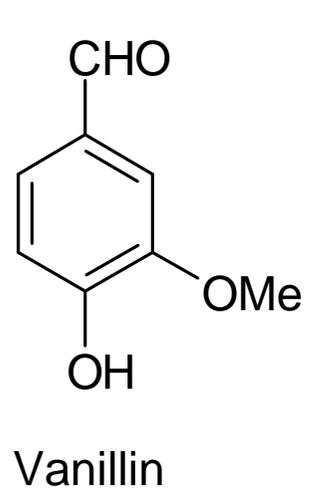


## Gerbstoffe: Ester der Gallussäure (Depside)



Gallussäure

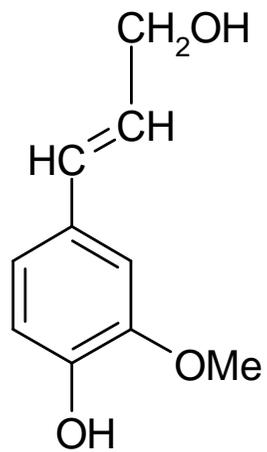
## Aromastoffe



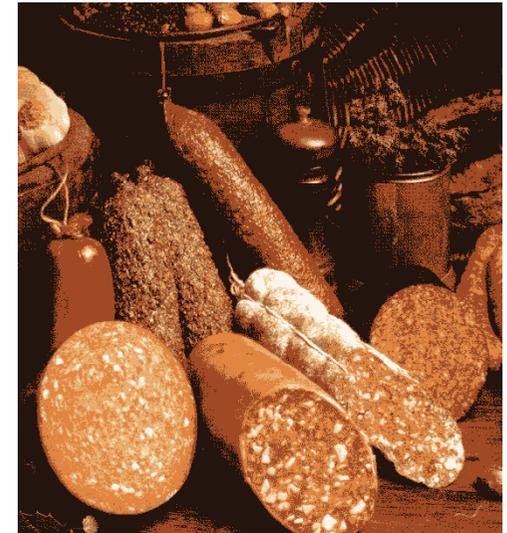
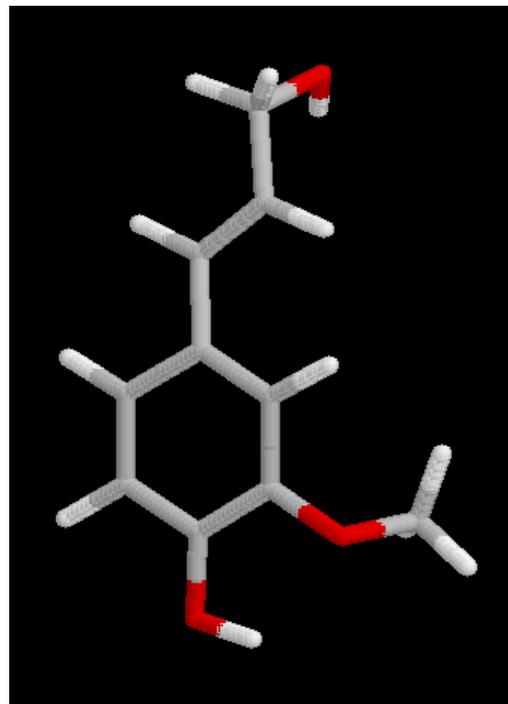
# Phenole als Bausteine von Lignin (Holz: 25-30%)

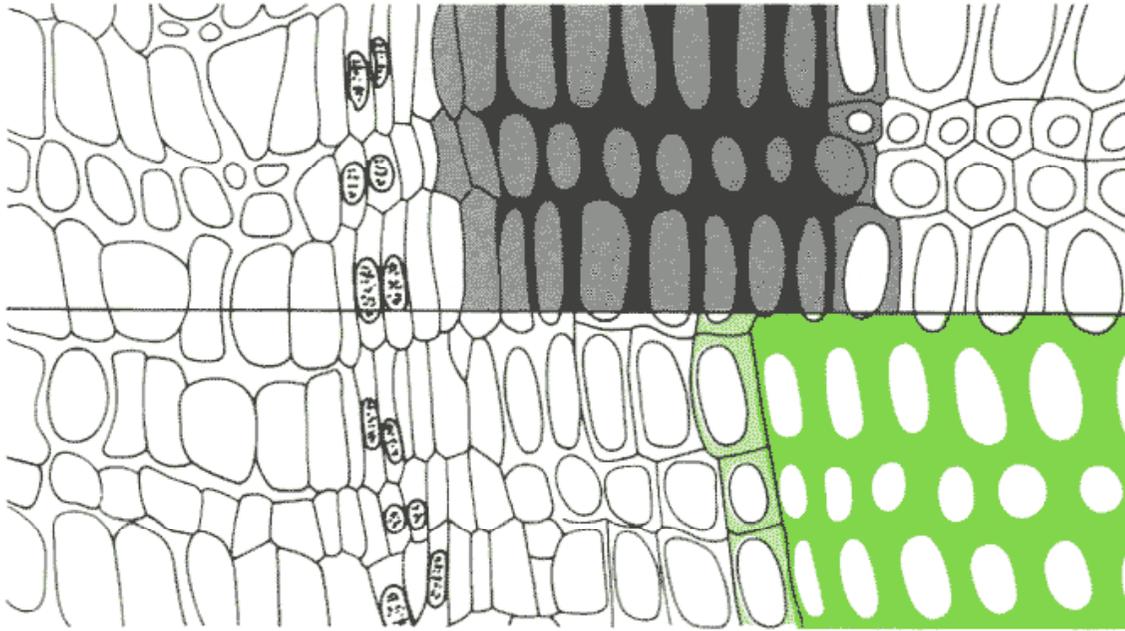
Freisetzung bei Fasslagerung, Räuchern  
Wirken konservierend, bakterizid  
Antioxidantien, Aroma

## Phenylpropane C6-C3



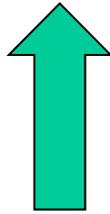
Grundbaustein  
Coniferylalkohol





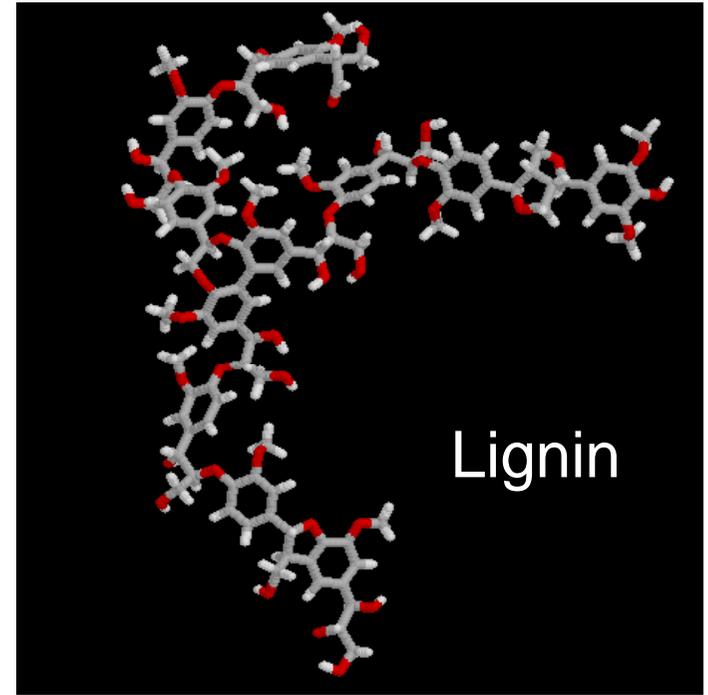
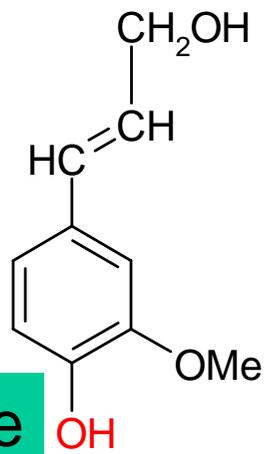
Kambium

Glucosidase

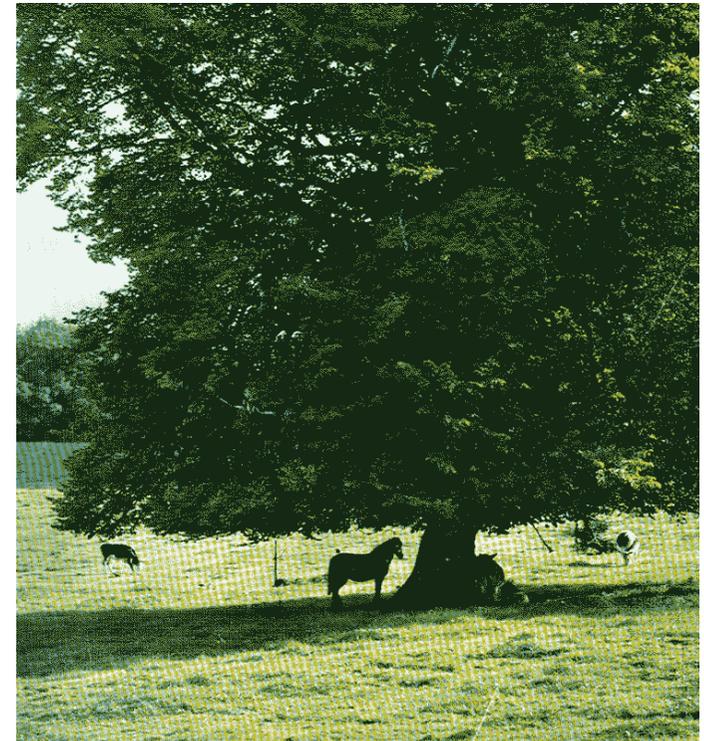


Polymerisation  
der Phenole

Glucose

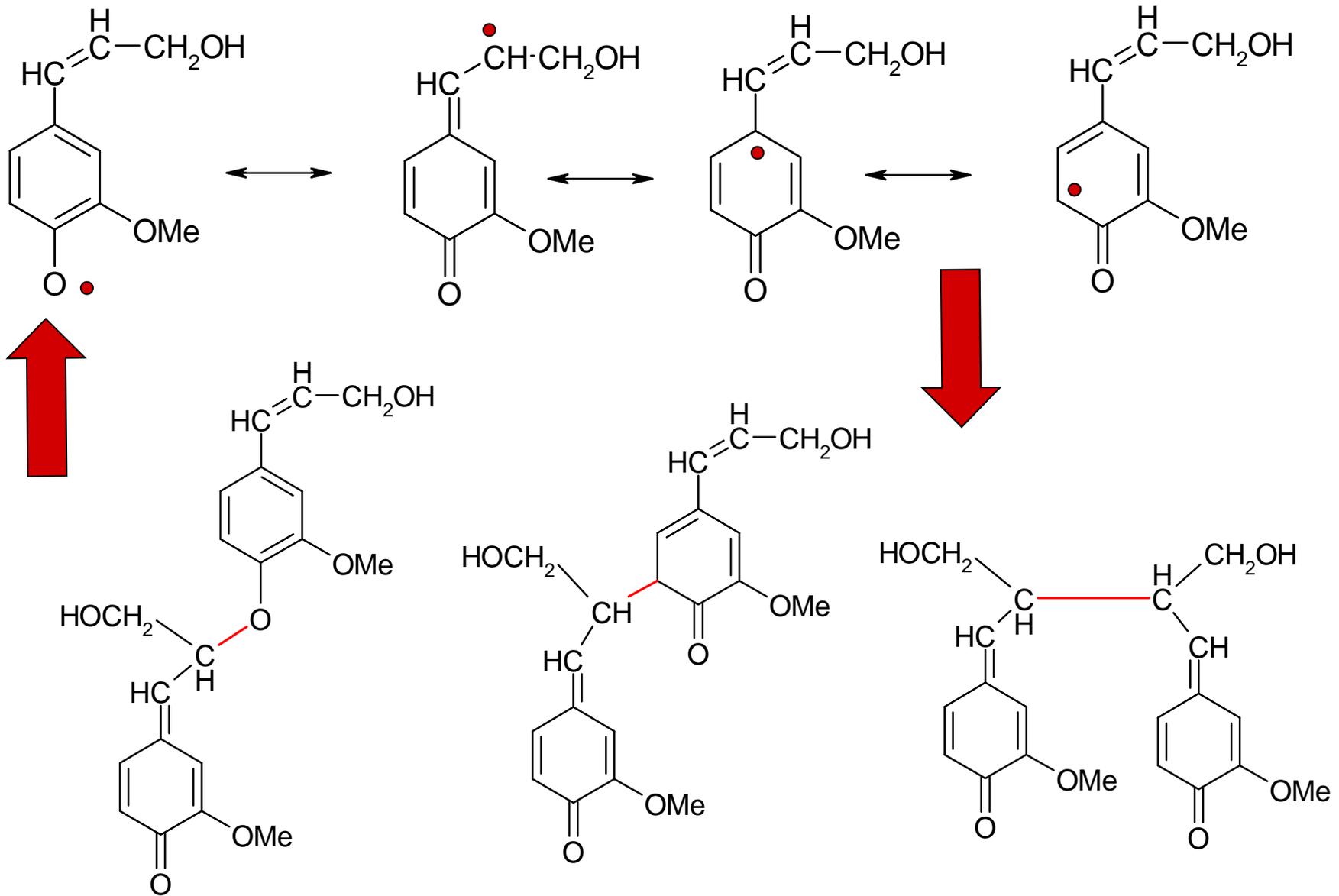


Lignin

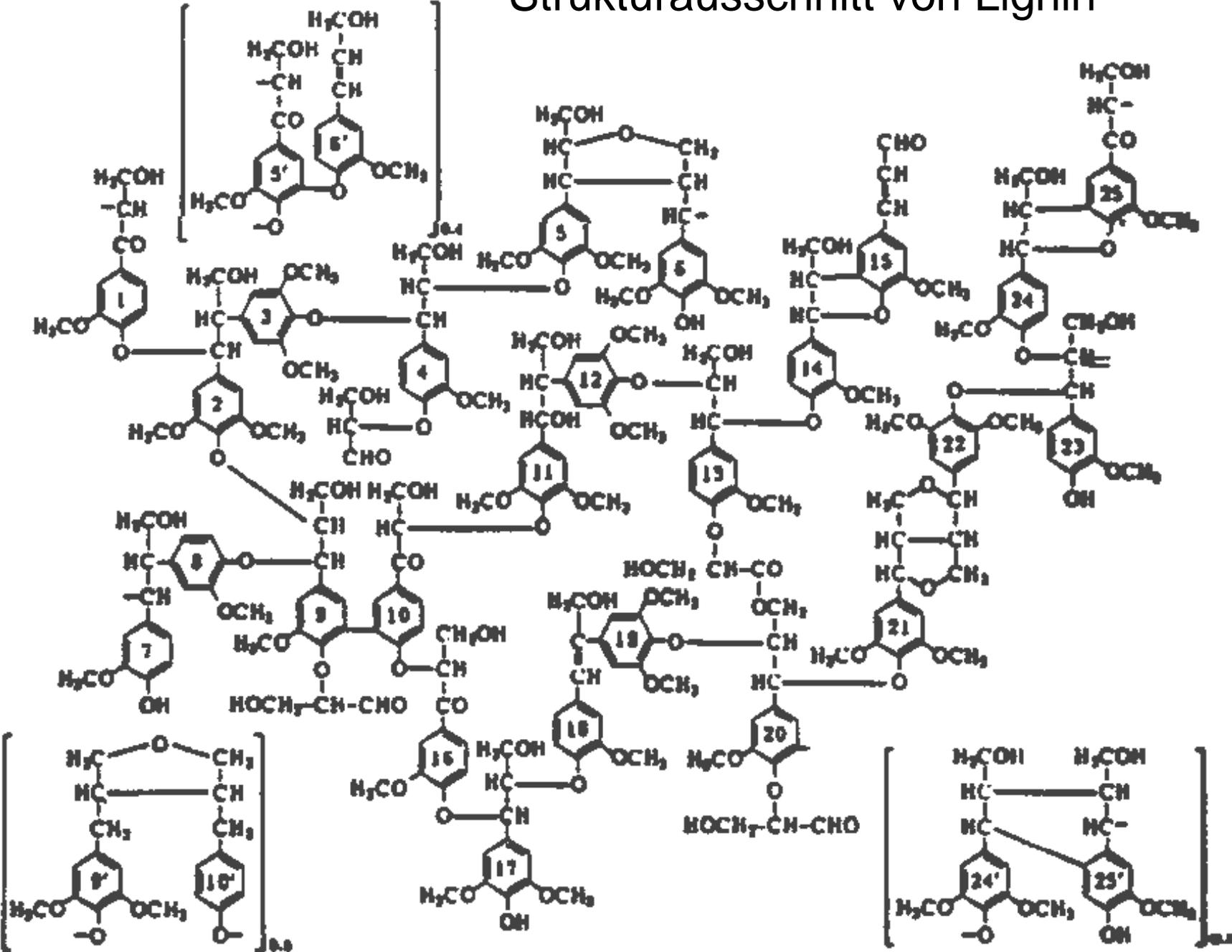


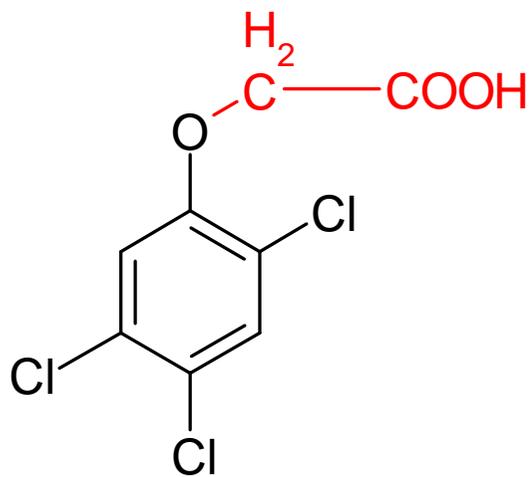
# Coniferylalkohol

## Mesomerie-stabilisierte Radikalbildung

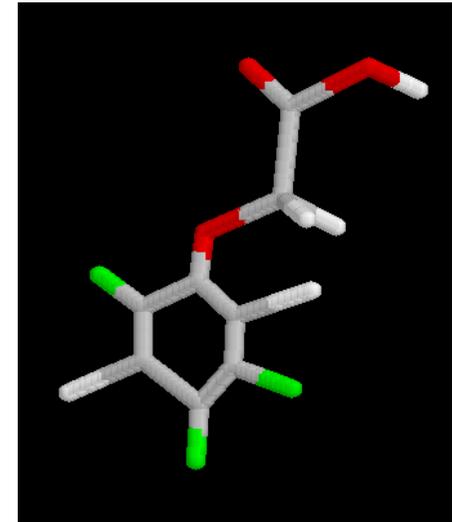


# Strukturausschnitt von Lignin

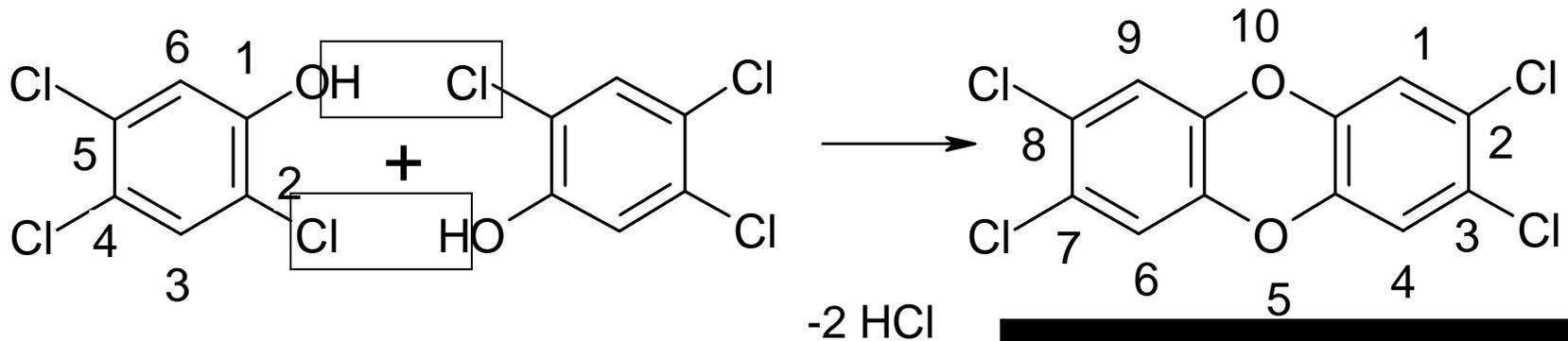




Herbizid  
2,4,5-T  
Trichlorphenoxyessigsäure

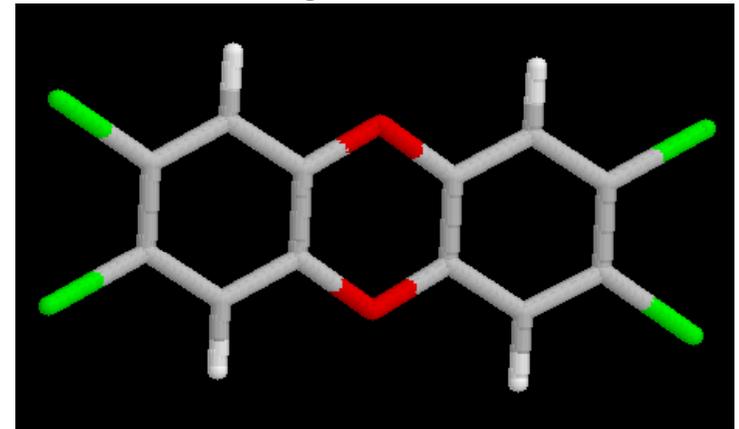


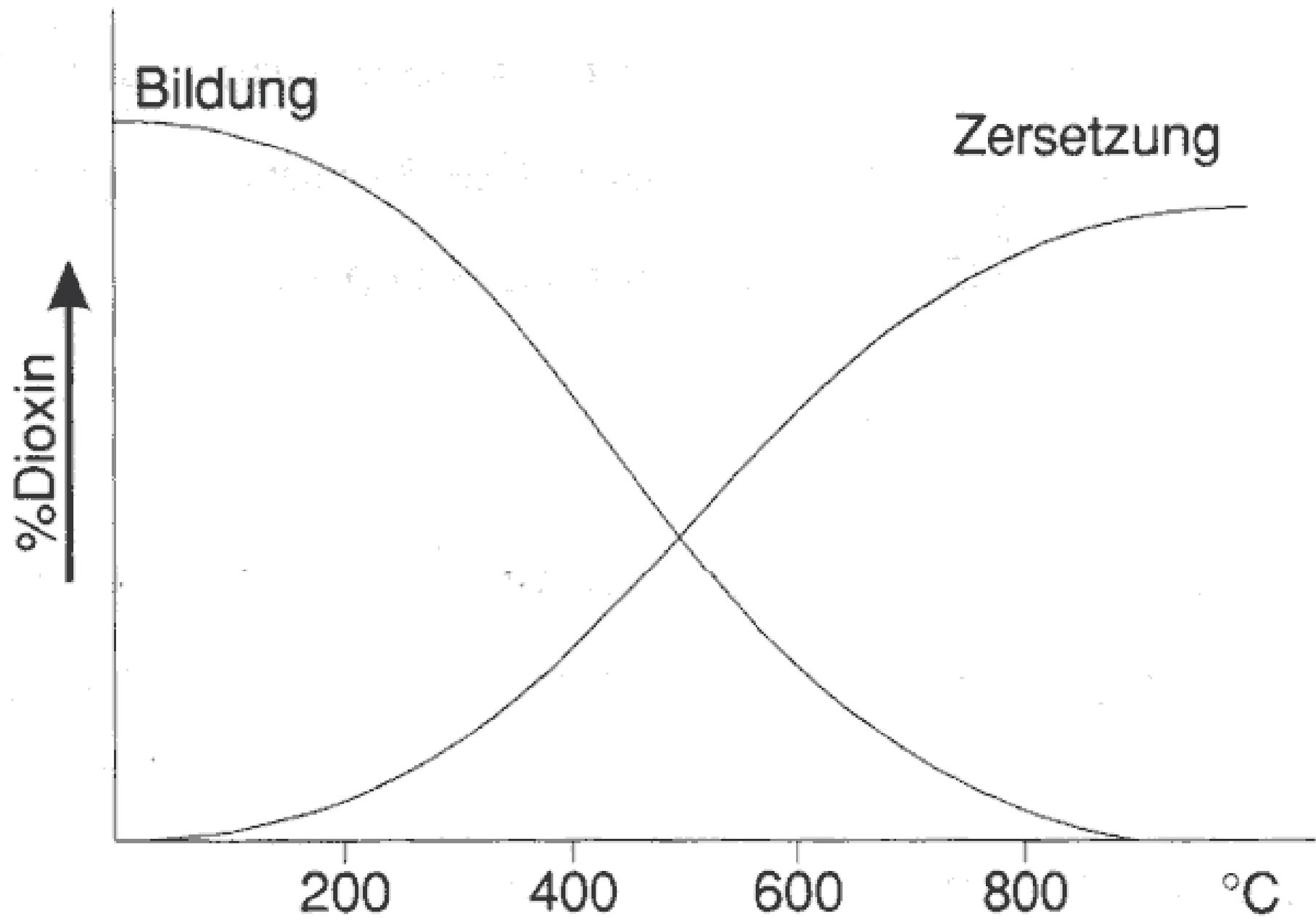
Dioxinbildung: 2,3,7,8-Tetrachlordi-*p*-benzodioxin (TCDD)



2,4,5-Trichlorphenol

LD<sub>50</sub>  
Maus: 0,6 µg/kg  
Hamster: 3mg/kg

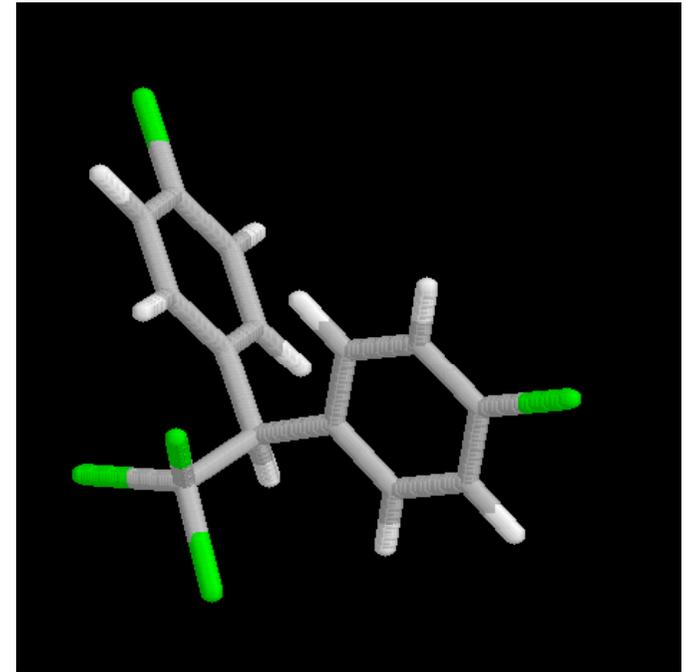
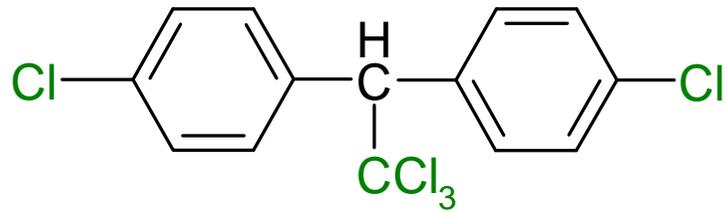




Insektizid

DDT

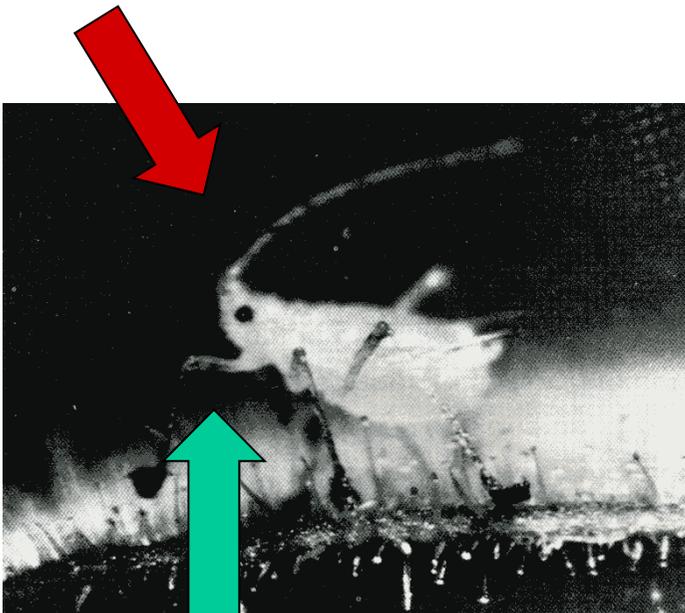
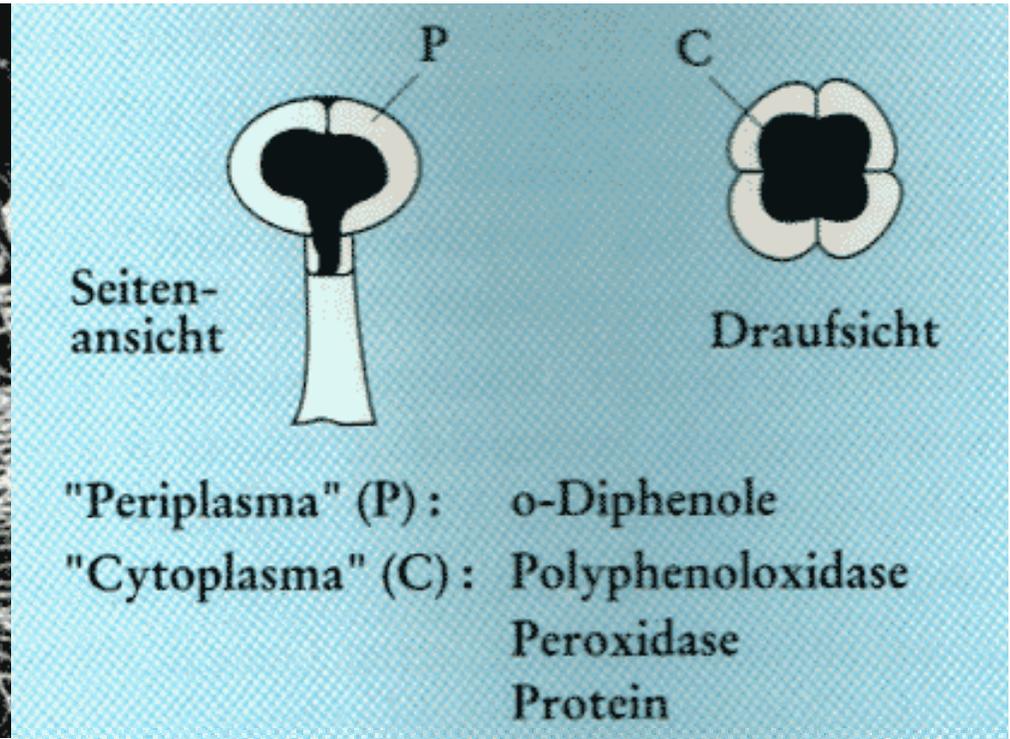
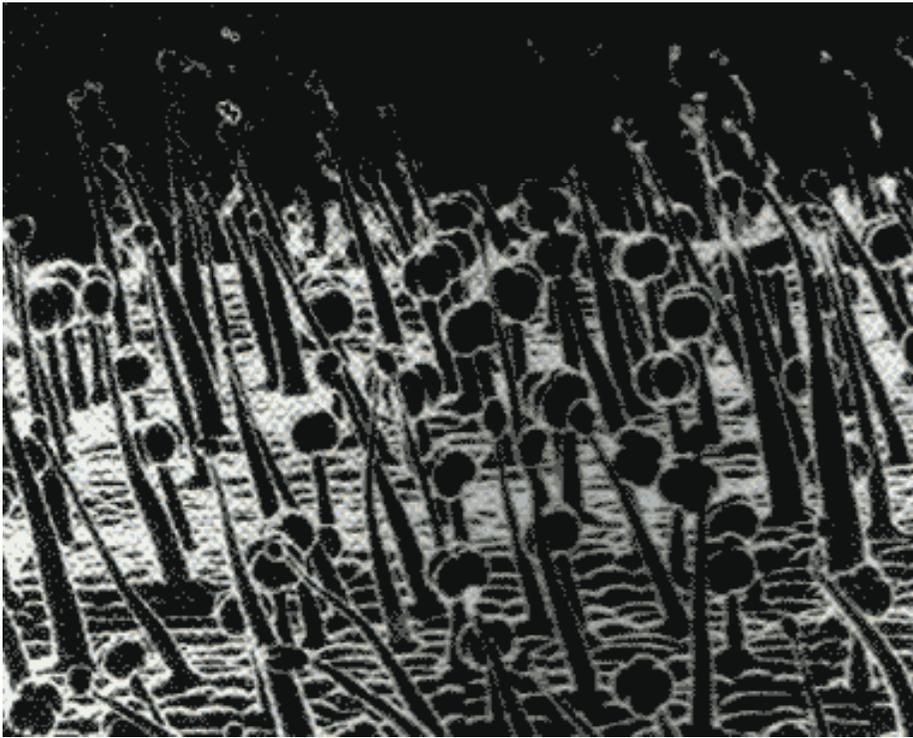
Dichlordiphenyltrichlorethan



Natürliche Abwehrstrategien:

Pheromone (Locksignale)





1. „Fixierung“ eines Insekts an der Blattoberfläche durch chemische Reaktion mit Chitin

2. Freisetzung eines Alarmpheromon

3. Freisetzung eines Lockpheromons einer Raubmilbe