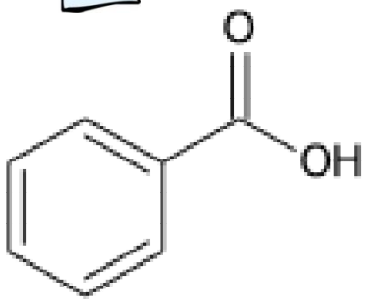
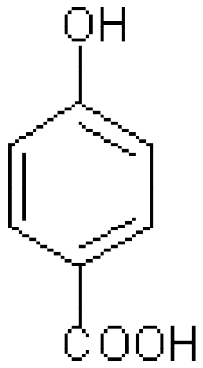
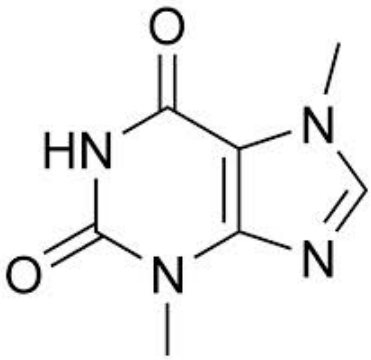


Acido Benzoico

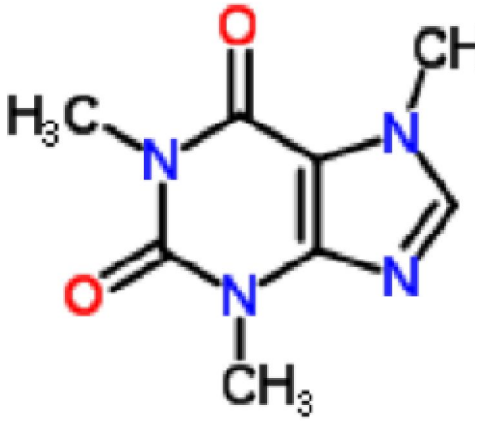


Acido p-idrossi benzoico

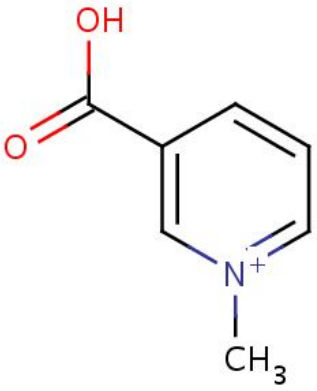
n-phenyl-nitrosamine



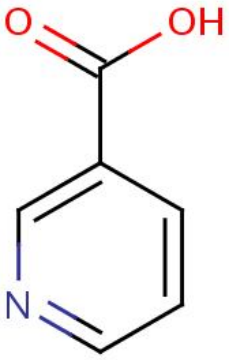
Teobromina



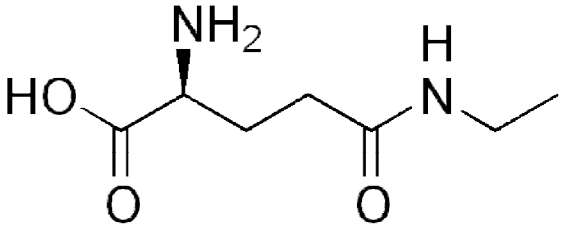
Caffeina



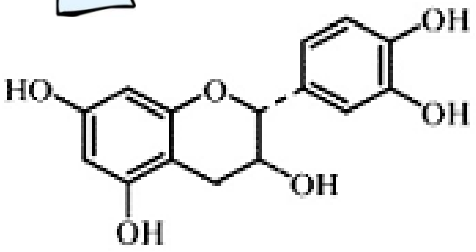
Trigonellina



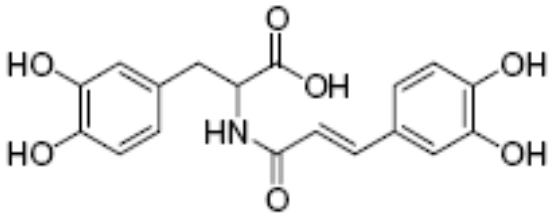
Acido Nicotinico



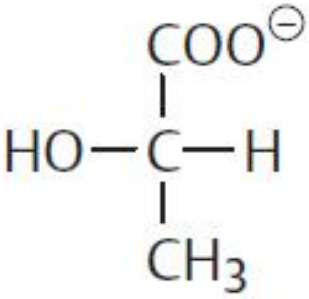
Teanina



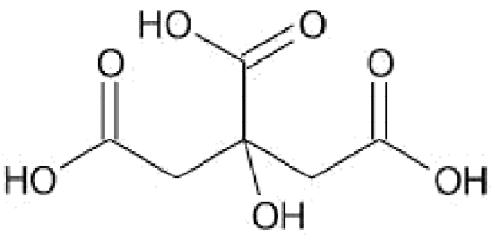
(-)-Epicatechin



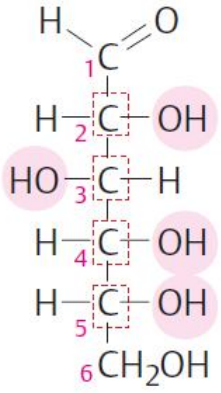
Clovamide



Acido lattico

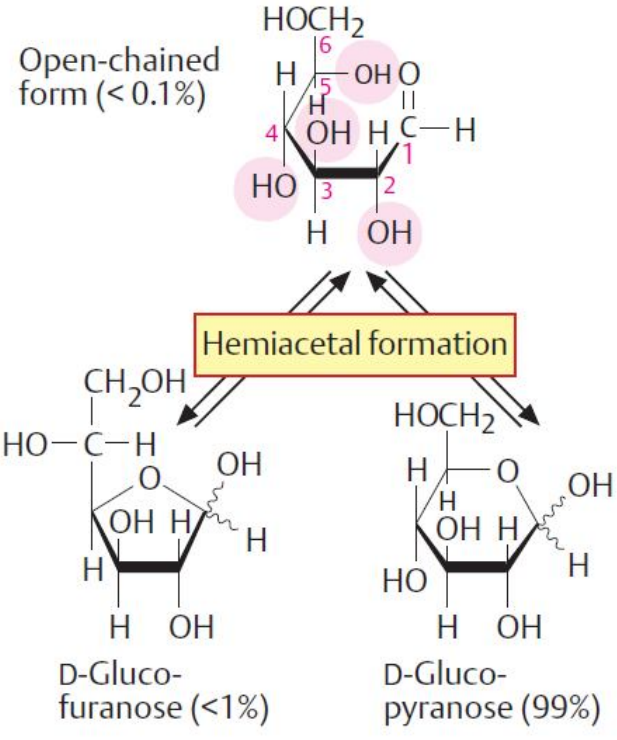


Acido citrico



Open-chained form of glucose

Chiral center

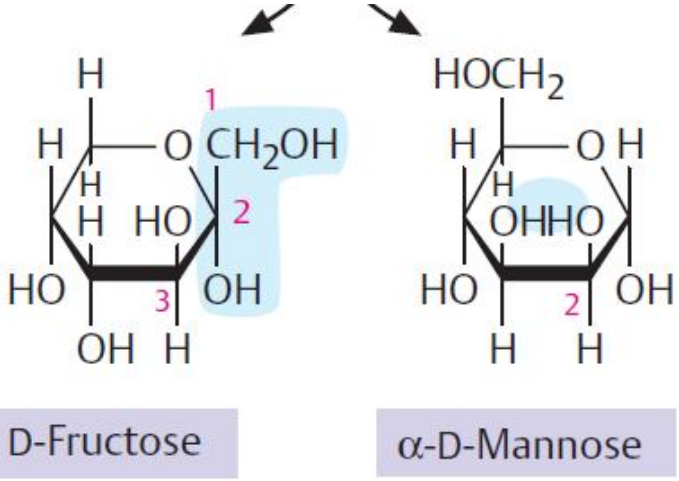


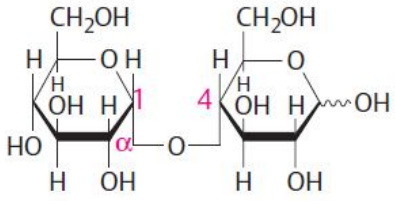
Open-chained form (< 0.1%)

Hemiacetal formation

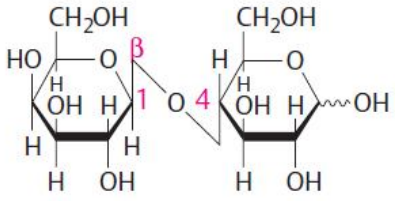
D-Gluco-furanose (<1%)

D-Gluco-pyranose (99%)

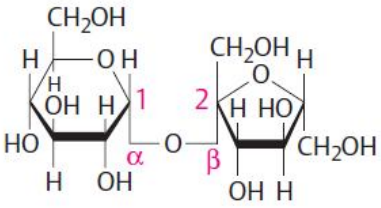




1. Maltose
α-D-Glucopyranosyl-
(1→4)-D-glucopyranose



2. Lactose
β-D-Galactopyranosyl-
(1→4)-D-glucopyranose

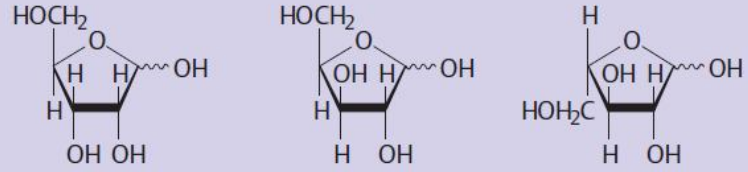


3. Sucrose
α-D-Glucopyranosyl-
(1↔2)-β-D-fructofuranoside

A. Important monosaccharides

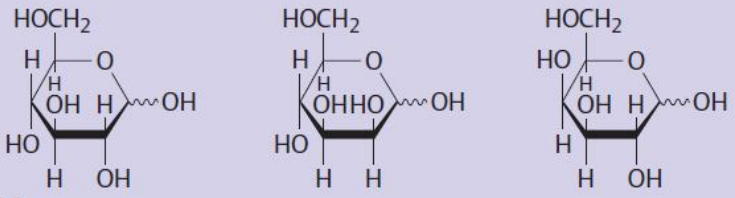
① Aldoses

D-Ribose (Rib) | D-Xylose (Xyl) | L-Arabinose (Ara)



Pentoses

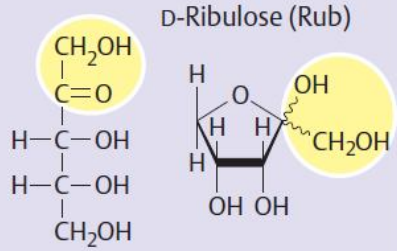
D-Glucose (Glc) | D-Mannose (Man) | D-Galactose (Gal)



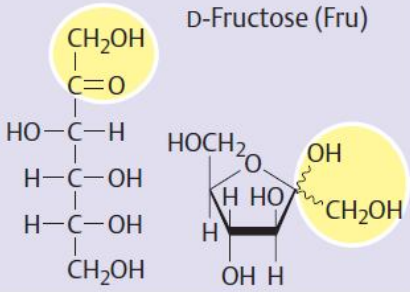
Hexoses

② Ketoses

D-Ribulose (Rub)

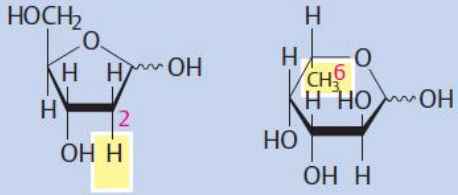


D-Fructose (Fru)



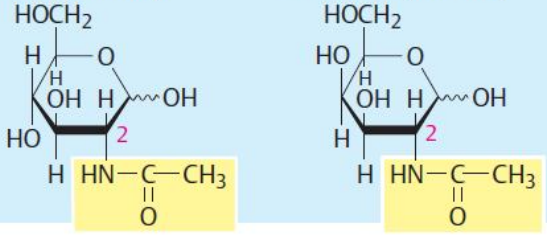
③ Deoxyaldoses

2-Deoxy-D-ribose (dRib) | L-Fucose (Fuc)



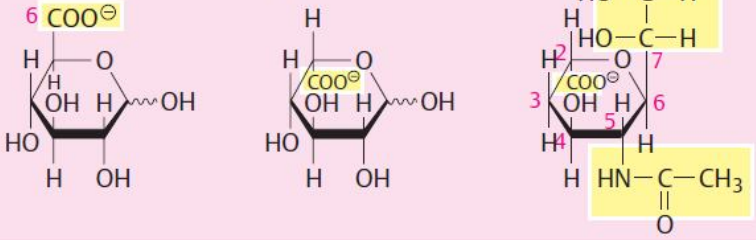
④ Acetylated amino sugars

N-Acetyl-D-glucosamine (GlcNAc) | *N*-Acetyl-D-galactosamine (GalNAc)



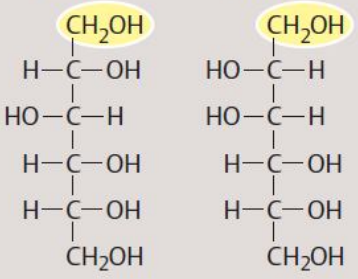
⑤ Acidic monosaccharides

D-Glucuronic acid (GlcUA) | L-Iduronic acid (IduUA) | *N*-Acetylneuraminic acid (NeuAc)



⑥ Sugar alcohols (alditoles)

D-Sorbitol | D-Mannitol



Formic acid	1 : 0	
Acetic acid	2 : 0	
Propionic acid	3 : 0	
Butyric acid	4 : 0	
Valerianic acid	5 : 0	
Caproic acid	6 : 0	
Caprylic acid	8 : 0	
Capric acid	10 : 0	
Lauric acid	12 : 0	
Myristic acid	14 : 0	
Palmitic acid	16 : 0	
Stearic acid	18 : 0	
Oleic acid	18 : 1;	9
Linoleic acid	18 : 2;	9,12
Linolenic acid	18 : 3;	9,12,15
Arachidic acid	20 : 0	
Arachidonic acid	20 : 4;	5,8,11,14
Behenic acid	22 : 0	
Erucic acid	22 : 1;	13
Lignoceric acid	24 : 0	
Nervonic acid	24 : 1;	15

Aliphatic					Sulfur-containing	
Glycine (Gly, G)	Alanine (Ala, A)	Valine (Val, V) ☆	Leucine (Leu, L) ☆	Isoleucine (Ile, I) ☆	Cysteine (Cys, C)	Methionine (Met, M) ☆
H	CH_3	$H_3C-CH(CH_3)$	$CH_2CH(CH_3)CH_3$	$H_3C-C(H)(CH_2CH_3)$	CH_2SH	$CH_2CH_2SCH_3$
Polarity					8.3 (pK_a value)	
−2.4	−1.9	−2.0	−2.3	−2.2	−1.2	−1.5

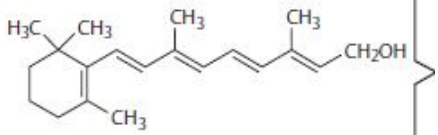
Aromatic			Cyclic	Neutral	
Phenylalanine (Phe, F) ☆	Tyrosine (Tyr, Y)	Tryptophan (Trp, W) ☆	Proline (Pro, P)	Serine (Ser, S)	Threonine (Thr, T) ☆
CH_2-phenyl	CH_2-phenyl-OH	CH_2-indole	Pyrrolidine ring	CH_2OH	$H_3C-C(H)(OH)$
	10.1	Indole ring			
+0.8	+6.1	+5.9	+6.0	+5.1	+4.9

☆ Essential amino acids □ Chiral center

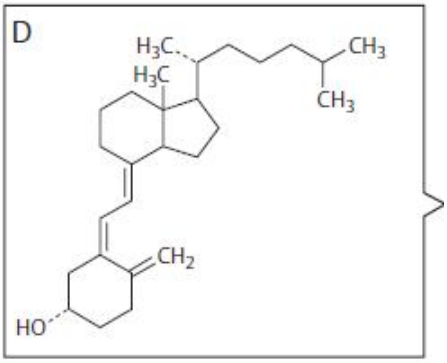
Neutral		Acidic		Basic		
Asparagine (Asn,N)	Glutamine (Gln, Q)	Aspartic acid (Asp, D)	Glutamic acid (Glu, E)	Histidine (His, H)	Lysine (Lys,K) ☆	Arginine (Arg, R)
CH_2CONH_2	$CH_2CH_2CONH_2$	CH_2COO^-	$CH_2CH_2COO^-$	CH_2-imidazole	$CH_2CH_2CH_2CH_2NH_3^+$	$CH_2CH_2CH_2NH$-C(=NH_2^+)-NH_2
		4.0	4.3	6.0 (Imidazole ring)	10.8	12.5
+9.7	+9.4	+11.0	+10.2	+10.3	+15.0	+20.0

Vitamine

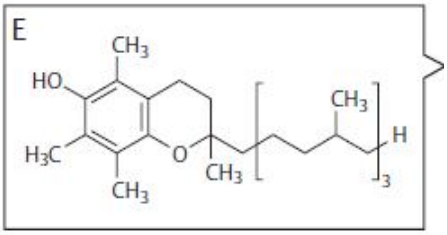
A



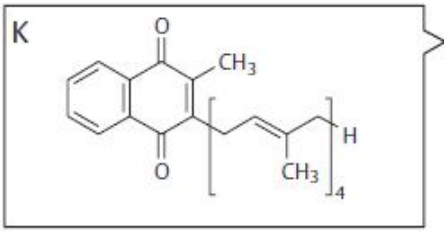
D



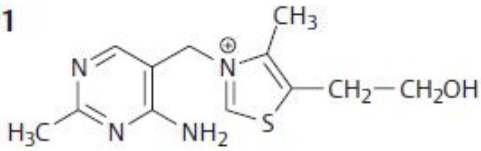
E



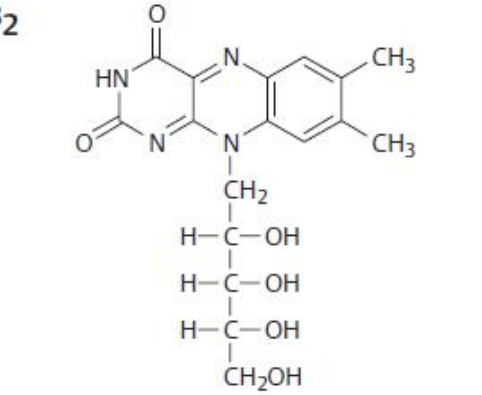
K

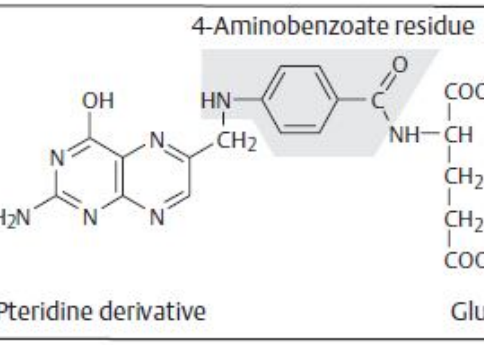


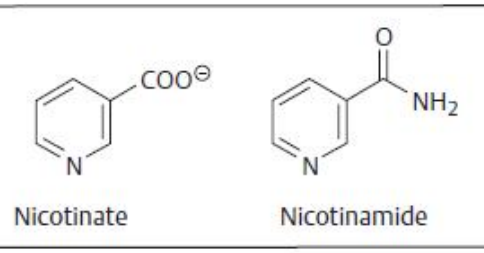
B_1

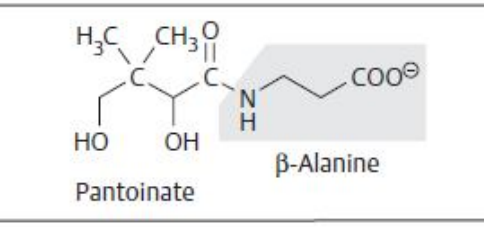


B_2





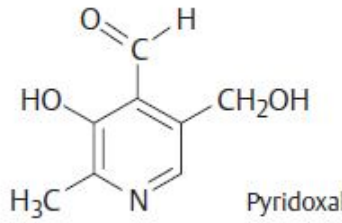




* Adult daily requirement

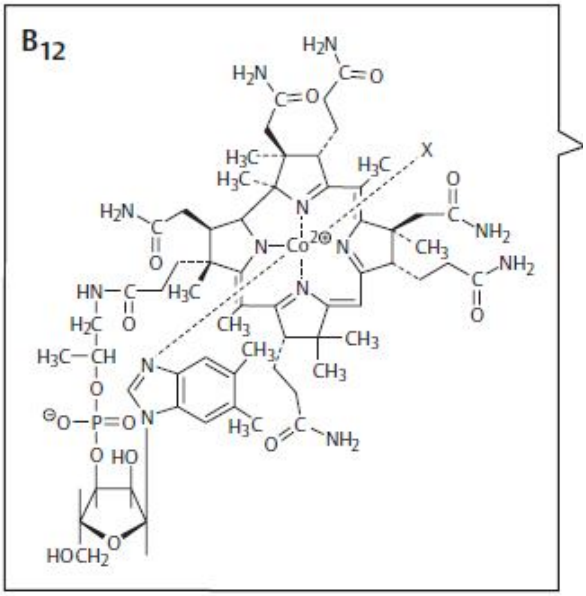
Vitamine

B_6

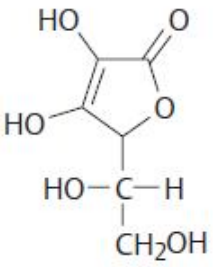


Pyridoxal

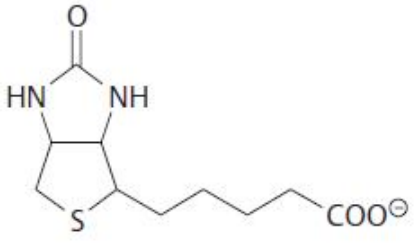
B_{12}



C

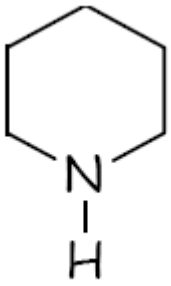


H



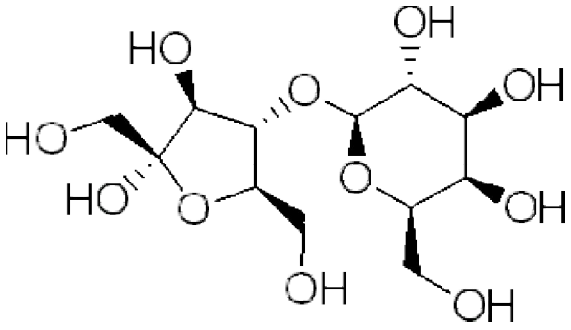
$(CH_3)_3NO \Rightarrow (CH_3)_3N$

Trimetil ammina N-ossido



Piperidina

Lattulosio
4-O-β-D-Galactopyranosyl-D-fructose



Start: Formation of peroxy ($RO_2^{\bullet}$), alkoxy ($RO^{\bullet}$) or alkyl ($R^{\bullet}$) radicals

Chain propagation:

(1) $R^{\bullet} + O_2 \longrightarrow RO_2^{\bullet}$ k_1: 10^9 l mol^{-1} s^{-1}

(2) $RO_2^{\bullet} + RH \longrightarrow ROOH + R^{\bullet}$ k_2: 10–60 l mol^{-1} s^{-1}

(3) $RO^{\bullet} + RH \longrightarrow ROH + R^{\bullet}$

Chain branching:

(4) $ROOH \longrightarrow RO^{\bullet} + {}^{\bullet}OH$

(5) $2\,ROOH \longrightarrow RO_2^{\bullet} + RO^{\bullet} + H_2O$

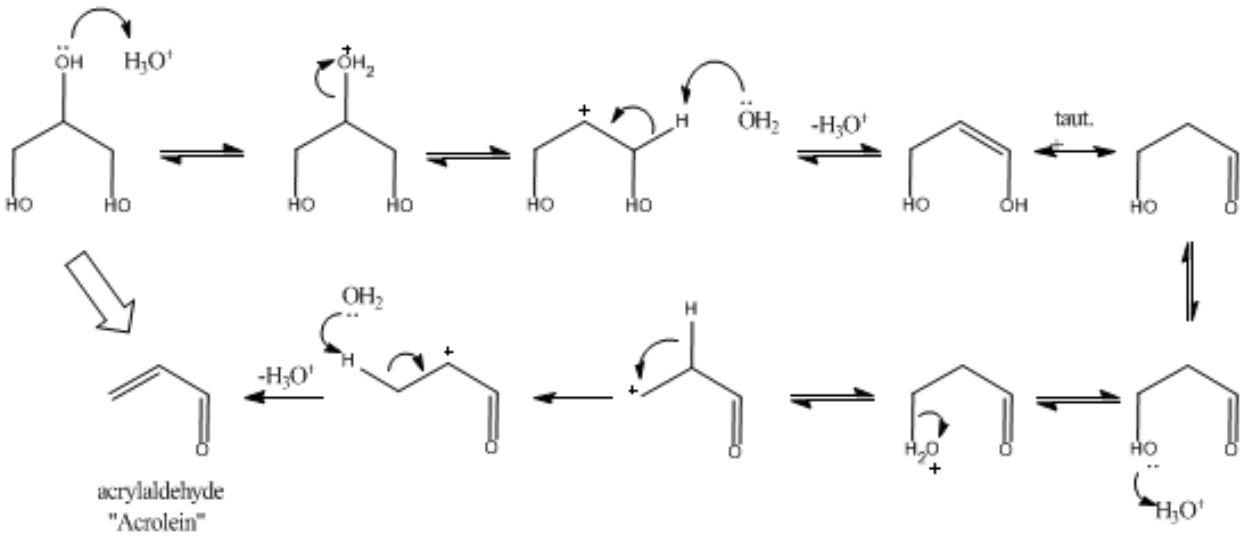
Chain termination:

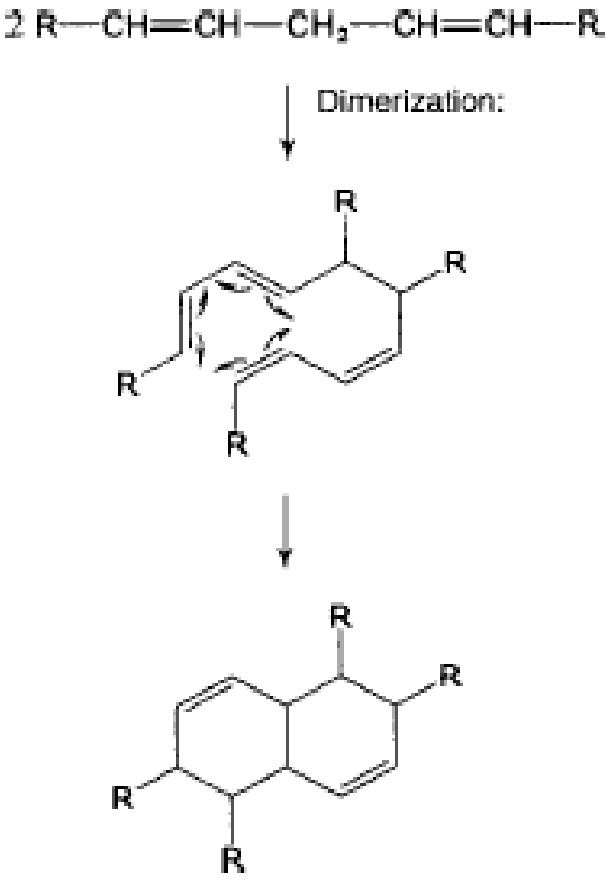
(6) $2\,R^{\bullet} \longrightarrow$

(7) $R^{\bullet} + RO_2^{\bullet} \longrightarrow$ } Stable products

(8) $2\,RO_2^{\bullet} \longrightarrow$

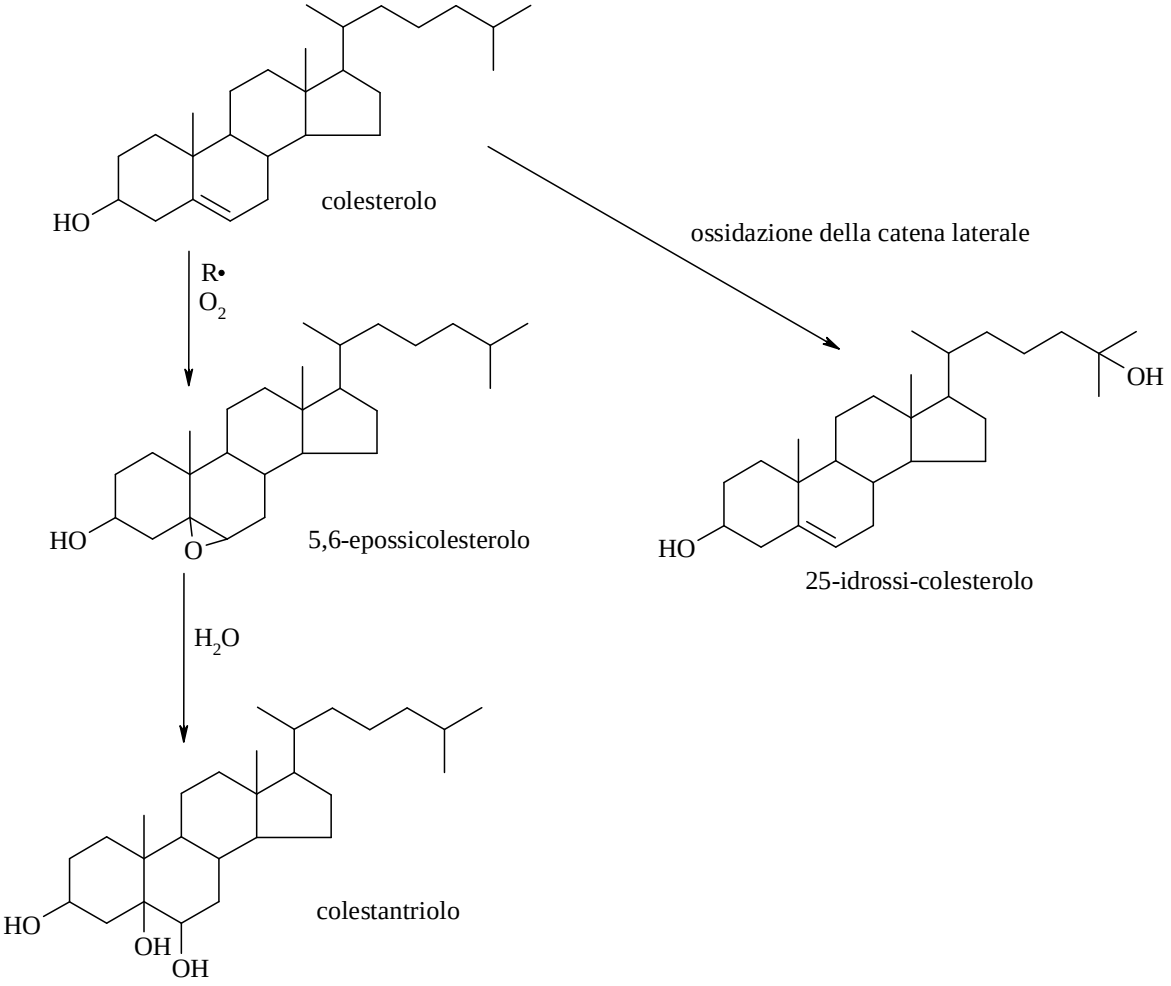
Formazione acroleina

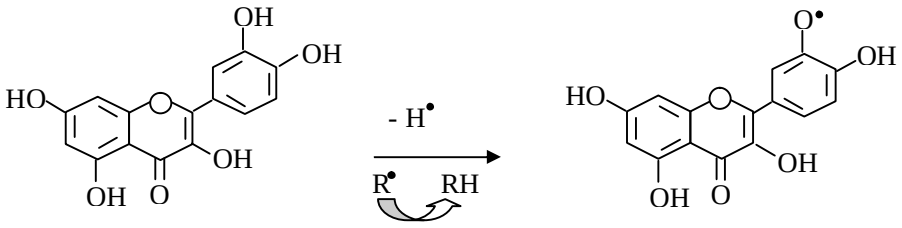




Dimerizzazione acidi grassi polinsaturi

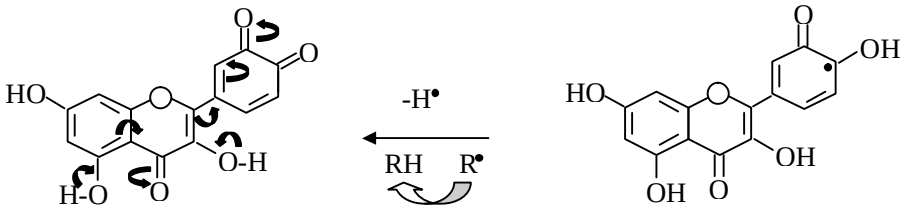
Derivati ossidati del colesterolo



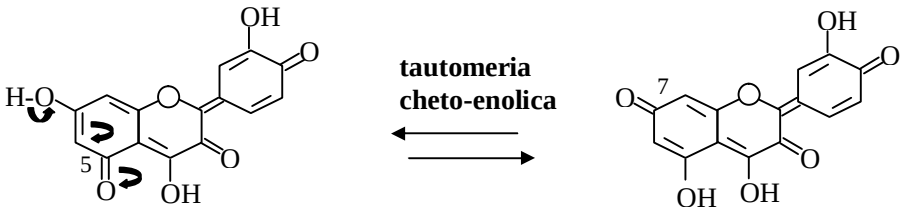


quercetina **radicale fenossile**

stabilizzazione per risonanza

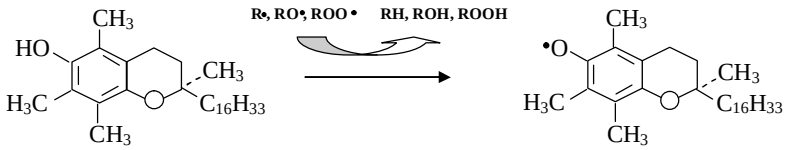


o-chinone

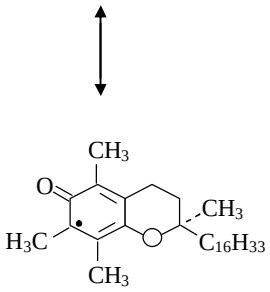


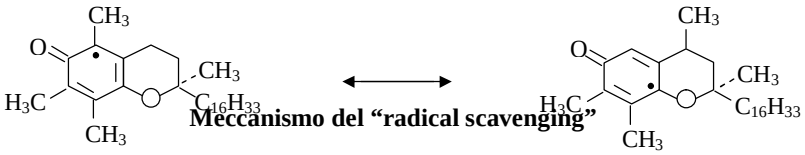
quercetin-5-chinone metide **quercetin-7-chinone metide**

Risonanza del radicale α-tocoferoxile nel trasferimento dell'idrogeno fenolico

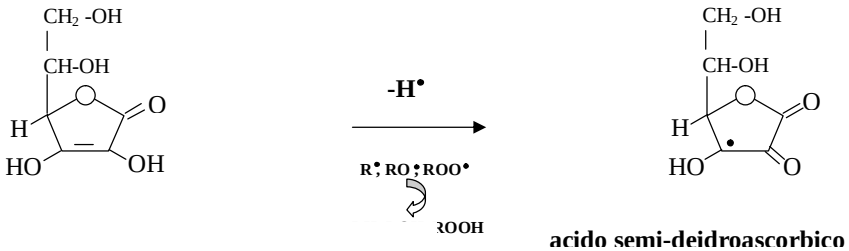


radicale α-tocoferoxile

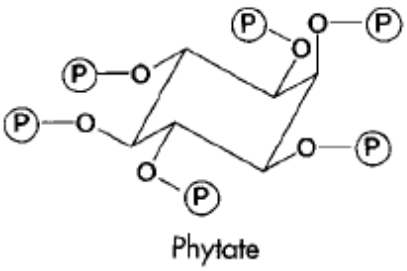


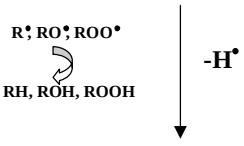


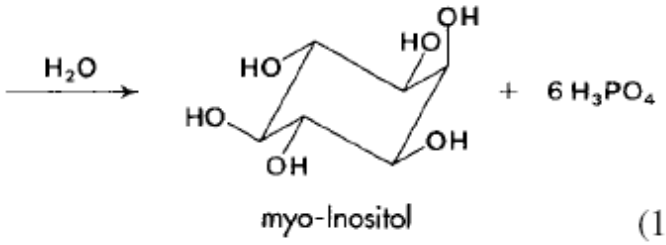
Meccanismo del "radical scavenging"



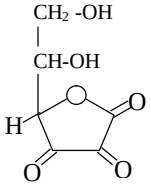
acido semi-deidroascorbico



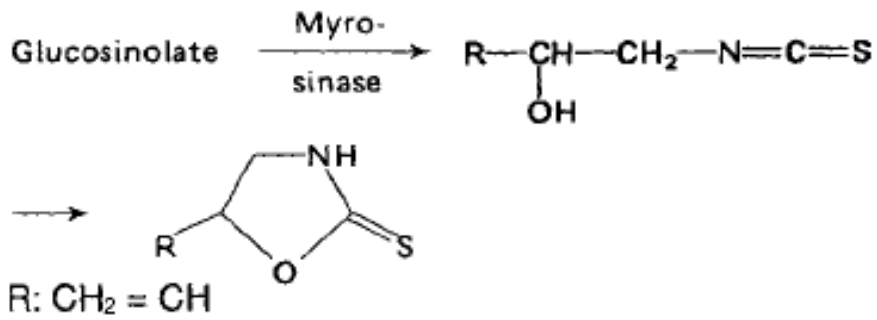


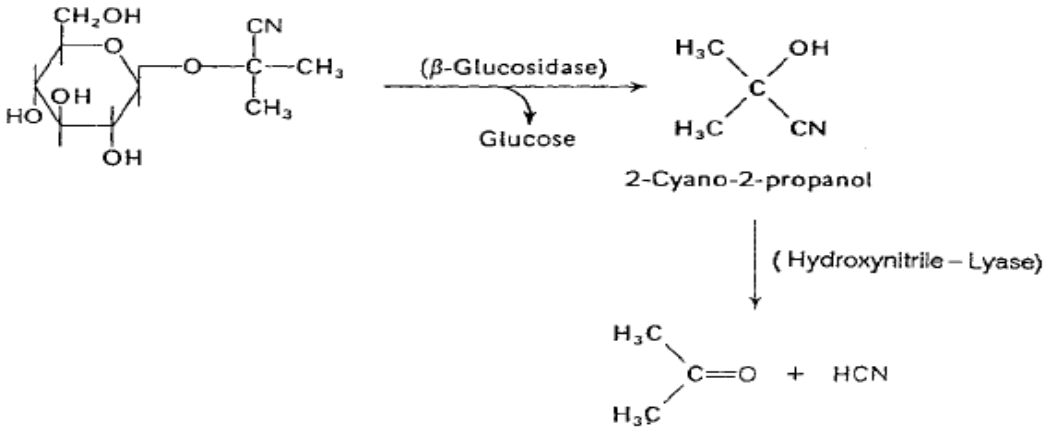


(15.1)

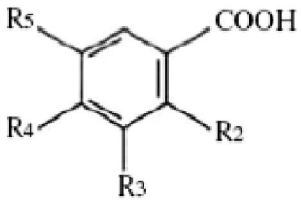


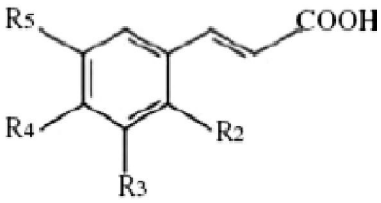
acido deidroascorbico





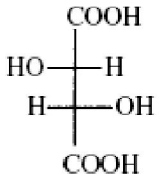
Lima beans: linamarin degradation, resulting in a release of hydrocyanic acid



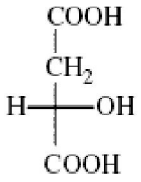


(1) Benzoic acids	R2	R3	R4	R5	(2) Cinnamic acids
p-Hydroxybenzoic acid	H	H	OH	H	*p*-Coumaric acid
Protocatechic acid	H	OH	OH	H	Caffeic acid
Vanillic acid	H	OCH_3	OH	H	Ferulic acid
Gallic acid	H	OH	OH	OH	
Syringic acid	H	OCH_3	OH	OCH_3	Sinapic acid
Salicylic acid	OH	H	H	H	
Gentisic acid	OH	H	H	OH	

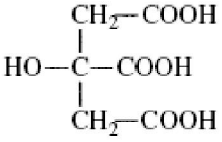
Table 1.1. The main organic acids in grapes



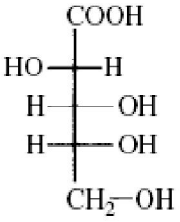
L(+)-Tartaric acid



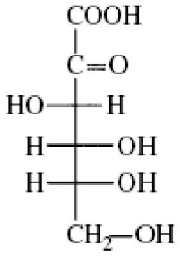
L(−)-Malic acid



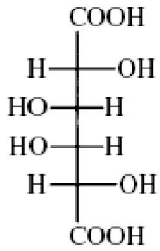
Citric acid



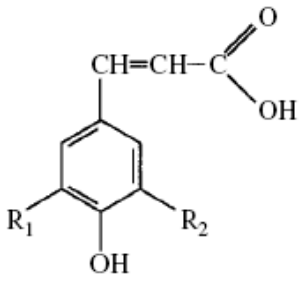
D-Gluconic acid



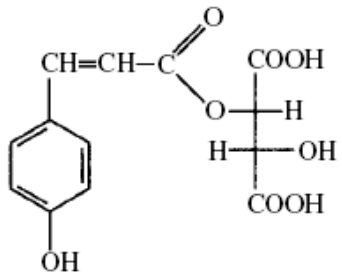
2-keto D-Gluconic acid



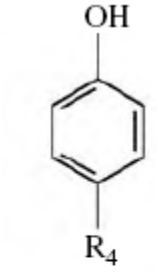
Mucic acid



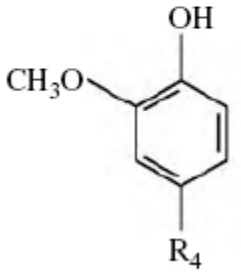
Coumaric acid
($R_1 = R_2 = H$)
Caffeic acid
($R_1 = OH$; $R_2 = H$)



Coumaryl tartaric acid



R_4	Name	Origin
$CH_2 - CH_3$	Ethyl phenol	Red wine
$CH = CH_2$	Vinyl phenol	White wine



R_4	Name	Origin
H	Gaiacol	Wood
CH_3	Methyl gaiacol	Wood
$CH_2 - CH_3$	Ethyl gaiacol	Red wine
$CH = CH_2$	Vinyl gaiacol	White wine
$CH_2 - CH_2 - CH_3$	Propyl gaiacol	Wood
$CH = CH - CH_3$	Allyl gaiacol	Wood

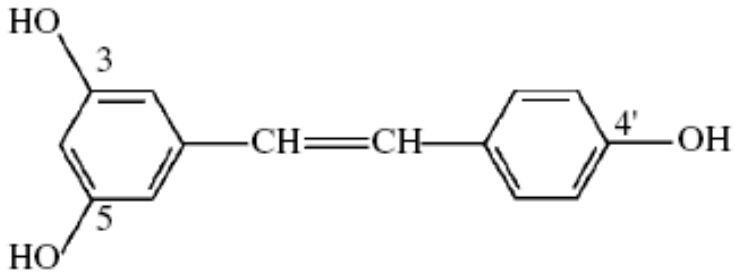
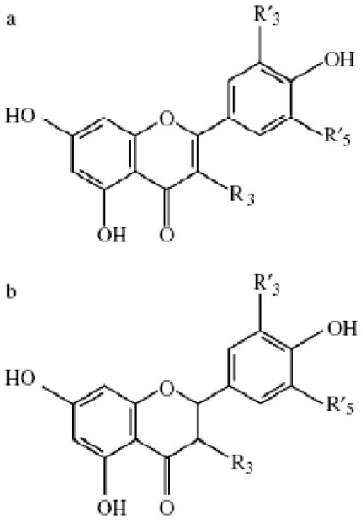


Fig. 6.6. Trihydroxy-3.5,4′-stilben (resveratrol)

flavonoidi



a) R_3 = OH

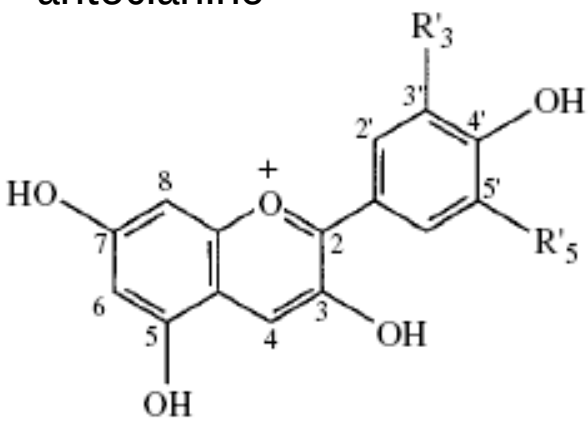
R'_3	R'_5	Name of aglycone
H	H	Kaempferol
OH	H	Quercetin
OH	OH	Myricetin

b) R_3 = OH

R'_3	R'_5	Name of aglycone
OH	H	Dihydroquercetin (taxifolin)

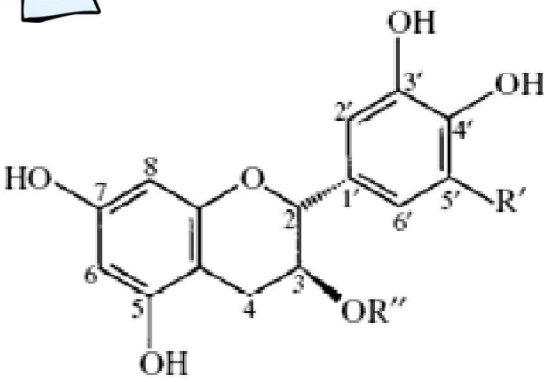
Flavonoids: a, flavone (R_3 = H) and flavonol (R_3 = OH); b, flavanone (R_3 = H) and flavanonol (R_3 = OH)

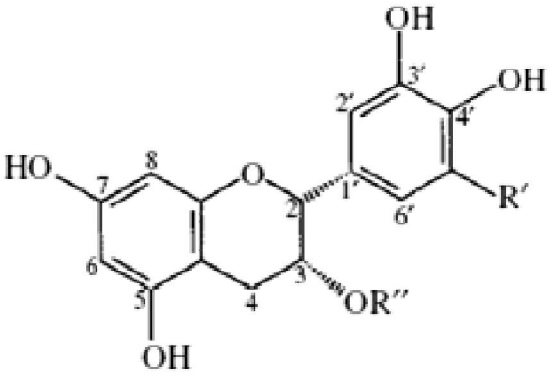
antocianine



R'_3	R'_5	Name of aglycone
OH	H	Cyanidin
OCH_3	H	Peonidin
OH	OH	Delphinidin
OH	OCH_3	Petunidin
OCH_3	OCH_3	Malvidin

flavanoli





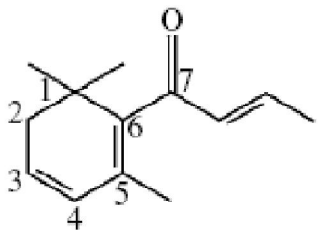
Catechin Series

R′ = H, R″ = H: (+)-catechin (2R, 3S)
R′ = H, R″ = H: (–)-catechin (2S, 3R)
R′ = OH, R″ = H: gallocatochin
R′ = H, R″ = gallic acid: galloyl catechin (catechin-3-0-gallate)

Epicatechin Series

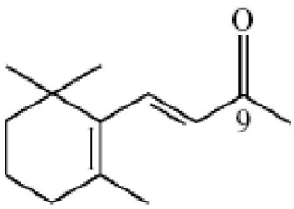
R′ = H, R″ = H: (+)-epicatechin (2S, 3S)
R′ = H, R″ = H: (–)-epicatechin (2R, 3R)
R′ = OH, R″ = H: epigallocatechin
R′ = H, R″ = gallic acid: galloyl epicatechin (epicatechin-3-0-gallate)

norisoprenoidi



E.g. β-damascenone

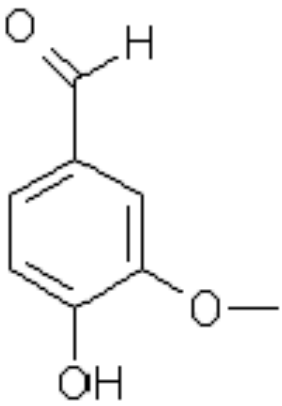
Damascone series



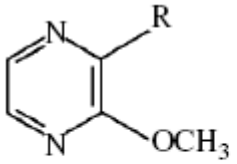
E.g. β-ionone

Ionone series

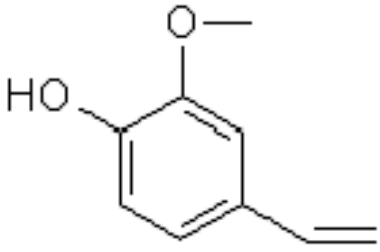
Vanillina



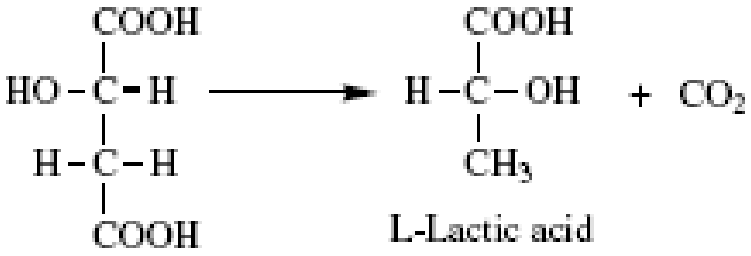
metossi pirazine



R: $CH_2CH(CH_3)_2$ — 2-Methoxy-3-isobutylpyrazine
R: $CH(CH_3)_2$ — 2-Methoxy-3-isopropylpyrazine
R: $CH(CH_3)CH_2CH_3$ — 2-Methoxy-3-*sec*-butylpyrazine



4-Vinyl guaiacolo



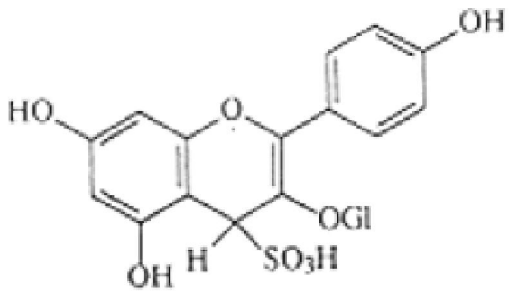


FIGURE 26
Colorless anthocyanin-sulfate
(-SO_2) complex.