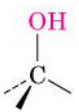
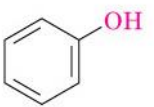
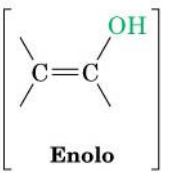


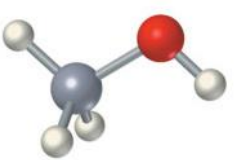
Alcol



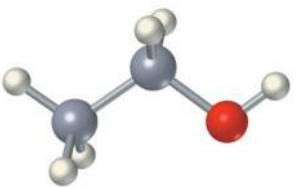
Fenolo

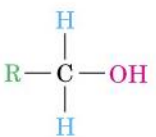


Enolo

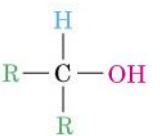


$$H_2C{=}CH_2 + H_2O \xrightarrow[250^\circ C]{H_3PO_4} CH_3CH_2OH$$

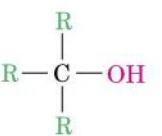




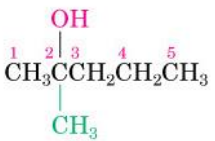
Alcol primario (1°)



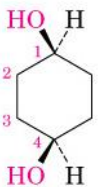
Alcol secondario (2°)



Alcol terziario (3°)

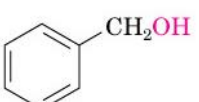


2-Metil-2-pentanolo



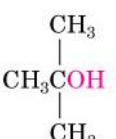
***cis*-1,4-Cicloesandiolo**

3-Fenil-2-butanolo



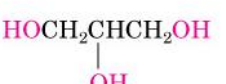
Alcol benzilico
(Fenil metanolo)

Alcol allilico
(2-Propen-1-olo)



Alcol *tert*-butilico
(2-Metil-2-propanolo)

Glicole etilenico
(1,2-Etandiolo)



Glicerolo
(1,2,3-Propantriolo)

FIGURA 17.1 Confronto dei punti di ebollizione di alcuni alcani, cloroalcani ed alcoli. Gli alcoli mostrano generalmente i punti di ebollizione più alti.

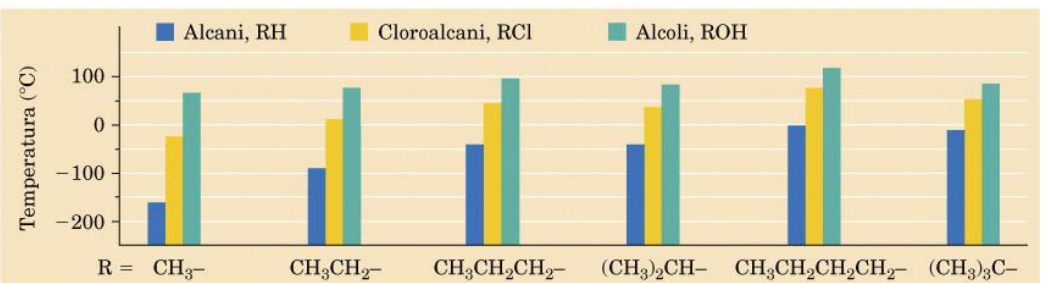
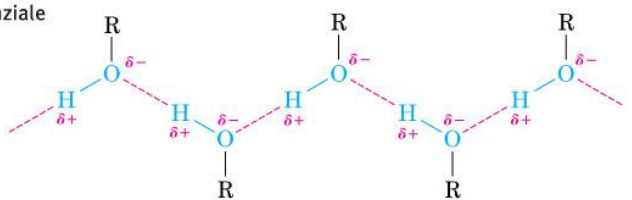


FIGURA 17.2 Il legame a idrogeno negli alcoli e nei fenoli. Le molecole sono tenute unite da una debole attrazione che si instaura tra un idrogeno polarizzato positivamente di un gruppo OH e l'ossigeno polarizzato negativamente di un altro gruppo OH.
La mappa di potenziale elettrostatico del metanolo mostra chiaramente l'idrogeno del legame O—H polarizzato positivamente (zona blu) e l'ossigeno polarizzato negativamente (zona rossa).



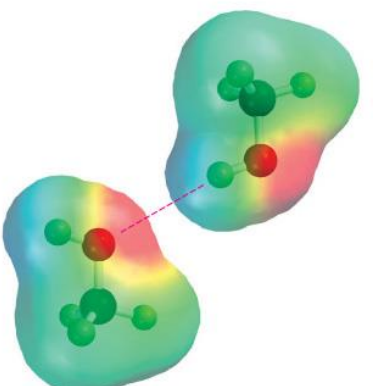


TABELLA 8.1 Punti di ebollizione e solubilità in acqua di cinque gruppi di alcani ed alcoli con pesi molecolari simili

Formula di struttura	Nome	Peso molecolare	p.e. (°C)	Solubilità in acqua
CH_3OH	Metanolo	32	65	Infinita
CH_3CH_3	Etano	30	-89	Insolubile
CH_3CH_2OH	Etanolo	46	78	Infinita
$CH_3CH_2CH_3$	Propano	44	-42	Insolubile
$CH_3CH_2CH_2OH$	1-Propanolo	60	97	Infinita
$CH_3CH_2CH_2CH_3$	Butano	58	0	Insolubile
$CH_3CH_2CH_2CH_2OH$	1-Butanolo	74	117	8 g/100 g
$CH_3CH_2CH_2CH_2CH_3$	Pentano	72	36	Insolubile
$HOCH_2CH_2CH_2CH_2OH$	1-Pentanolo	88	138	2.3 g/100

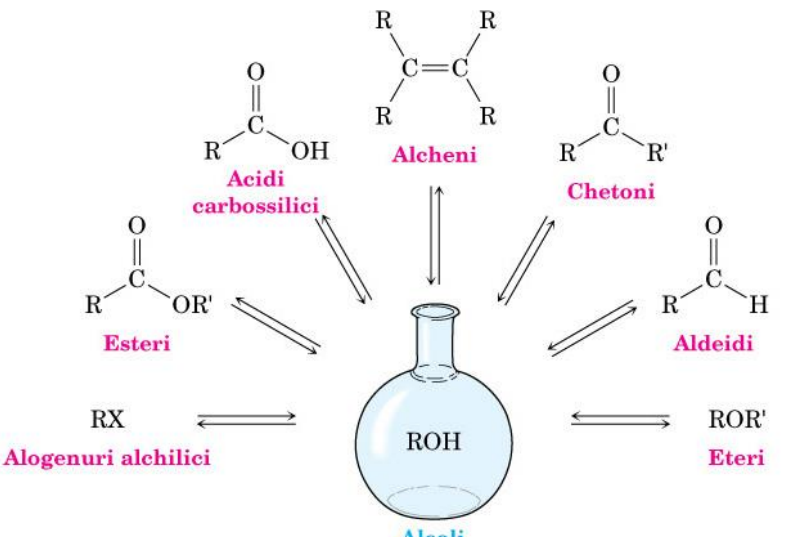
TABELLA 8.2 Punti di ebollizione e solubilità in acqua di alcuni eteri ed alcoli con pesi molecolari simili

Formula di struttura	Nome	Peso molecolare	p.e. (°C)	Solubilità in acqua
CH_3CH_2OH	Etanolo	46	78	infinita
CH_3OCH_3	Etere dimetilico	46	-24	7 g/100 g
$CH_3CH_2CH_2CH_2OH$	1-Butanolo	74	117	8 g/100 g
$CH_3CH_2OCH_2CH_3$	Etere dietilico	74	35	8 g/100 g
$CH_3CH_2CH_2CH_2CH_2OH$	1-Pentanolo	88	138	2.3 g/100 g
$HOCH_2CH_2CH_2CH_2OH$	1,4-Butandiolo	90	230	Infinita
$CH_3CH_2CH_2CH_2OCH_3$	Etere butilmetilico	88	71	Scarsa
$CH_3OCH_2CH_2OCH_3$				

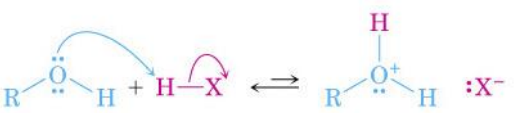
TABELLA 8.3 Punti di ebollizione di tre tioli ed alcoli con lo stesso numero di atomi di carbonio

Titolo	p.e. (°C)	Alcol	p.e. (°C)
Metantiolo	6	Metanolo	65
Etantiolo	35	Etanolo	78
1-Butantiolo	98	1-Butanolo	117

FIGURA 17.4 Il ruolo centrale degli alcoli nella chimica organica. Gli alcoli possono essere preparati da, e trasformati in molti composti organici.



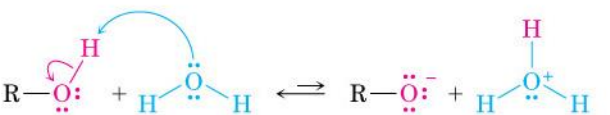
Gli alcoli come basi



Alcol **Ione ossonio**

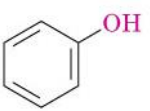
$$[o \quad ArOH + HX \rightleftharpoons Ar\overset{+}{O}H_2 \quad X^-]$$

Gli alcoli come acidi



I gruppi elettron-attrattori stabilizzano lo ione alcossido ed abbassano il pK_a

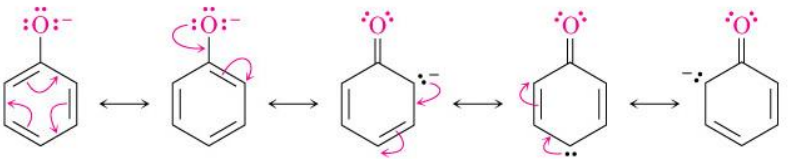
Fenolo

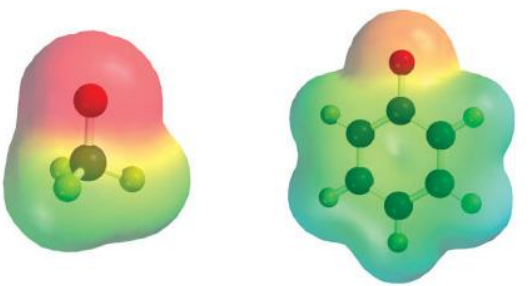


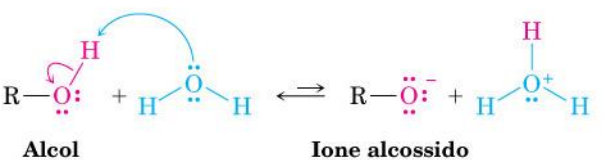
Fenolo: p.e. = 181.7°C

Acidità del fenolo

FIGURA 17.3 Lo ione fenossido, stabilizzato per risonanza, è più stabile di uno ione alcossido. Le mappe di potenziale elettrostatico mostrano come la carica negativa sia concentrata sull'ossigeno nello ione metossido, mentre sia delocalizzata sull'anello aromatico nel caso dello ione fenossido.







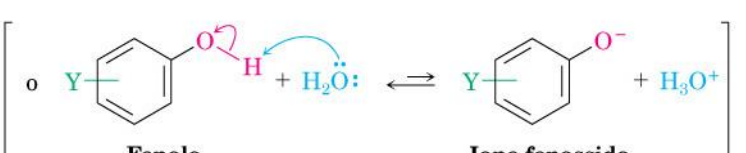
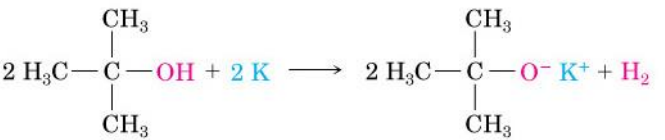


TABELLA 8.4 Valori di pK_a di alcuni alcoli in soluzione acquosa diluita*

Composto	Formula di struttura	pK_a	
Acido cloridrico	HCl	−7	Acido
Acido acetico	CH_3CO_2H	4.8	
Metanolo	CH_3OH	15.5	
Acqua	H_2O	15.7	
Etanolo	CH_3CH_2OH	15.9	
2-Propanolo	$(CH_3)_2CHOH$	17	
2-Metil-2-propanolo	$(CH_3)_3COH$	18	Acido

Formazione di alcossidi



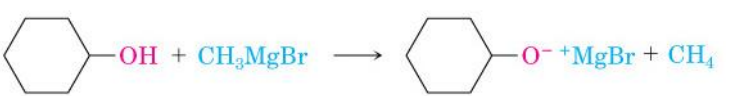
Alcol *tert*-butilico **Potassio *tert*-butossido**

$CH_3OH + NaH \longrightarrow CH_3O^- Na^+ + H_2$

Metanolo **Sodio metossido**

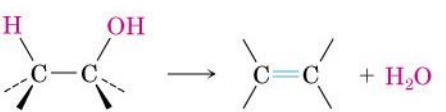
$CH_3CH_2OH + NaNH_2 \longrightarrow CH_3CH_2O^- Na^+ + NH_3$

Etanolo **Sodio etossido**



Cicloesanolo **Bromomagnesio cicloesossido**

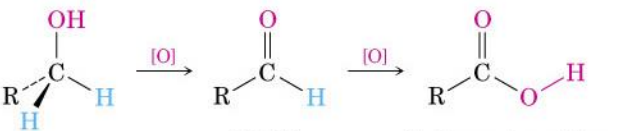
Reazione di disidratazione



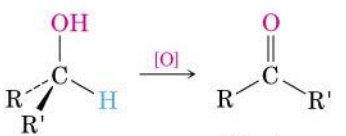

JOHN MCMURRY
CHIMICA ORGANICA
PICCIN


Ossidazione
OH
C
H
O
C
Riduzione
Alcol
Composto carbonilico

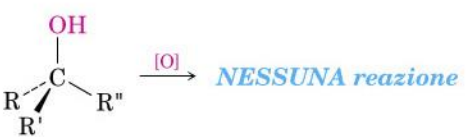
Alcol primario

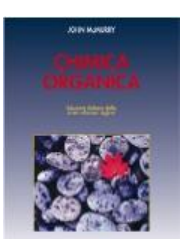


Alcol secondario

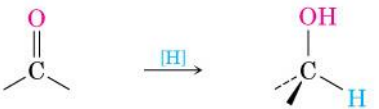


Alcol terziario



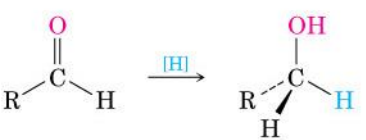


Dal volume: McMurry “Chimica organica”

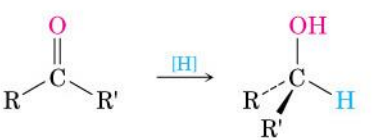


dove [H] indica un generico agente riducente

Composto carbonilico **Alcol**

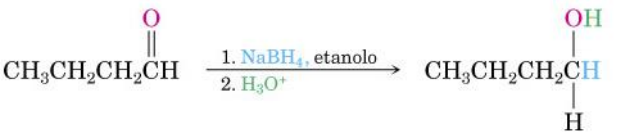


Aldeide **Alcol primario**



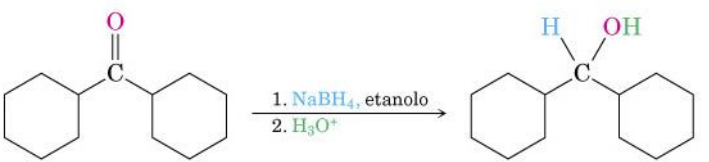
Chetone **Alcol secondario**

Riduzione di una aldeide



Butanale — **1-Butanolo (85%) (alcol 1°)**

Riduzione di un chetone



Dicicloesilchetone — **Dicicloesilmetanolo (88%) (alcol 2°)**

Dal volume: McMurry “Chimica organica”

Piccin Nuova Libraria S.p.A.

2. Reazioni degli alcoli

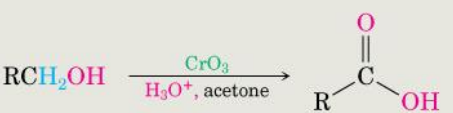
(a) Acidità (Paragrafo 17.3)

$$\mathrm{ROH} + \mathrm{NaH} \longrightarrow \mathrm{RO^-\,Na^+} + \mathbf{H_2}$$
$$2\,\mathrm{ROH} + 2\,\mathrm{Na} \longrightarrow 2\,\mathrm{RO^-\,Na^+} + \mathbf{H_2}$$

(c) Ossidazione (Paragrafo 17.8)

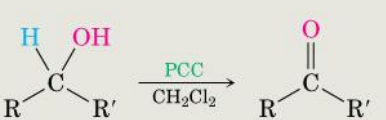
(1) Alcoli primari

Aldeide



Acido carbossilico

(2) Alcoli secondari



Chetone