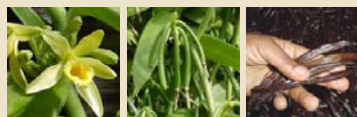
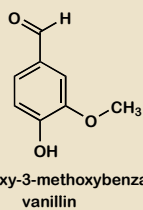
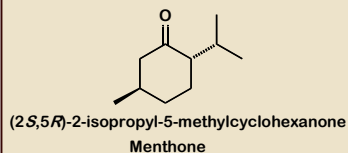


## Aldehydes and Ketones

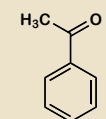


Vanilla beans

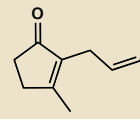


Peppermint

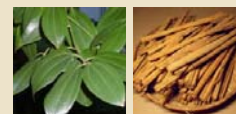
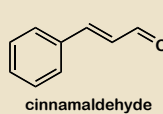
<http://www.bojensen.net/>



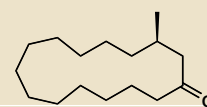
Red Clover



Jasmine



Cinnamon



Musk Deer

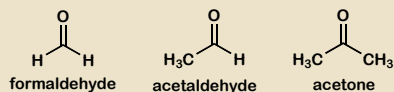
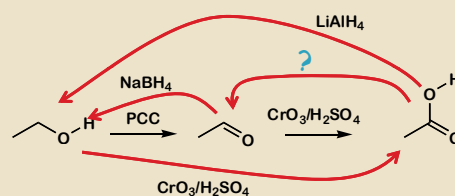


TABLE 16.1 Physical Properties of Aldehydes and Ketones

Formula	Name	mp (°C)	bp (°C)	Solubility in Water
HCHO	Formaldehyde	-92	-21	Very soluble
CH <sub>3</sub> CHO	Acetaldehyde	-125	21	∞
CH <sub>3</sub> CH <sub>2</sub> CHO	Propanal	-81	49	Very soluble
CH <sub>3</sub> (CH <sub>2</sub> ) <sub>2</sub> CHO	Butanal	-99	76	Soluble
CH <sub>3</sub> (CH <sub>2</sub> ) <sub>3</sub> CHO	Pentanal	-91.5	102	Slightly soluble
CH <sub>3</sub> (CH <sub>2</sub> ) <sub>4</sub> CHO	Hexanal	-51	131	Slightly soluble
C <sub>6</sub> H <sub>5</sub> CHO	Benzaldehyde	-26	178	Slightly soluble
C <sub>6</sub> H <sub>5</sub> CH <sub>2</sub> CHO	Phenylacetaldehyde	33	193	Slightly soluble
CH <sub>3</sub> COCH <sub>3</sub>	Acetone	-95	56.1	∞
CH <sub>3</sub> COCH <sub>2</sub> CH <sub>3</sub>	Butanone	-86	79.6	Very soluble
CH <sub>3</sub> COCH <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub>	2-Pentanone	-78	102	Soluble
CH <sub>3</sub> CH <sub>2</sub> COCH <sub>2</sub> CH <sub>3</sub>	3-Pentanone	-39	102	Soluble
C <sub>6</sub> H <sub>5</sub> COCH <sub>3</sub>	Acetophenone	21	202	Insoluble
C <sub>6</sub> H <sub>5</sub> COC <sub>6</sub> H <sub>5</sub>	Benzophenone	48	306	Insoluble

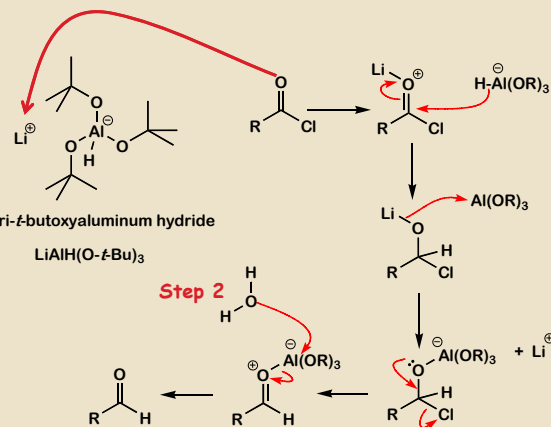
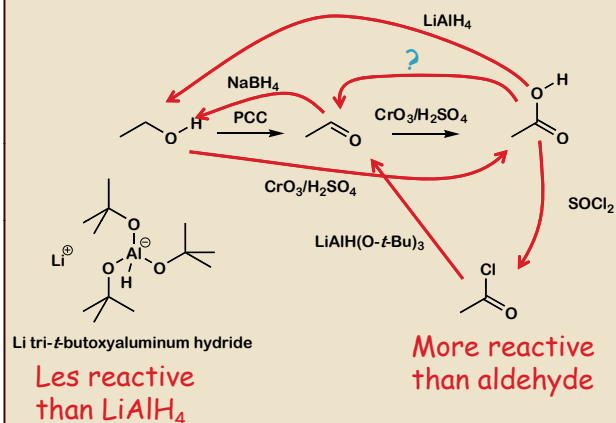
## Aldehyde Redox Chemistry

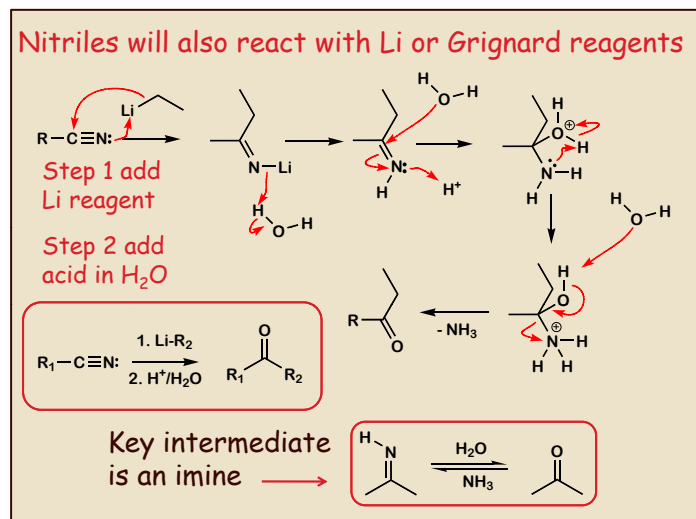
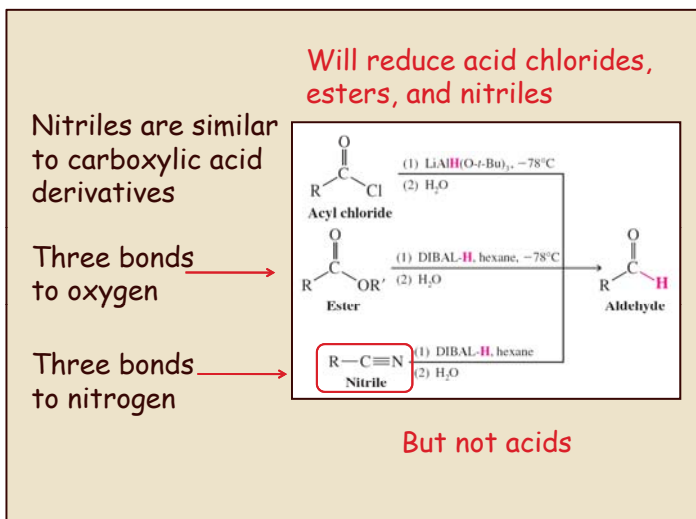
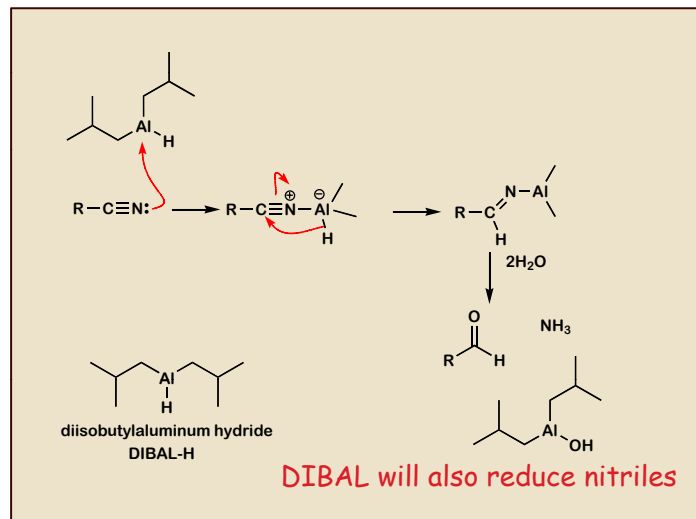
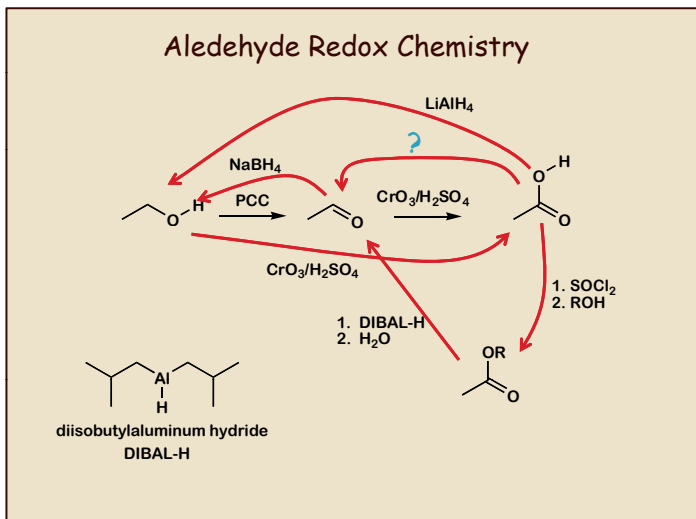
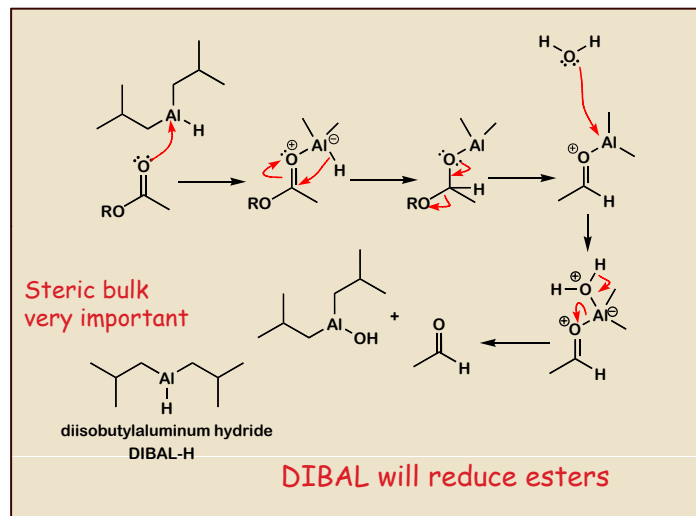
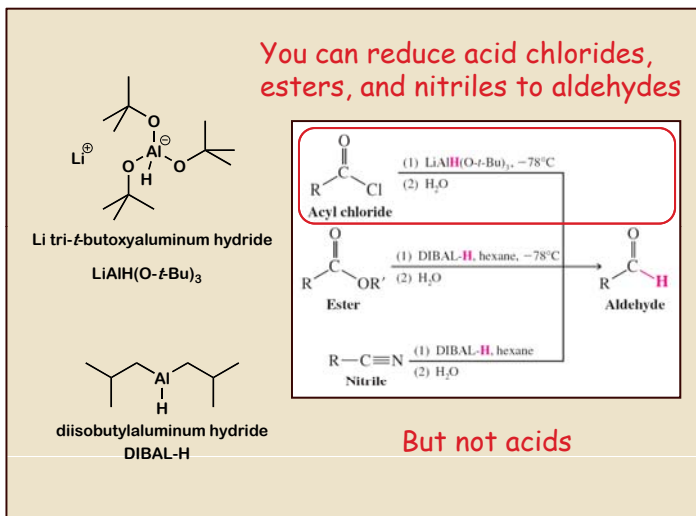


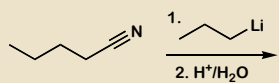
How do you make an aldehyde from an acid?

Make the acid more reactive and use a less reactive reducing agent.

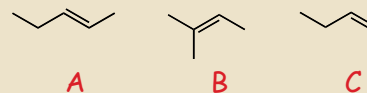
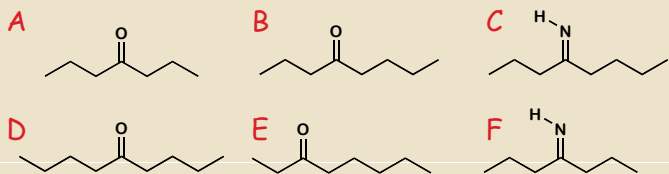
## Aldehyde Redox Chemistry







Predict the product

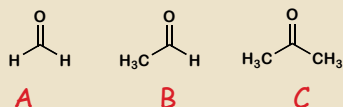


Which alkene is the most stable?

Why?

Alkenes are electron deficient

Alkyl groups are electron donor groups.

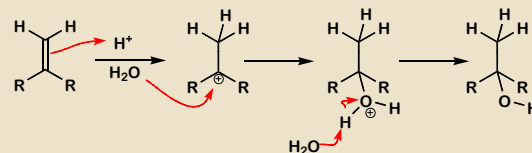


Which carbonyl is the most stable?

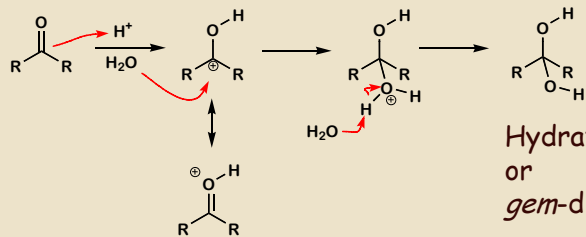
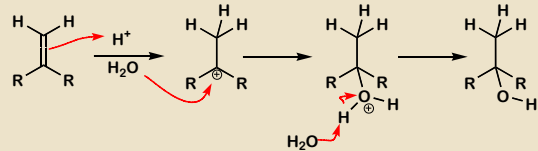
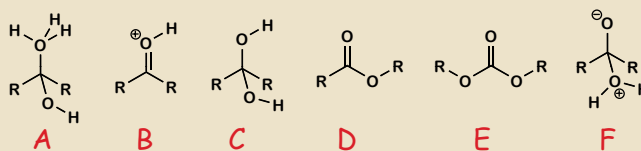
Why?

Carbonyl carbons are electron deficient

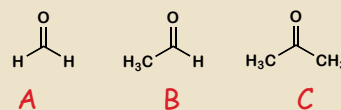
Alkyl groups are electron donor groups.



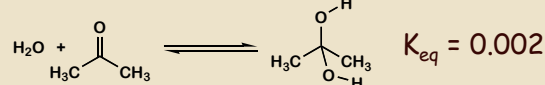
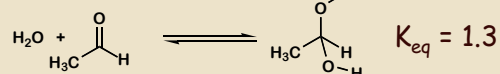
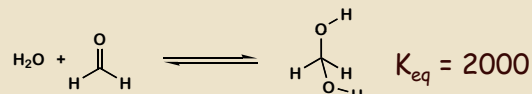
Do the same reaction with a ketone.  
What is the product?

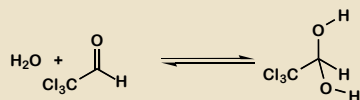


Hydrate  
or  
*gem*-diol

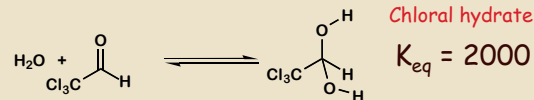
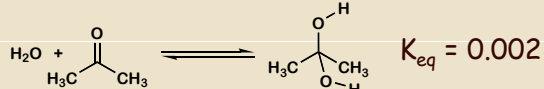
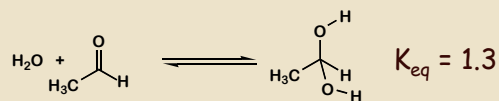


Which carbonyl would form the most stable hydrate?

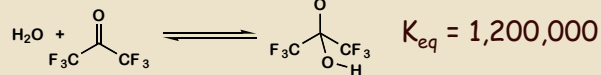




Will  $K_{eq}$  be higher (A) or lower (B) than for acetaldehyde?



Chloral hydrate



Electron Withdrawing Groups destabilize carbonyl  
Electron Donating Groups stabilize carbonyl

