

# Reacciones redox

- Oxidación: **perdida de electrones.**
- Reduccion: **ganancia de electrones.**



# Oxidación de un substrato orgánico

- Adición de oxígeno
- Pérdida de hidrógenos
- Pérdida de electrones para ese compuesto

# Reducción de un substrato orgánico

- Pérdida de oxígeno
- Adición de hidrógenos
- Adición de electrones a un substrato orgánico

# Asignación del estado de oxidación para un átomo de C

- Identificar los ligantes unidos al átomo de C
- para cada elemento diferente a C se le asigna su estado de oxidación normal:

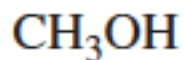
H: +1, O: -2, halógenos: -1 etc. 0 para otros átomos de C.

oxidation reactions

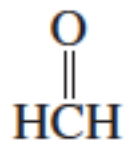
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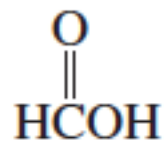
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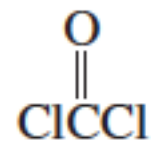
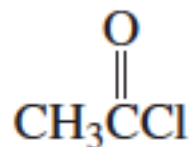
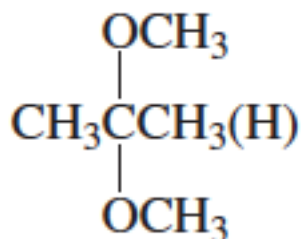
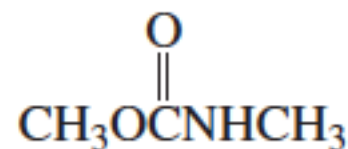
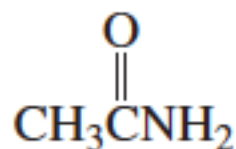
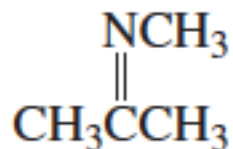
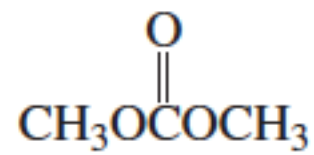
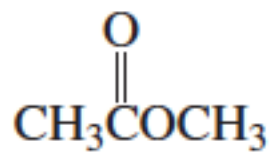
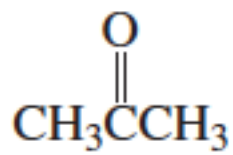
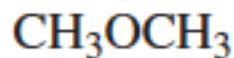
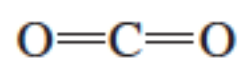
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3



4



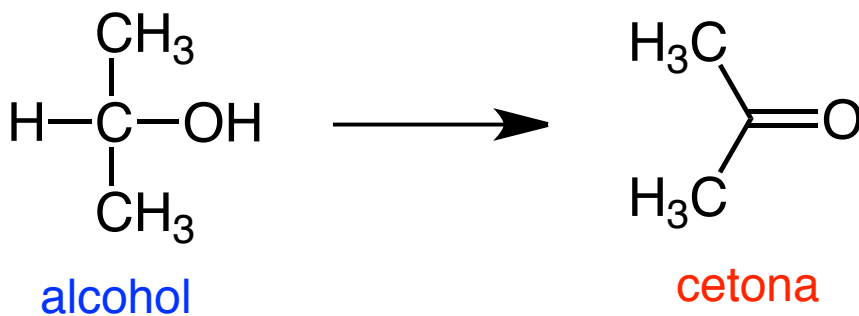
**OXIDATION STATE**  
number of C—Z bonds  
(Z = O, N, or halogen)

reduction reactions

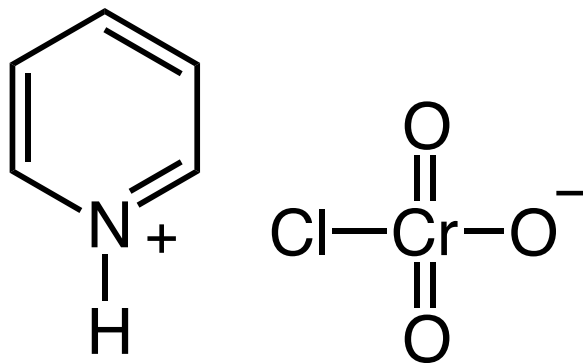
# **AGENTES OXIDANTES**

# Reactivos de cromo

- Todas las formas de cromo son agentes oxidantes poderosos.
- $\text{H}_2\text{CrO}_4$
- $\text{K}_2\text{Cr}_2\text{O}_7/\text{H}_2\text{SO}_4$
- $\text{CrO}_3/\text{H}_2\text{SO}_4$



- PCC

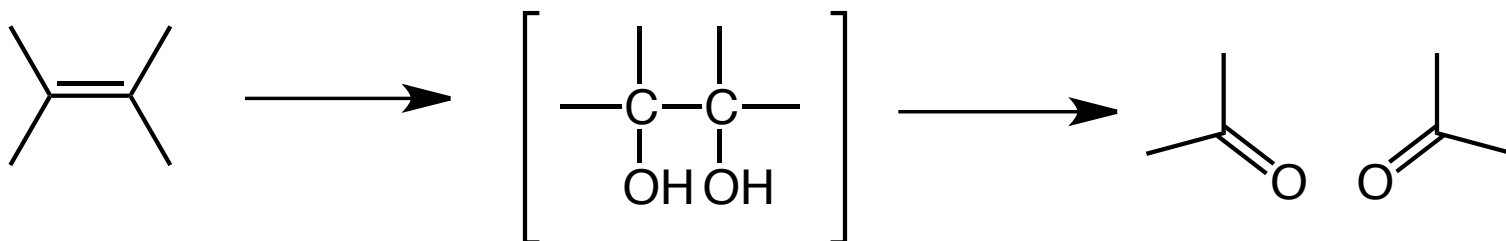
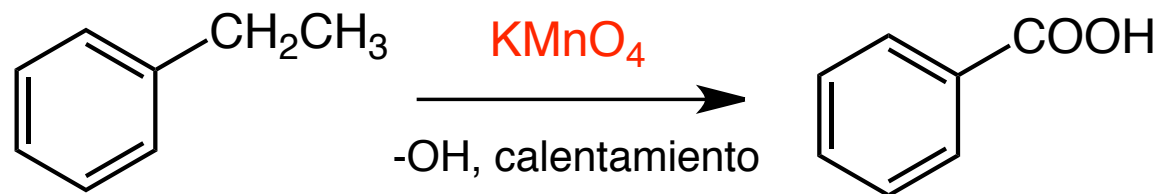


- $\text{CrO}_3/\text{CH}_2\text{Cl}_2$  (reactivo de Collins)
- $\text{CrO}_2\text{Cl}_2$  (cloruro de cromilo)



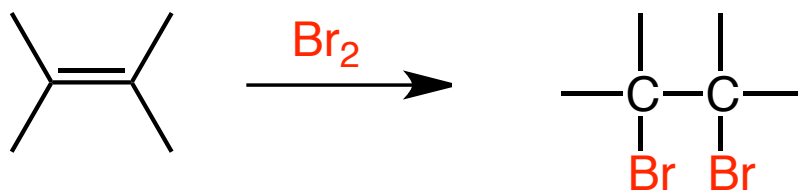
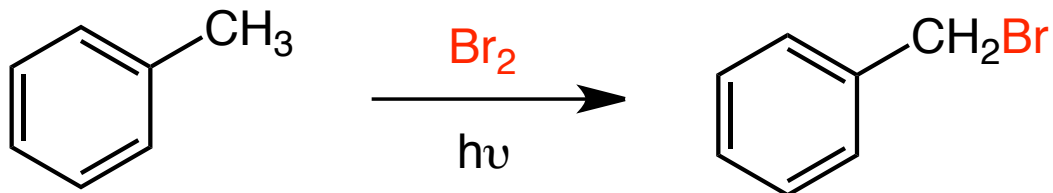
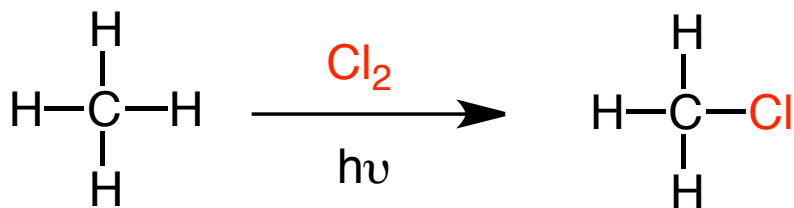
# Reactivos de manganeso

- $\text{KMnO}_4$
- $\text{MnO}_2$



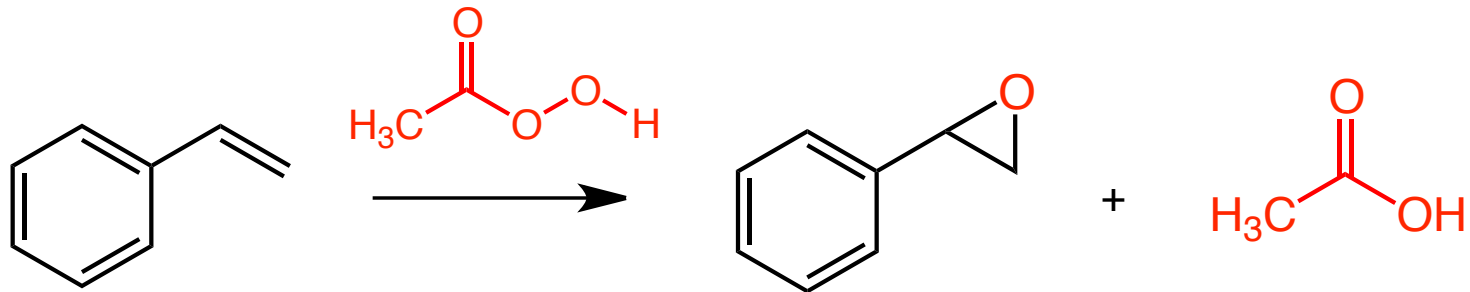
# Halógenos

- $F_2 > Cl_2 > Br_2 > I_2$
- NBS (*N*-bromosuccinimida)

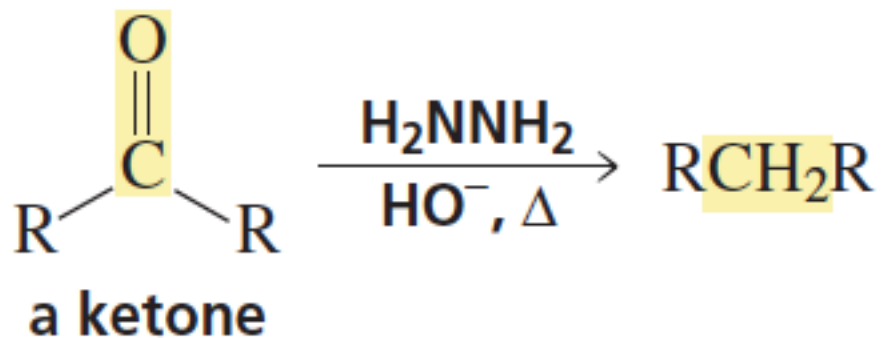
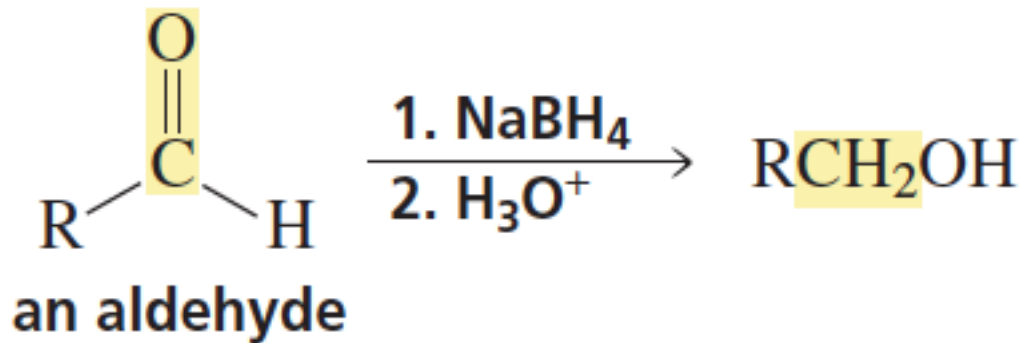
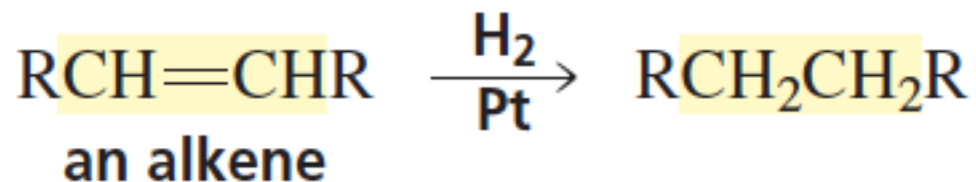


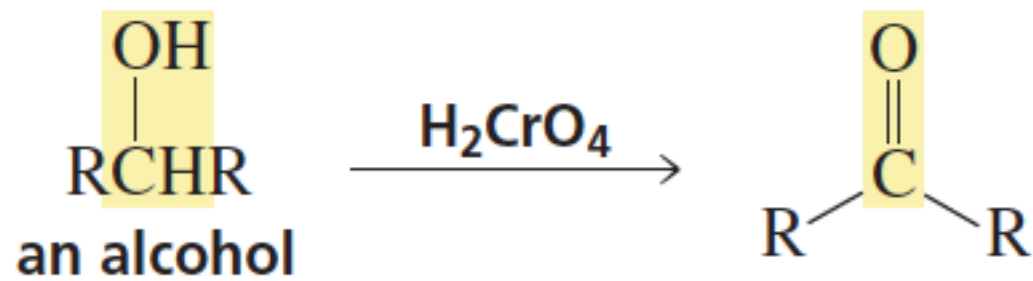
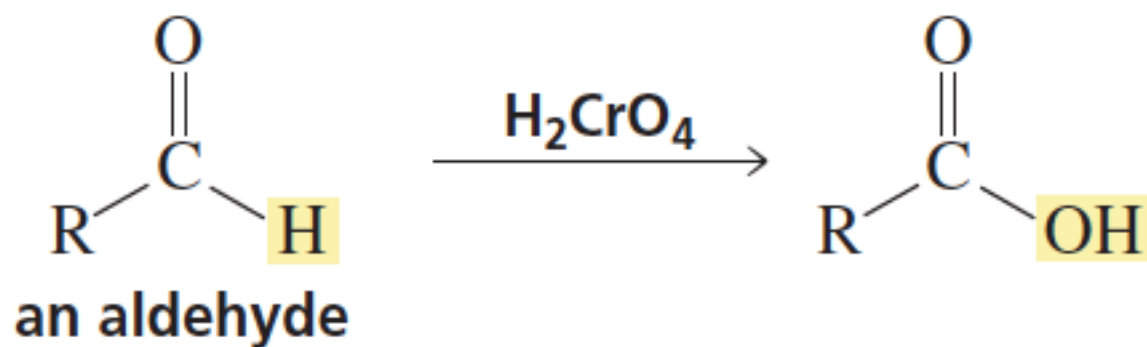
# Formas de oxígeno y peróxidos

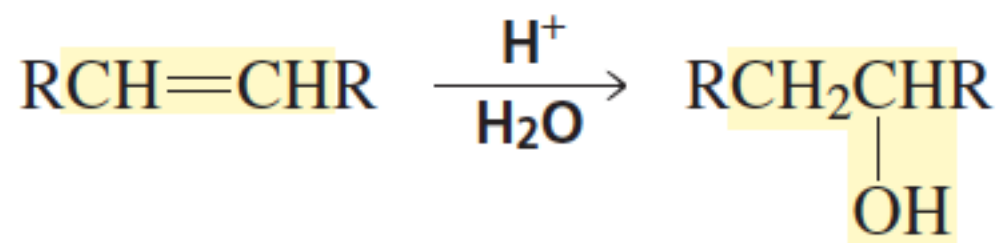
- $O_3$  ozono
- $O_2$  oxígeno (dioxígeno)
- $H_2O_2$  peróxido de hidrogeno. Agente oxidante moderado
- $RCO_3H$  peroxiácidos

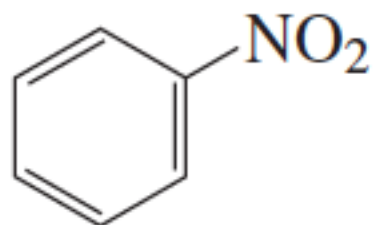


# Ejemplos de reacciones redox

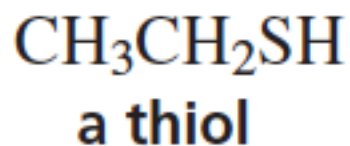
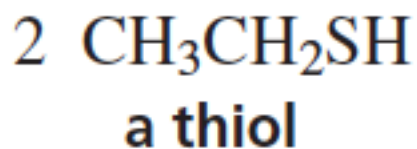
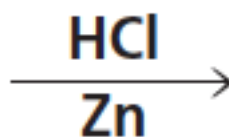
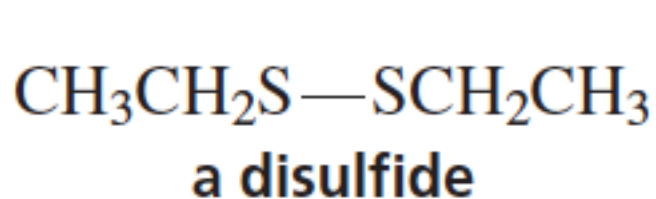
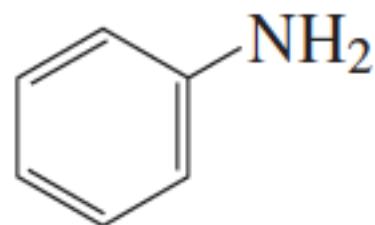
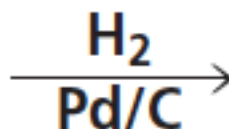








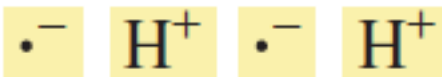
**nitrobenzene**



# Reacciones de reducción



two hydrogen atoms



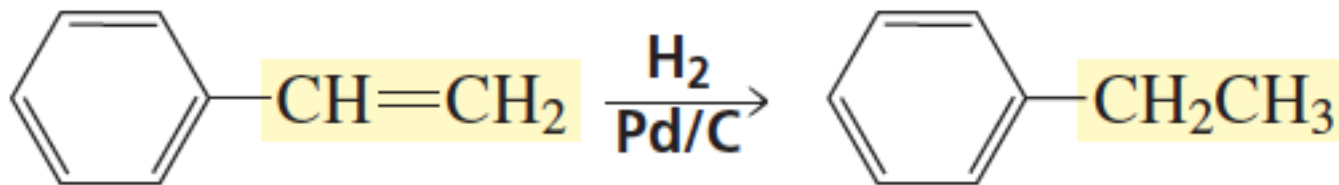
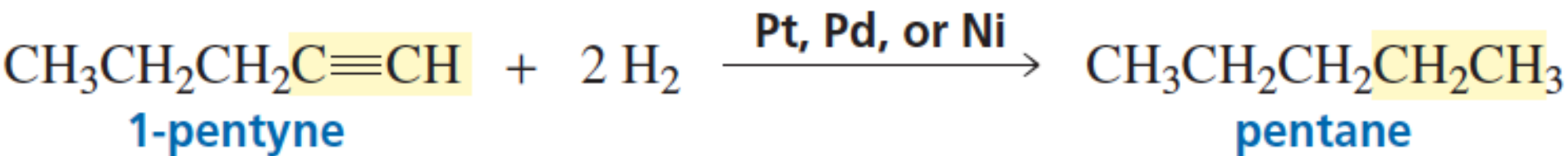
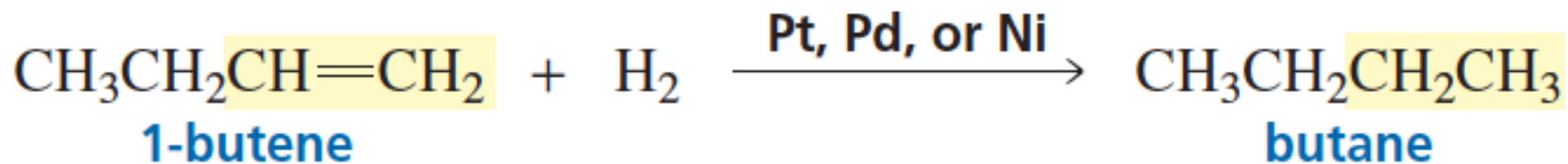
two electrons and two protons

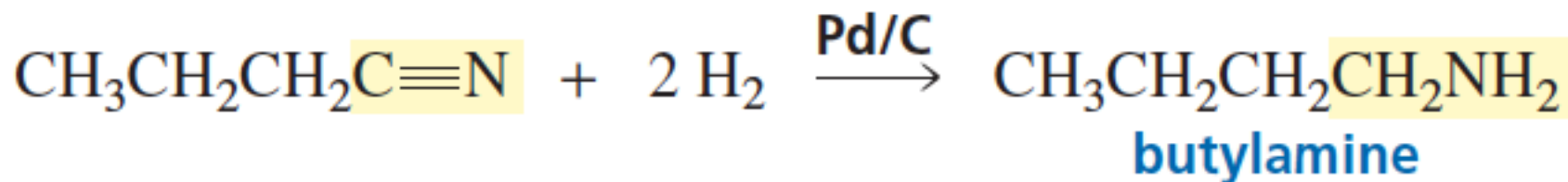
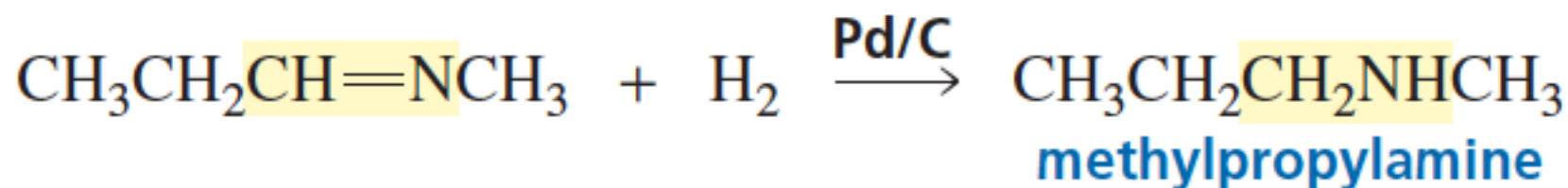


a hydride ion and a proton

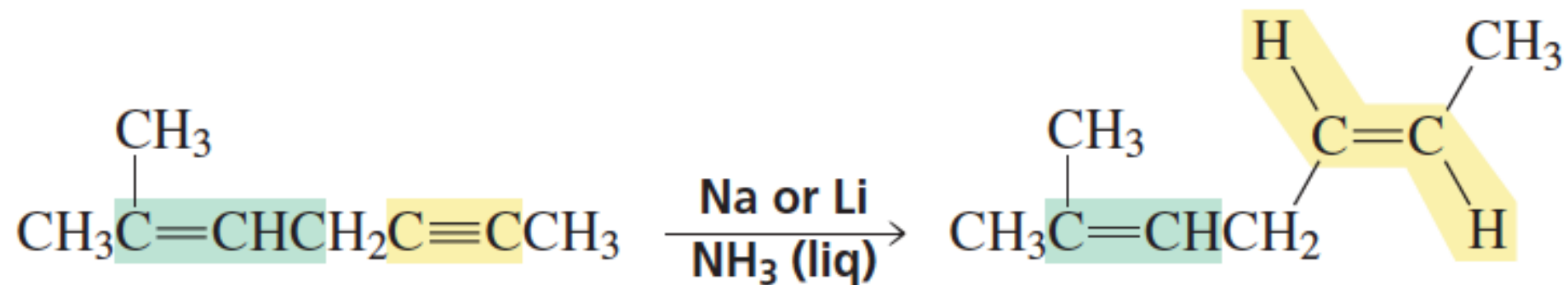
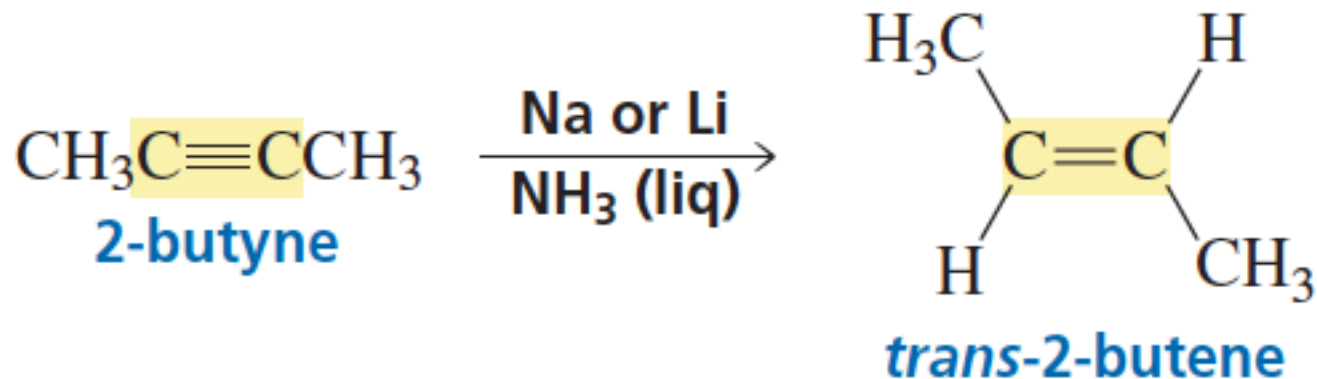


# Reducción por adición de 2 átomos de hidrógeno

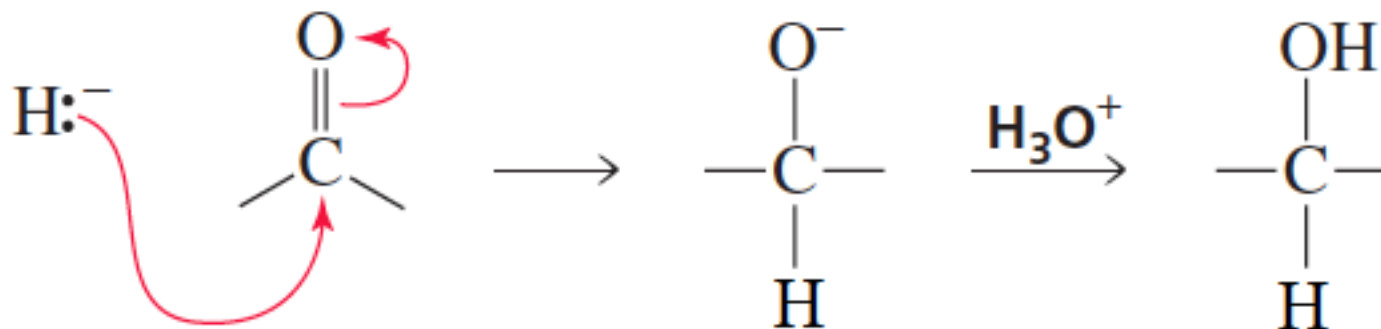


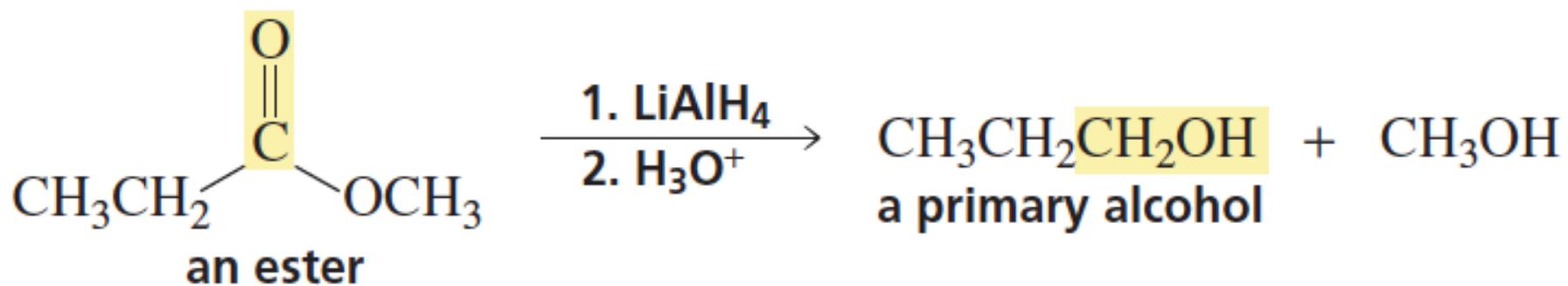
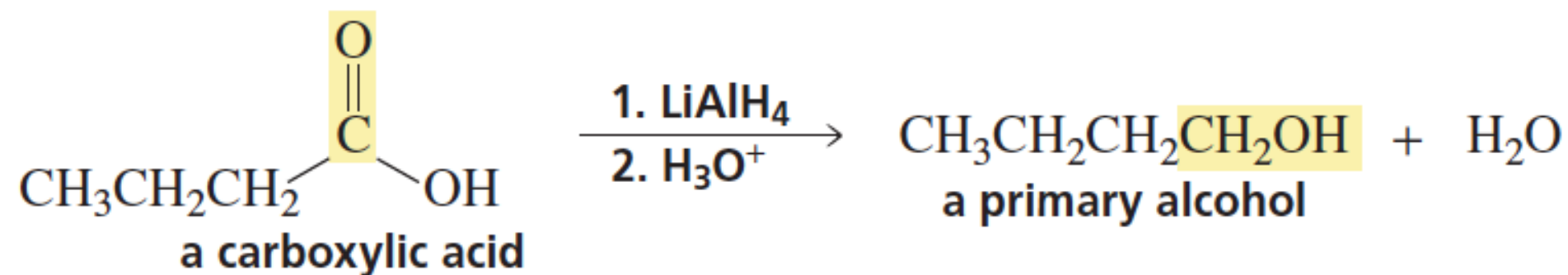


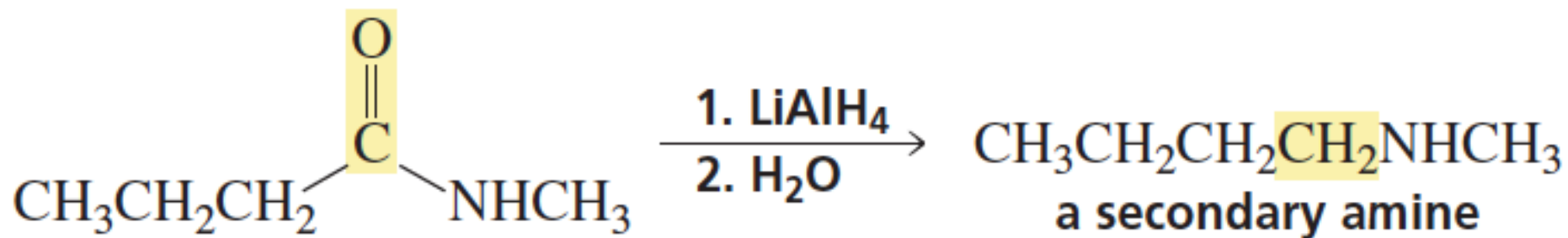
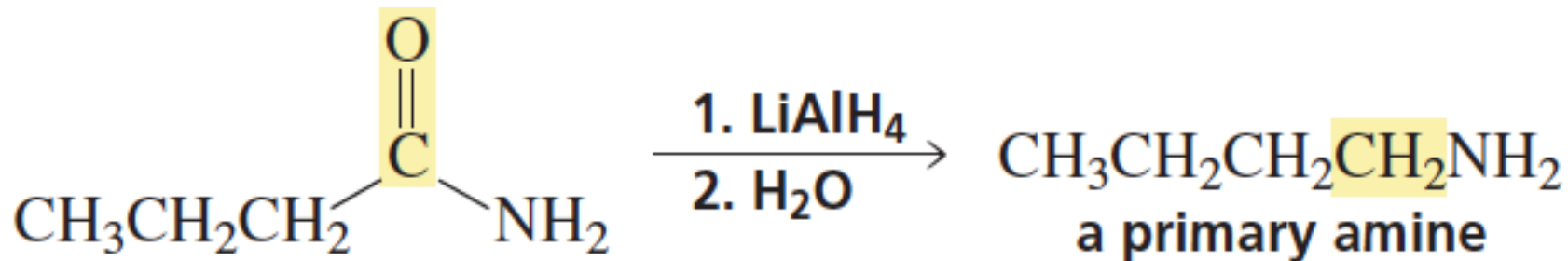
# Reducción por adición de un electrón, un protón, un electrón y un protón

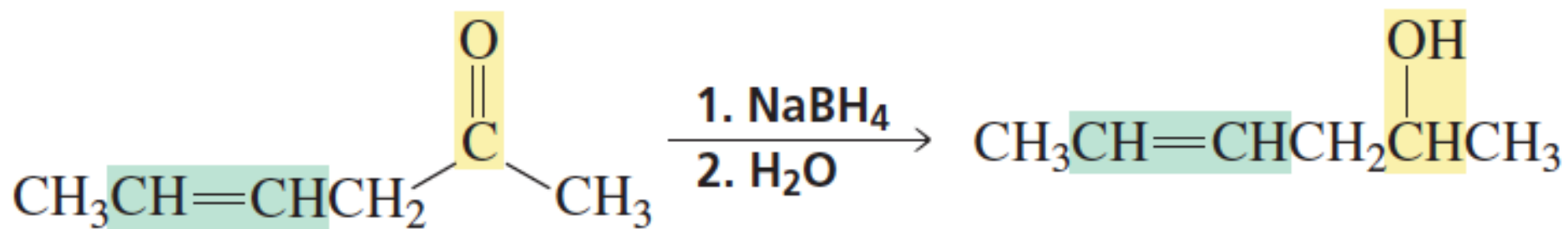


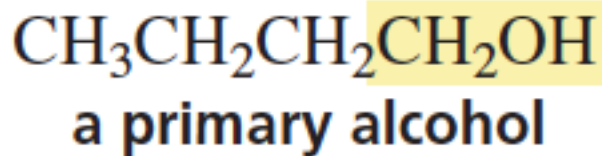
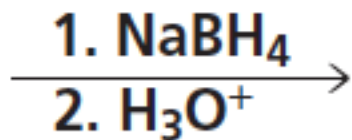
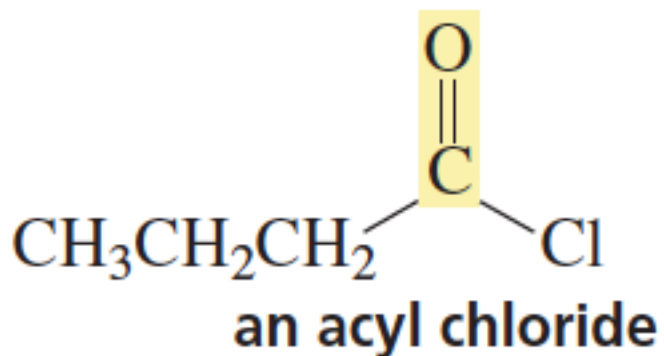
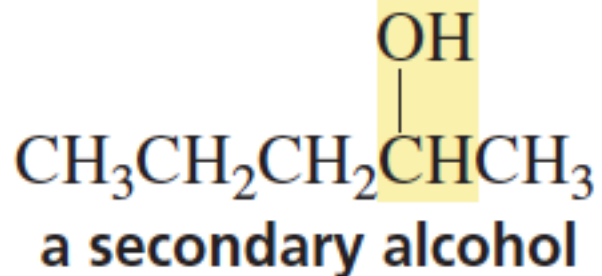
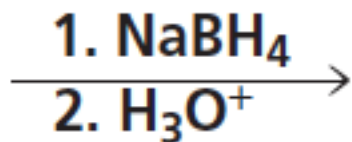
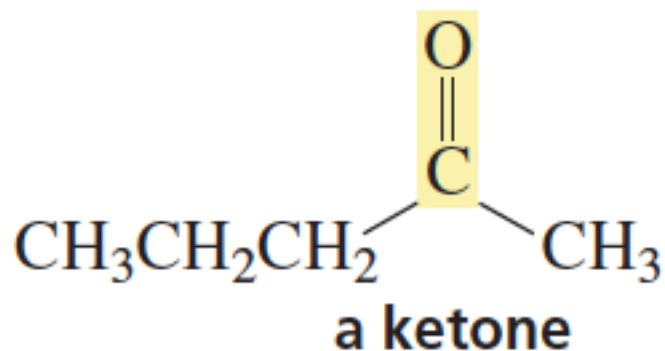
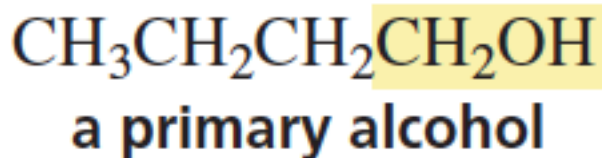
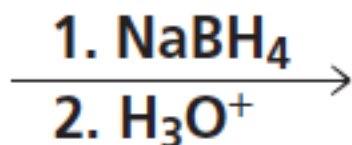
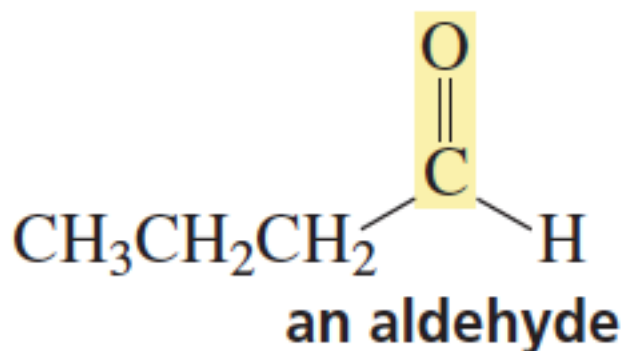
# Reducción por adición de un ion hidruro y un protón







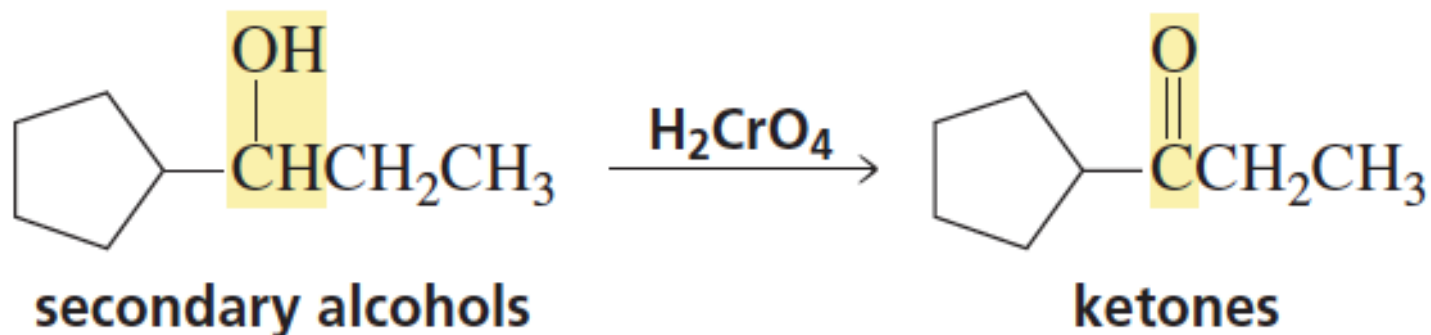
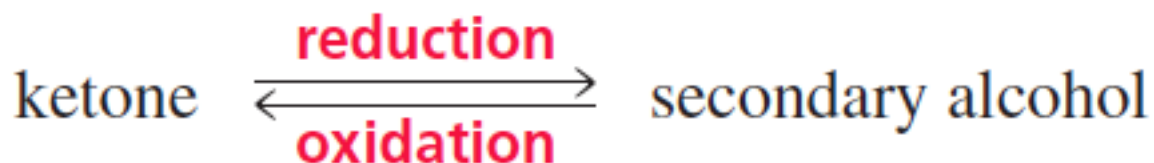


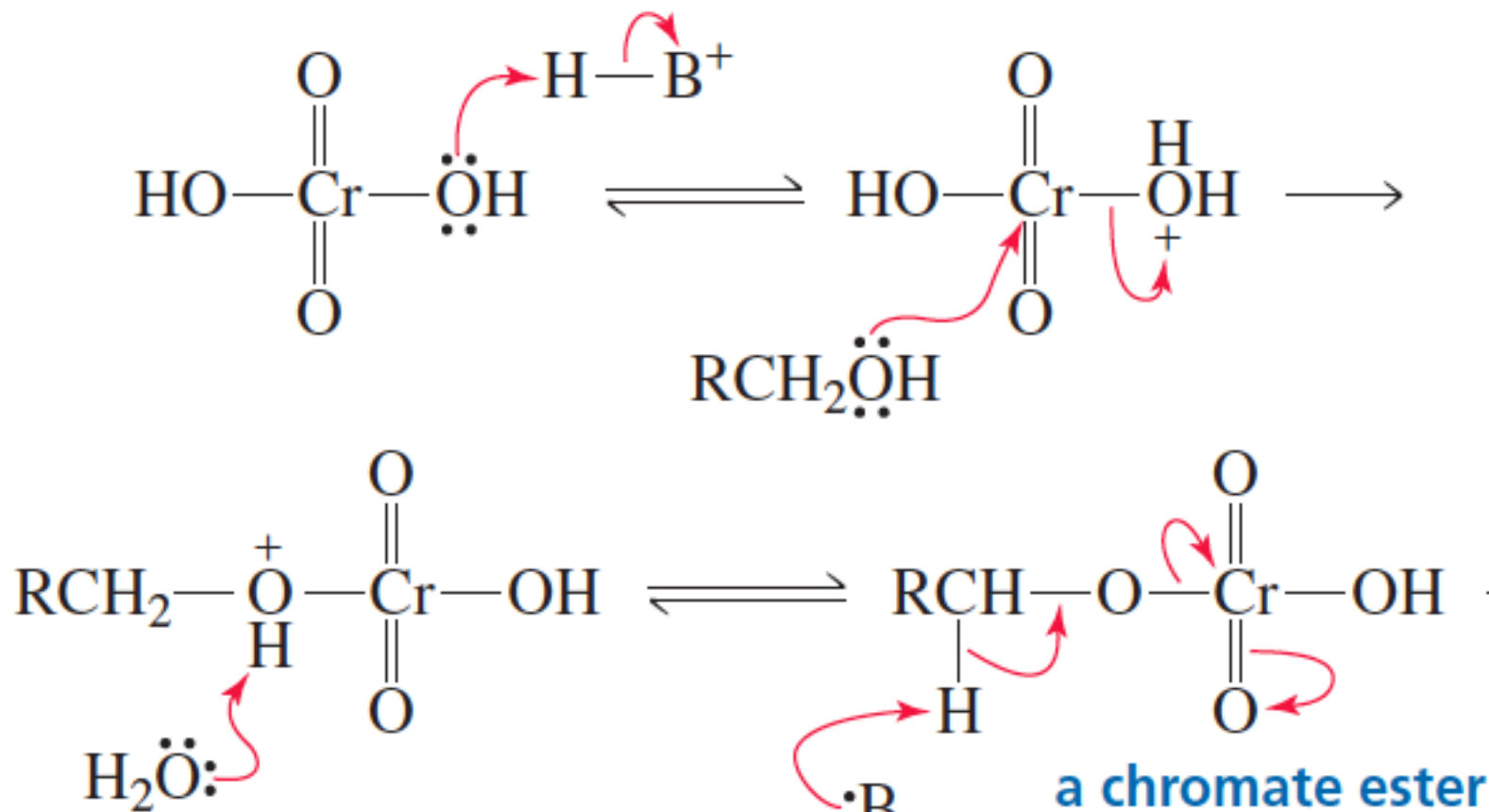




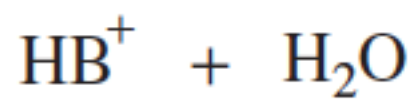
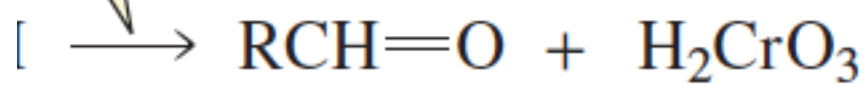
# Oxidación de alcoholes

- Oxidación es la reacción contraria a la reducción

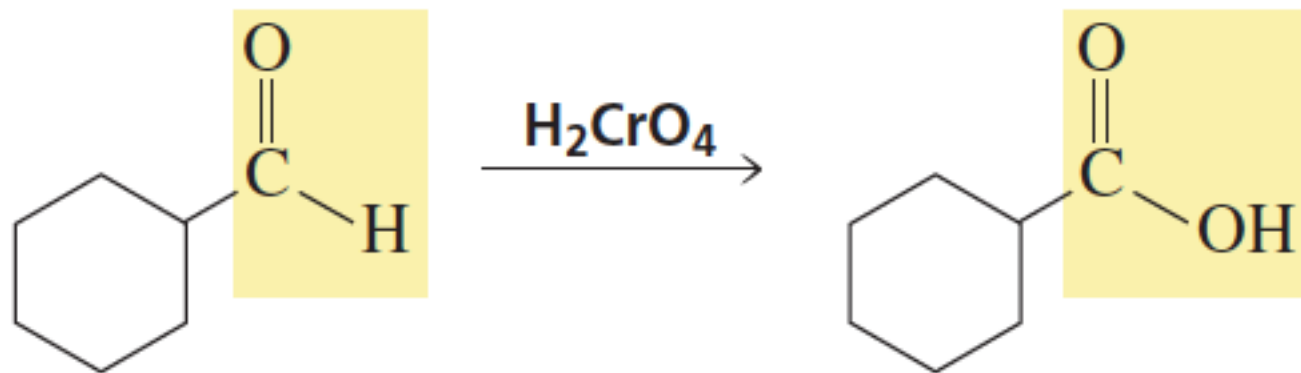
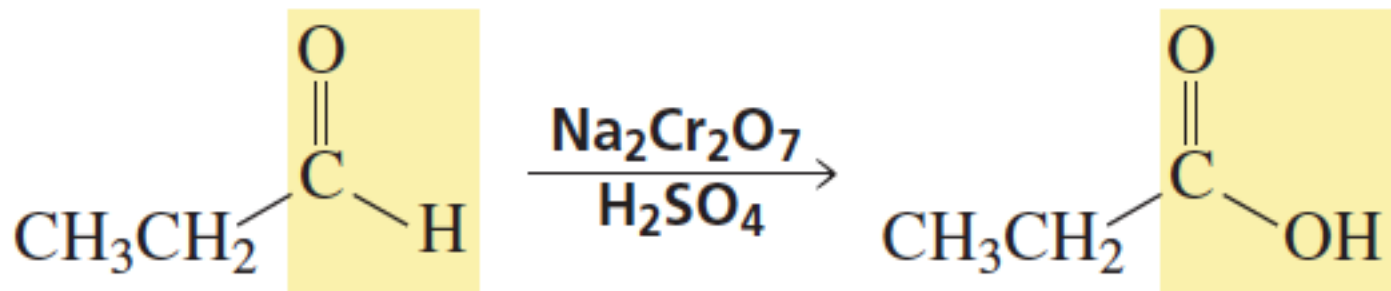




an E2 reaction

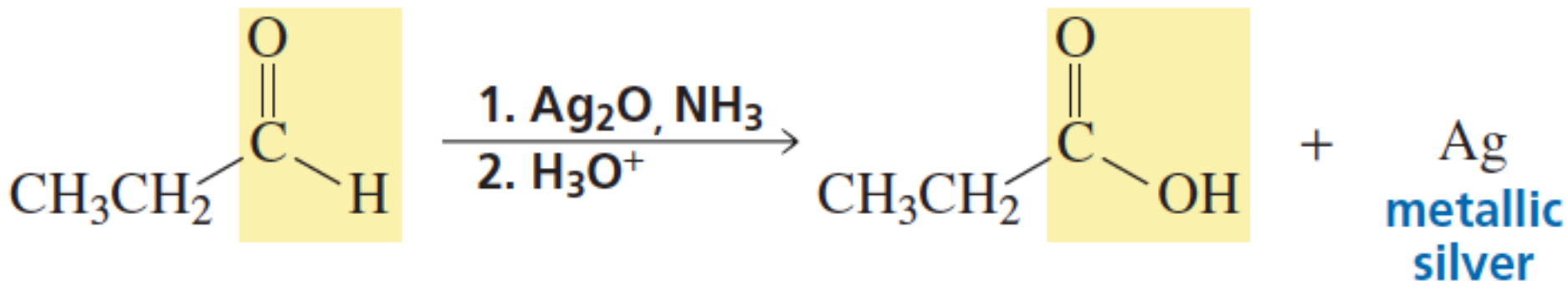


# Oxidación de aldehídos y cetonas

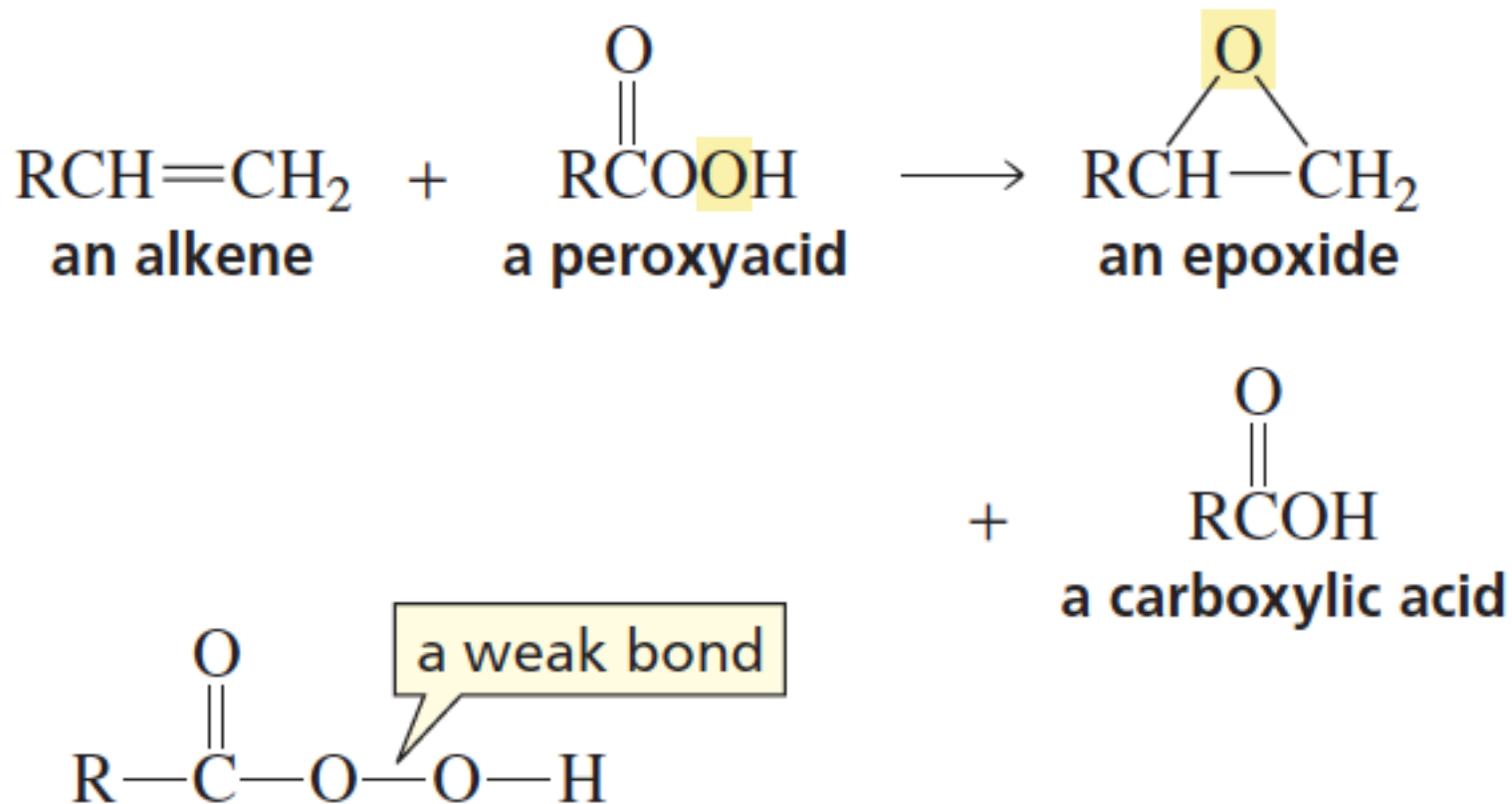


aldehydes

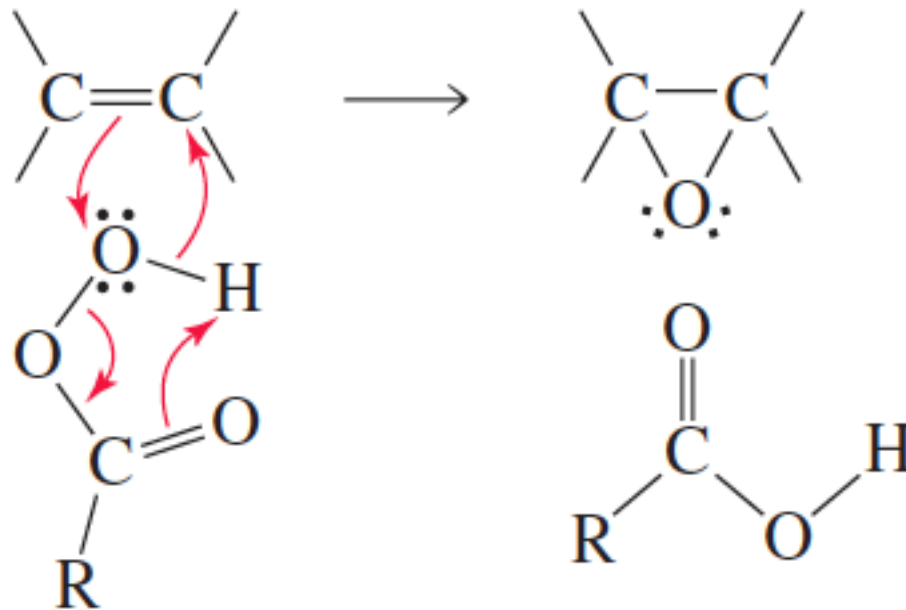
carboxylic acids



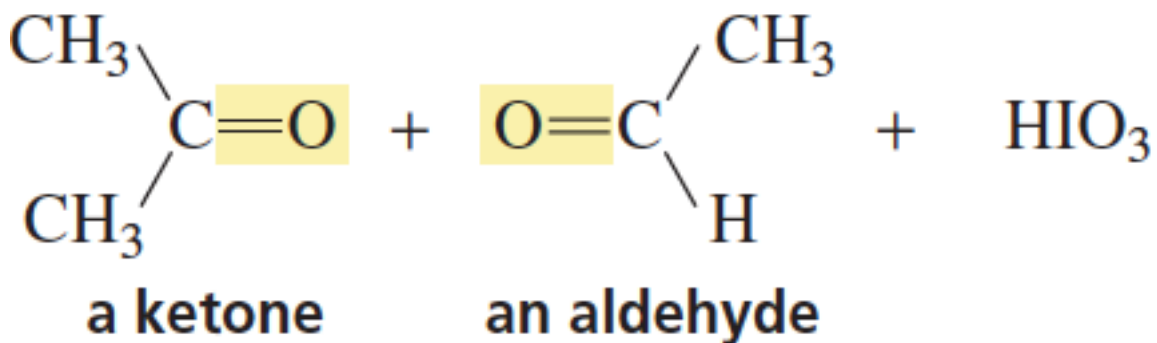
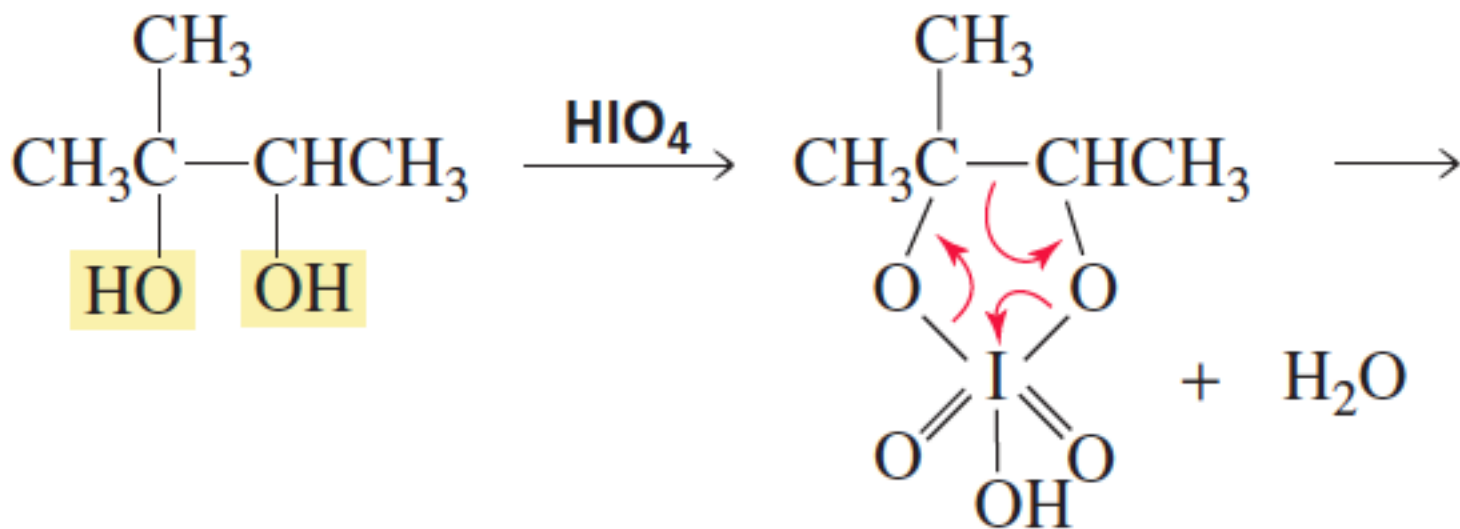
# Oxidación de alquenos

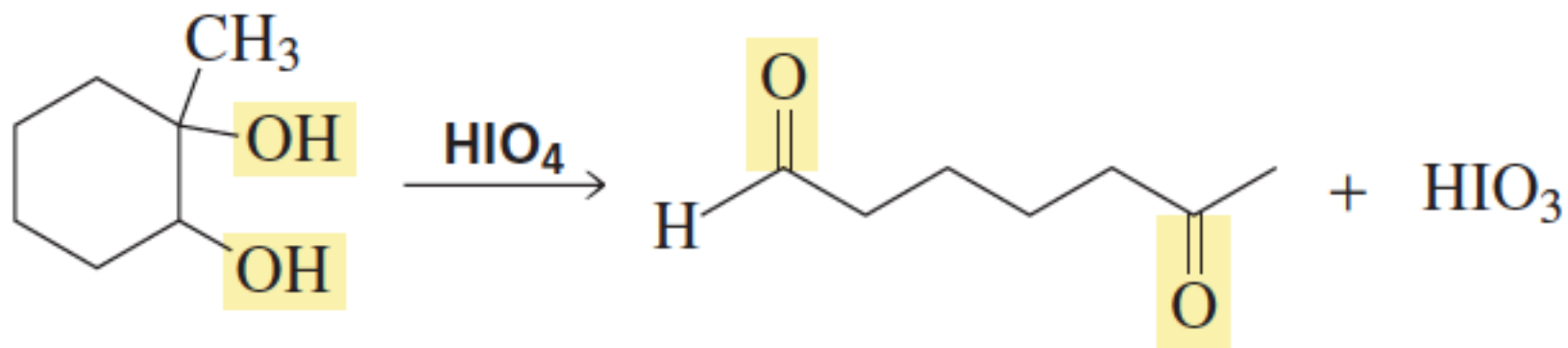


# Mecanismo de la oxidación de alquenos



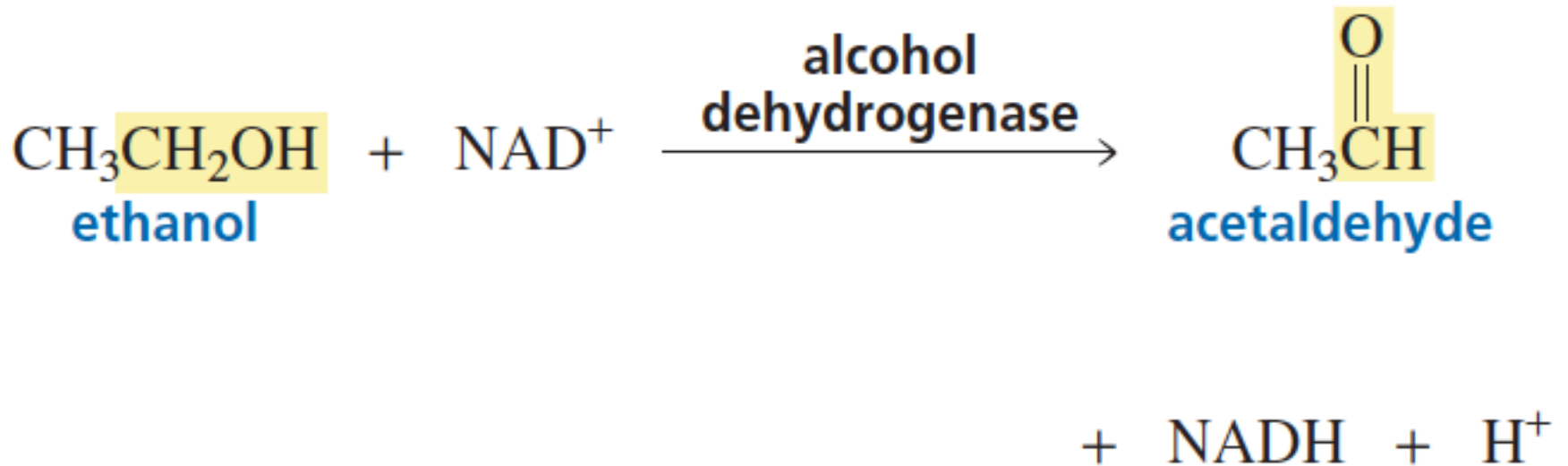
# Ruptura oxidativa de 1,2-dioles

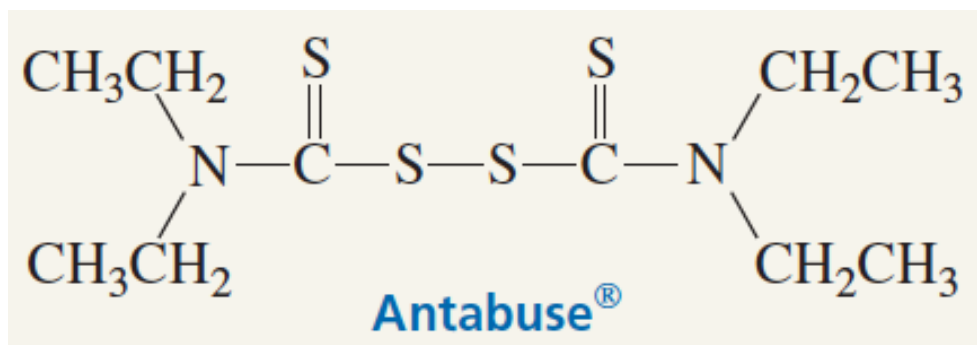
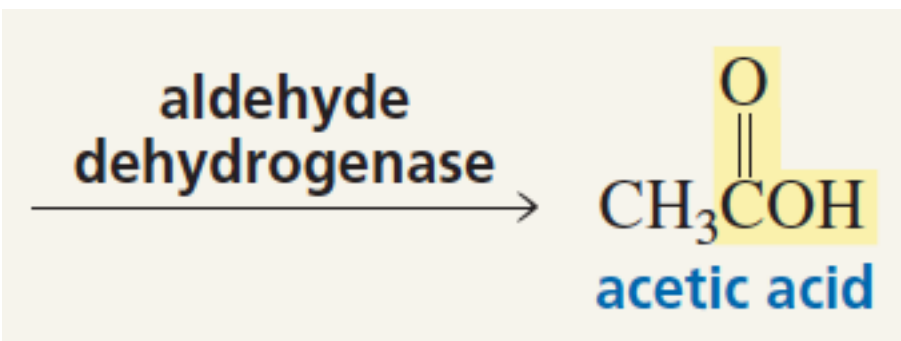
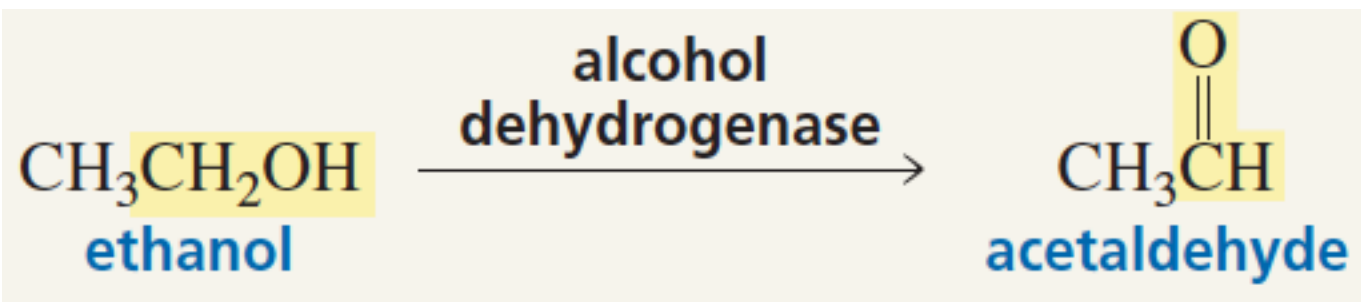




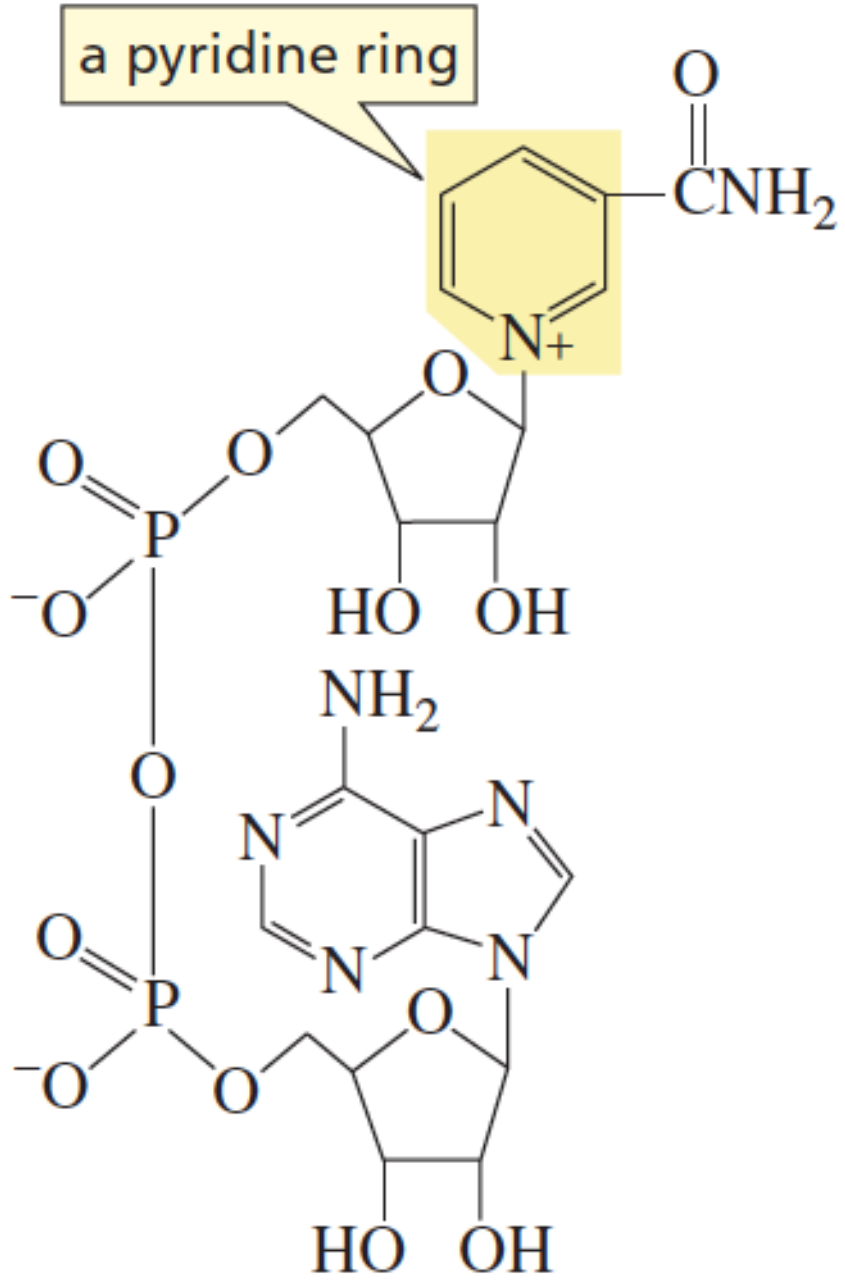


# Oxidación biológica de alcoholes

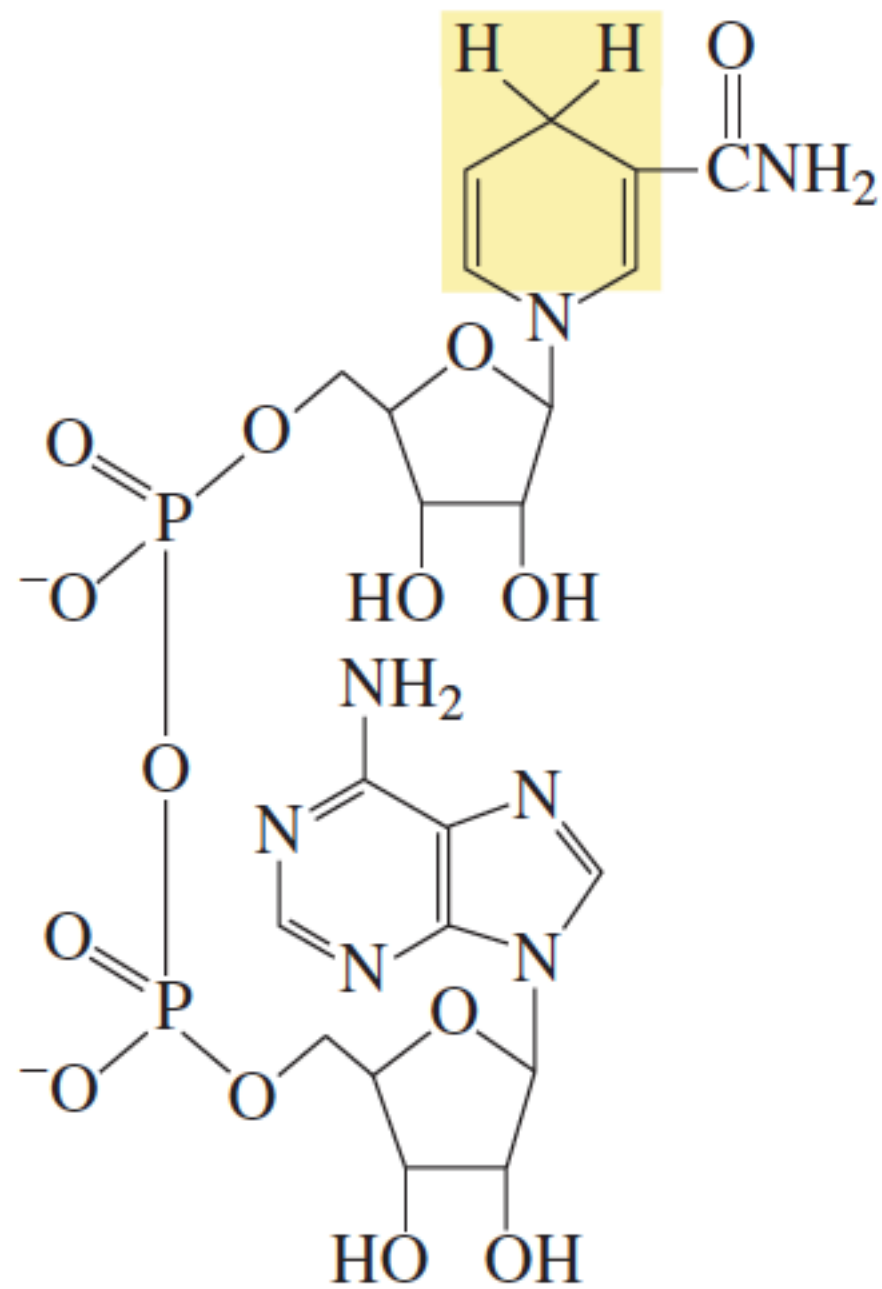




a pyridine ring

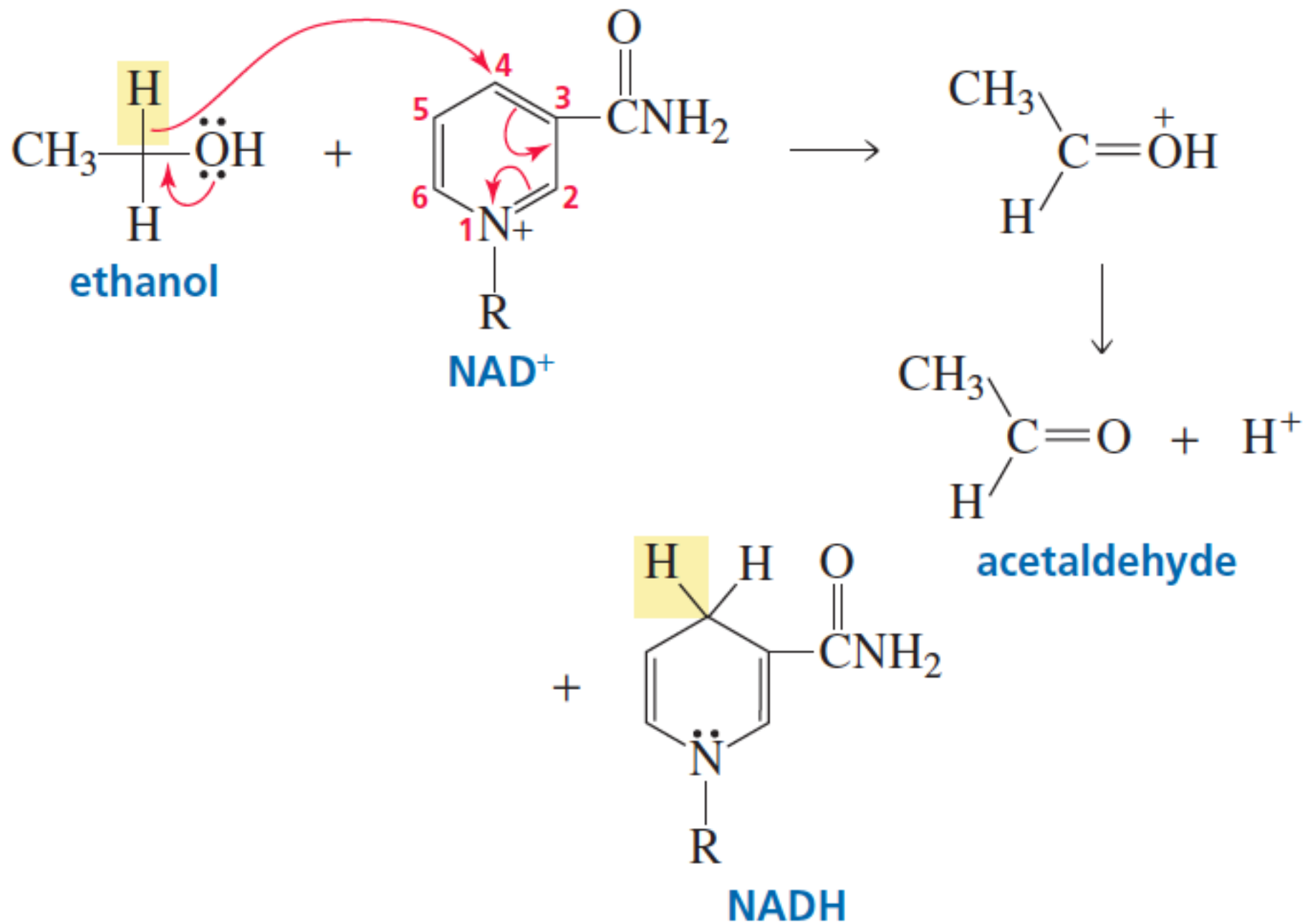


nicotinamide adenine dinucleotide  
**NAD<sup>+</sup>**



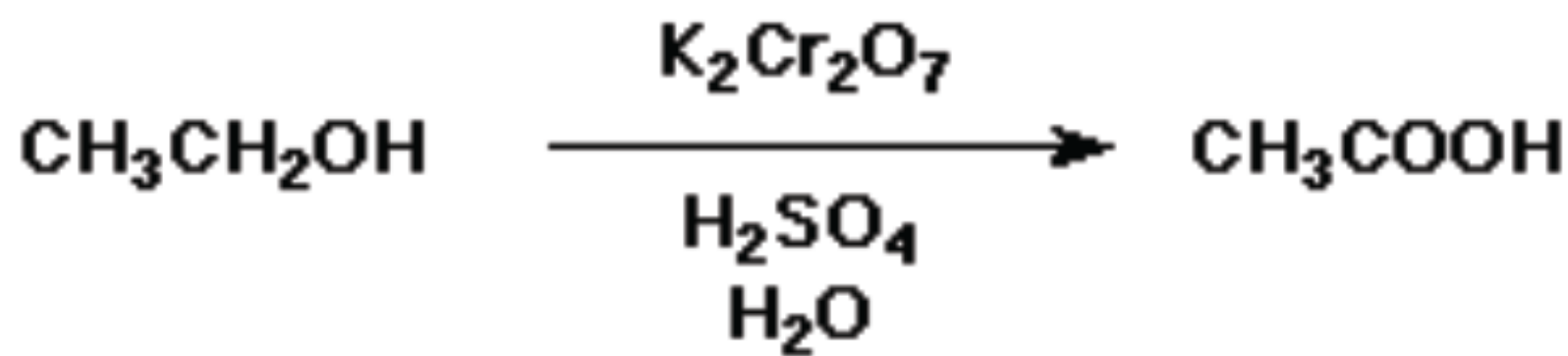
reduced nicotinamide adenine dinucleotide

**NADH**



# Balanceo de reacciones redox

- 1) Escriba la ecuación correspondiente para la sustancia que se oxida, indicando los electrones que se pierden en el proceso como protones.
- 2) Balancear las cargas con electrones.
- 3) Escriba la ecuación para la especie oxidante.
- 4) Balancear las cargas con electrones.
5. Multiplicar por el factor adecuado para que el número de electrones quede compensado.



¿Cuántos gramos de dicromato de sodio se requieren para transformar 70 g de ciclohexanol a ciclohexanona?