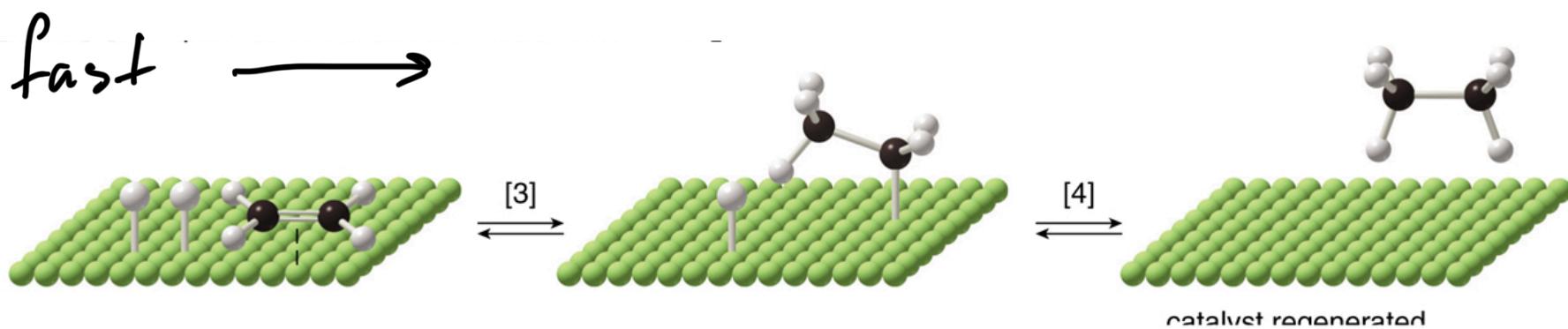
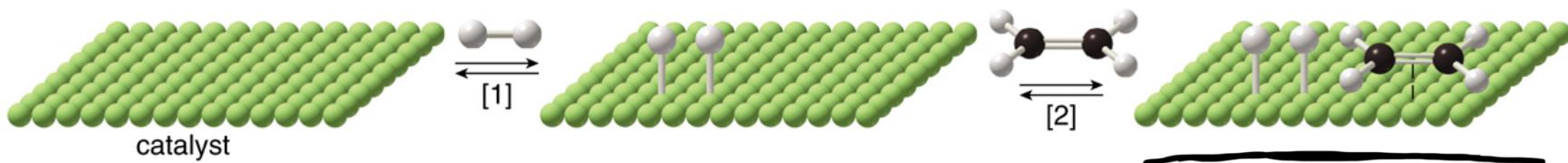


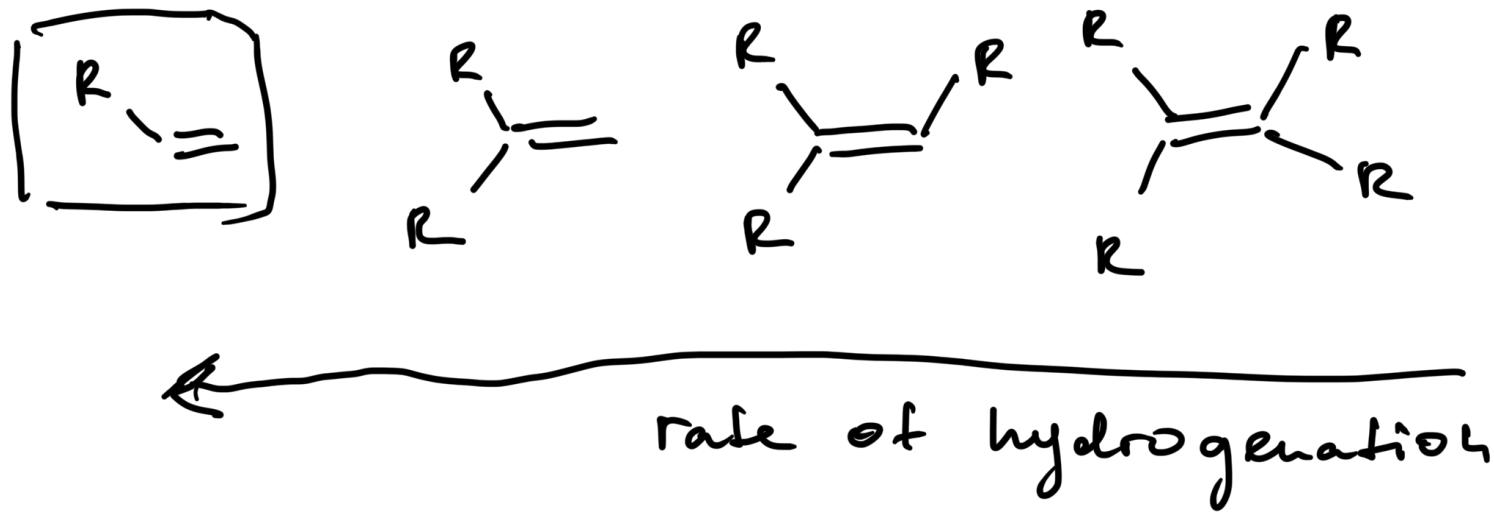
# Reduction: hydrogenation of alkenes

Mechanism of catalytic hydrogenation of alkenes



# Reduction: hydrogenation of alkenes

Reactivity trends



- rate of adsorption
- difficult to achieve selectivity

# Reduction: hydrogenation of alkenes

Hydrogenation and degrees of unsaturation



5 degrees of unsaturation (both rings and multiple bonds)

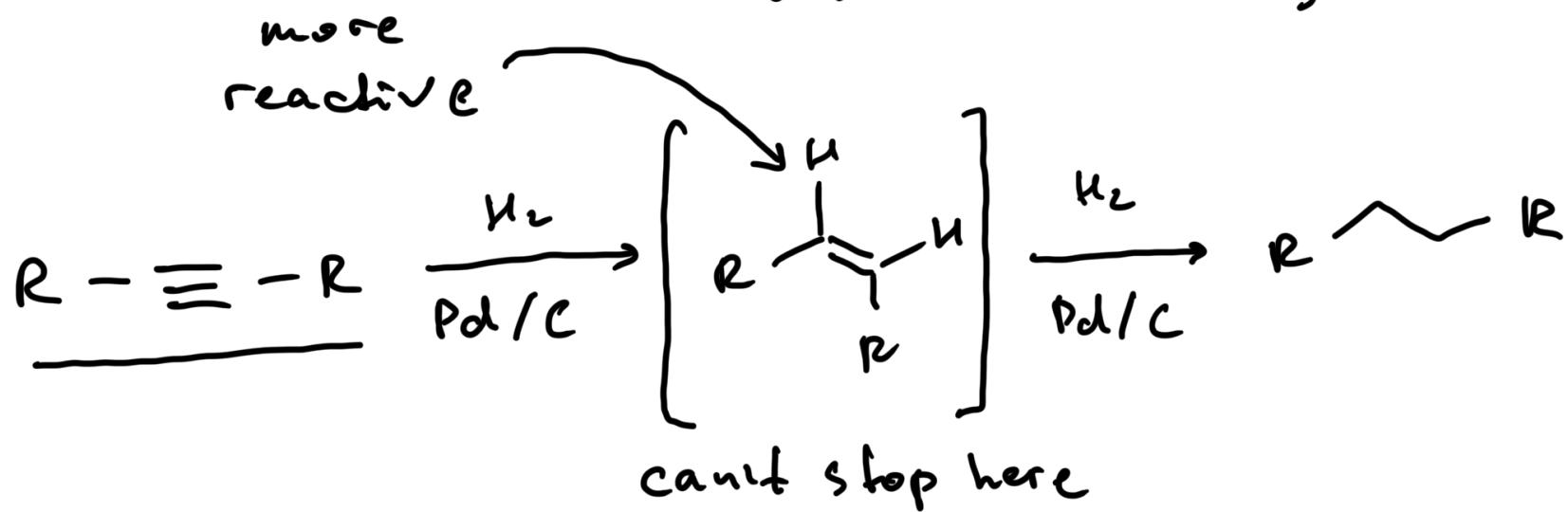
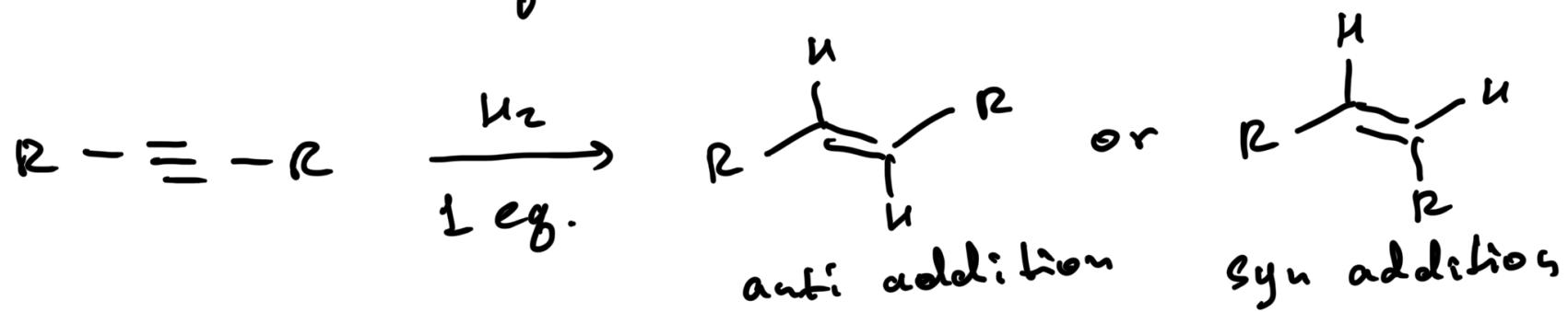
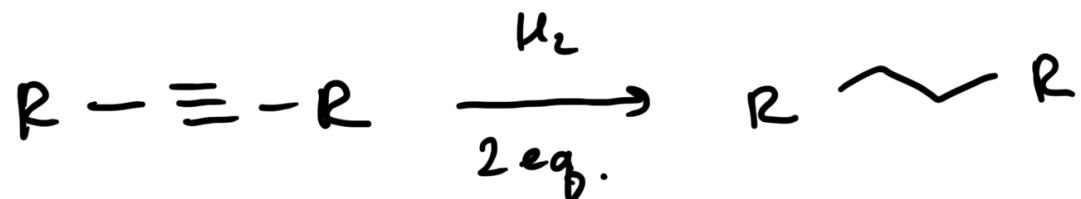


two C=C, three rings

# Reduction: hydrogenation of alkynes

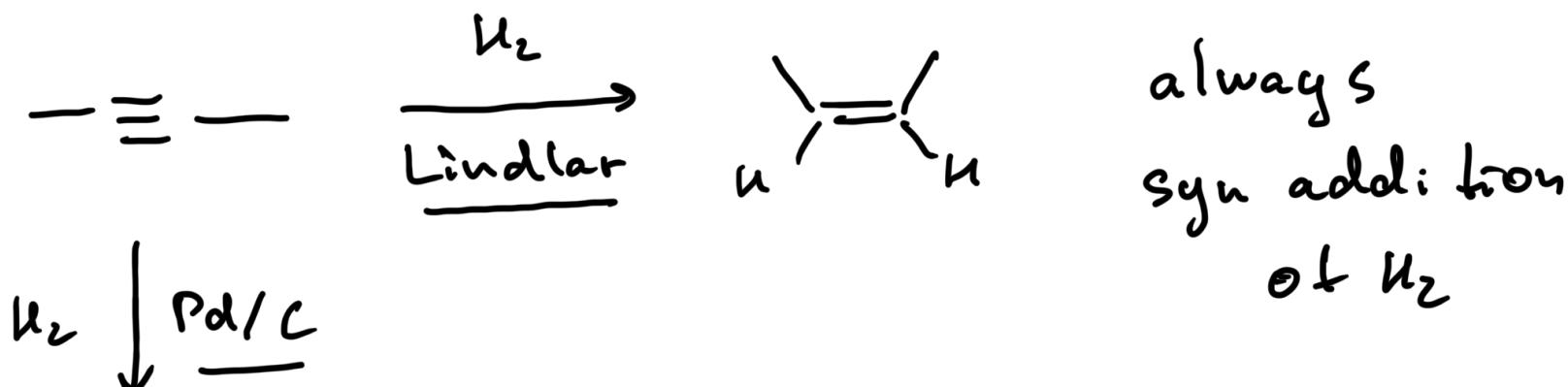
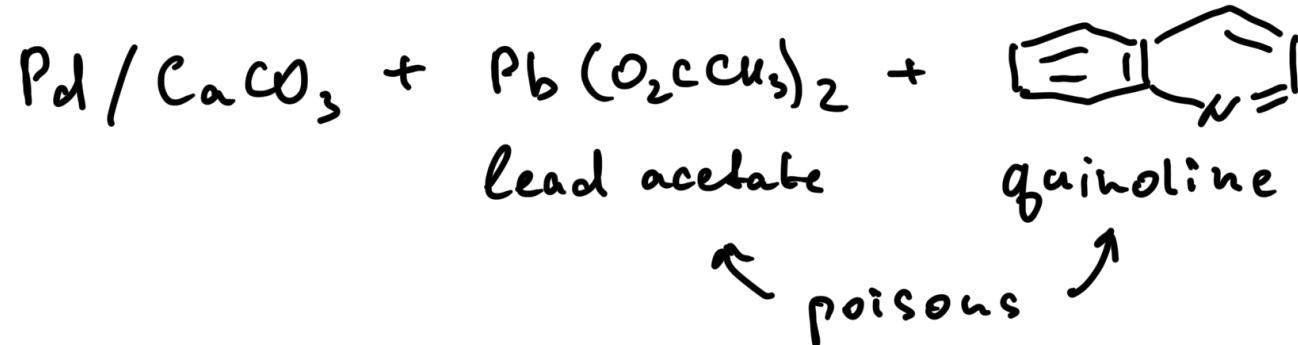
Reduction to alkanes

read 12.4



# Reduction: hydrogenation of alkynes

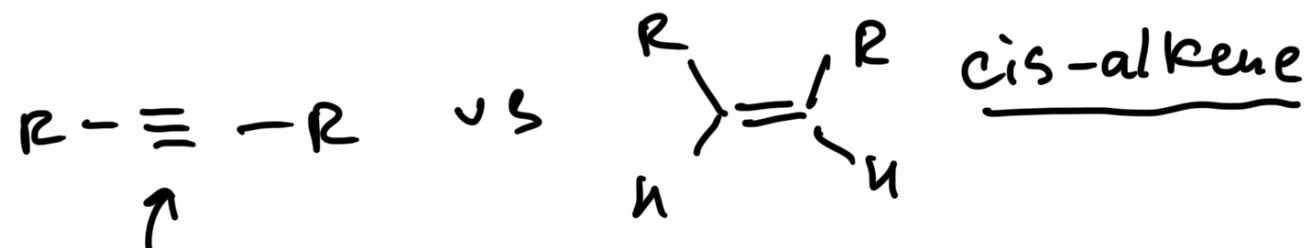
Reduction to *cis*-alkenes. Lindlar catalyst



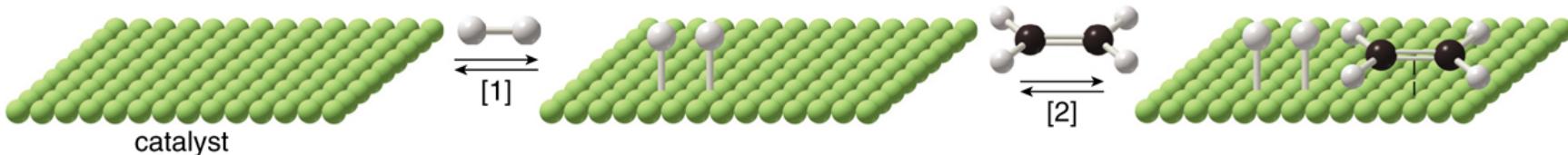
# Reduction: hydrogenation of alkynes

Reduction with Lindlar catalyst: basis for chemoselectivity

- alkenes undergo hydrogenations faster than alkynes
- BUT
- adsorption is the rate-determining step
  - poisons modify the surface of catalyst

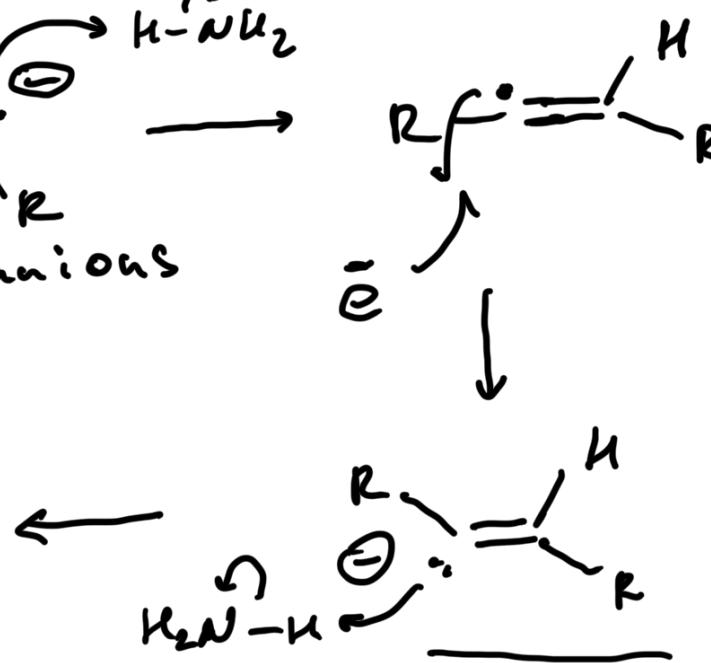
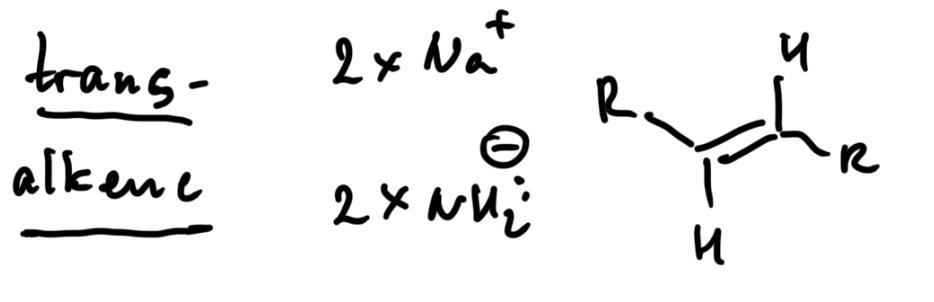
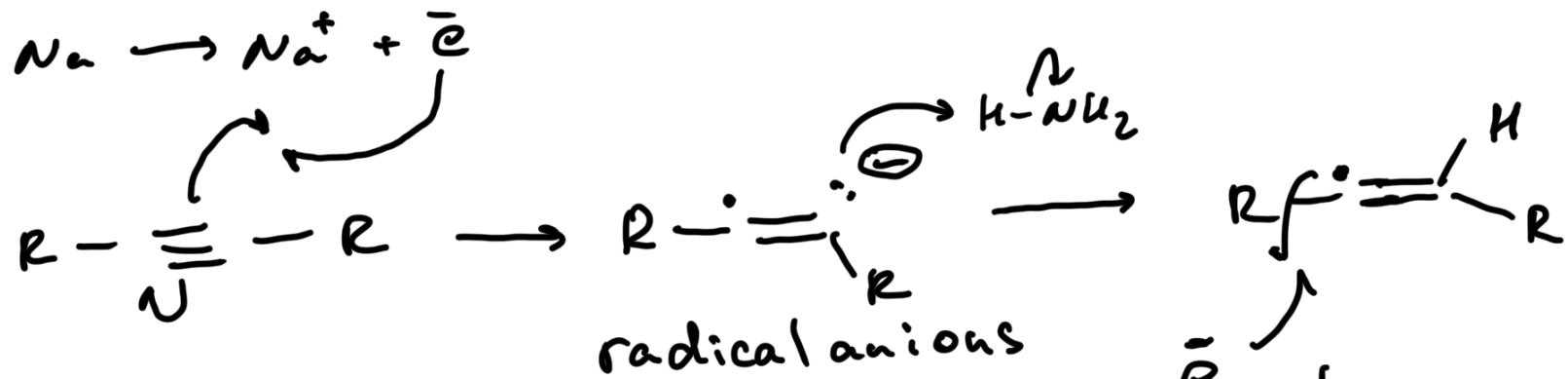
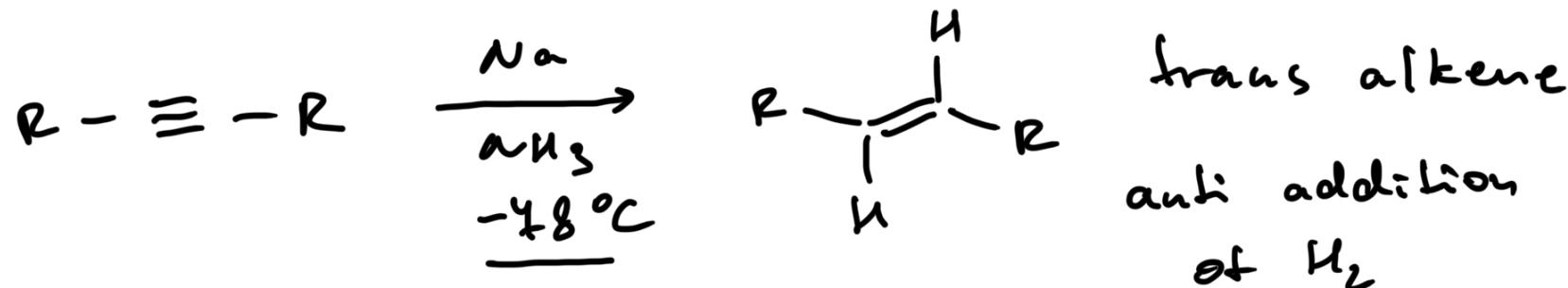


adsorption is faster



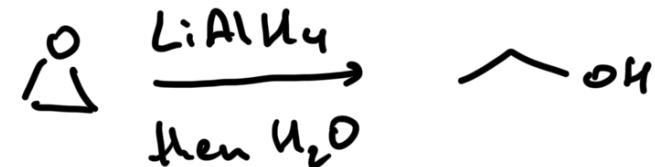
# Reduction: hydrogenation of alkynes

Reduction to *trans*-alkenes. Dissolving metal reduction. Mechanism

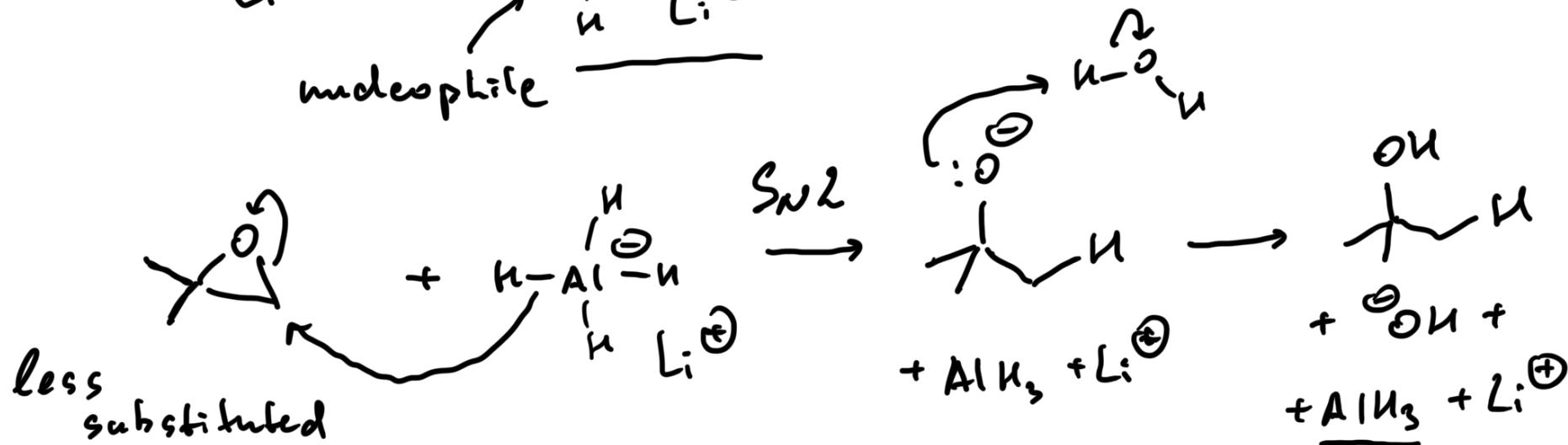
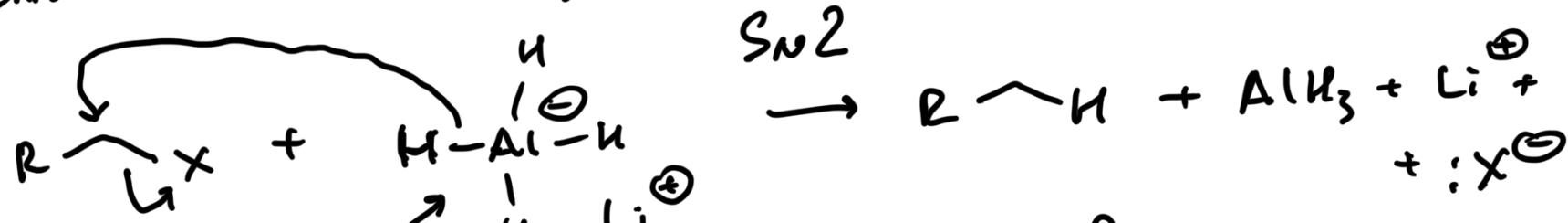


# Reduction with hydrides: polar C–X σ bonds

Reduction of alkyl halides and epoxides. Mechanism and selectivity



Lithium aluminum hydride



# Oxidation

What makes a good oxidant? Peroxides and metal oxides

# Oxidation

Overview of oxidation reactions

# **Oxidation: epoxidation of alkenes**

Oxidants and mechanism

# **Oxidation: epoxidation of alkenes**

Stereochemical aspects of epoxidation