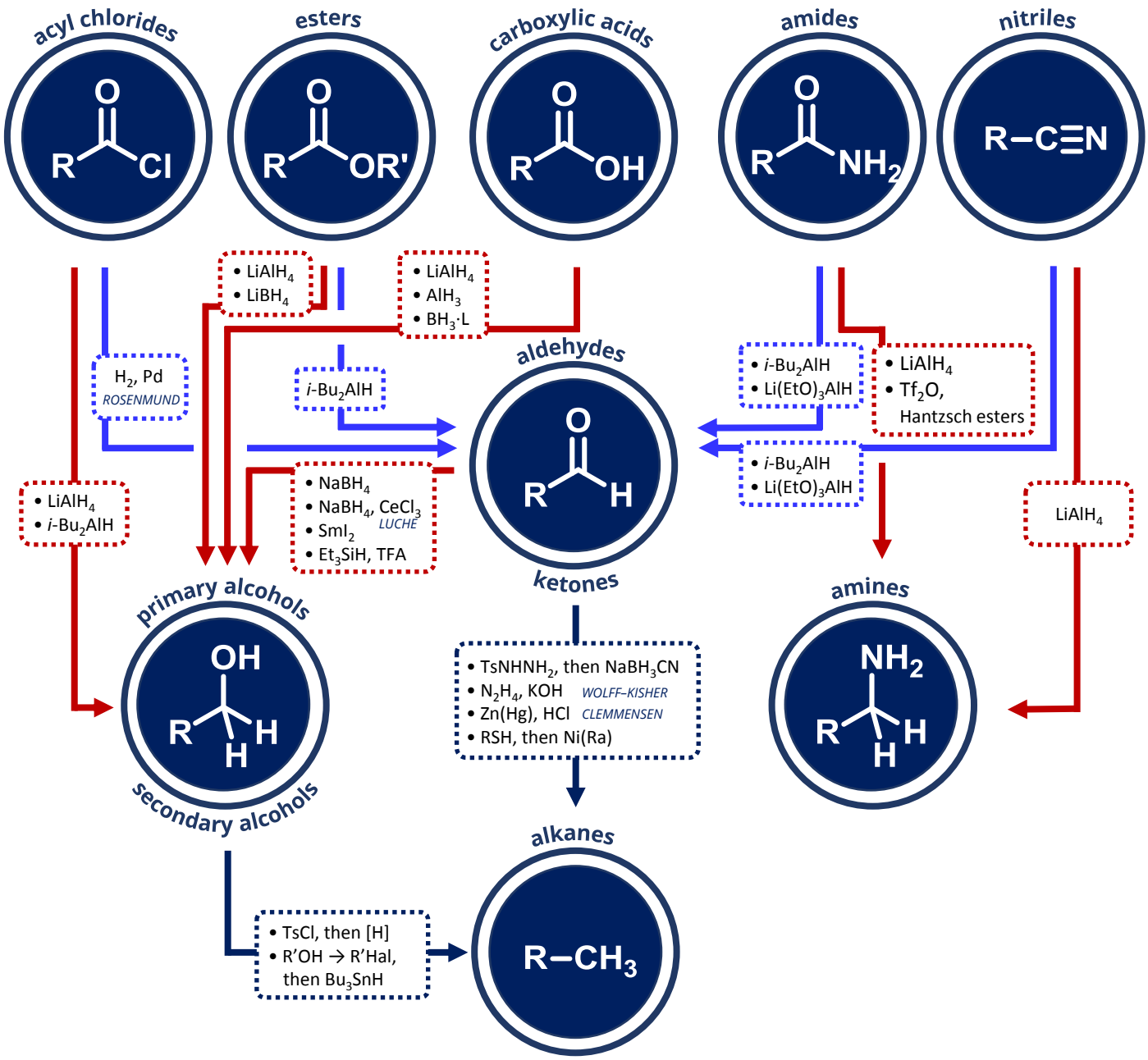
A Quick Guide to
REDUCTIONS IN ORGANIC CHEMISTRY



COMMON REDUCING AGENTS

$LiAlH_4$ — **LITHIUM ALUMINIUM HYDRIDE** (LAH)

Non-selective reagent for hydride transfer reductions. Reacts with carboxylic acids, esters, lactones, anhydrides, amides and nitriles, converting them into alcohols and amines. Ketones, aldehydes, epoxides, alkyl halides are also reduced with lithium aluminium hydride.

$LiBH_4$ — **LITHIUM BOROHYDRIDE**

Allows for selective reduction of esters in the presence of carboxylic acids, amides and nitriles. Also reacts with aldehydes, ketones and epoxides.

$NaBH_4$ — **SODIUM BOROHYDRIDE**

Reduces aldehydes and ketones to corresponding alcohols. Sodium borohydride is not reactive to esters, epoxides, lactones, carboxylic acids, nitro compounds and nitriles, but reduces acyl chlorides. In combination with $CeCl_3$ allows for selective reductions of α,β-unsaturated carbonyls without reacting with C=C-bonds.

i-Bu_2AlH — **DIISOBUTYLALUMINIUM HYDRIDE** (DIBAL, DIBALH, DIBAl-H)

Reduces esters and amides (also Weinreb amides) to corresponding aldehydes. Nitriles are reduces to aldehydes too via imine formation step.

SmI_2 (samarium iodide)
Selective reducing agent for carbonyl compounds and halides in the presence of esters and carboxylic acids.

BH_3·L (borane complexes)
Reduce carboxylic acids in the presence of esters, amides and halides.

AlH_3 (aluminium hydride, alane)
Powerful reducing agent, which reacts with acids, esters, amides, nitriles, aldehydes, ketones, acyl chlorides and others.

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