Amino Acid Synthesis:

Aside: Problem--both the amino group and the carboxy groups are reactive sites.

"Protecting Groups" needed

Easily installed at one functional group

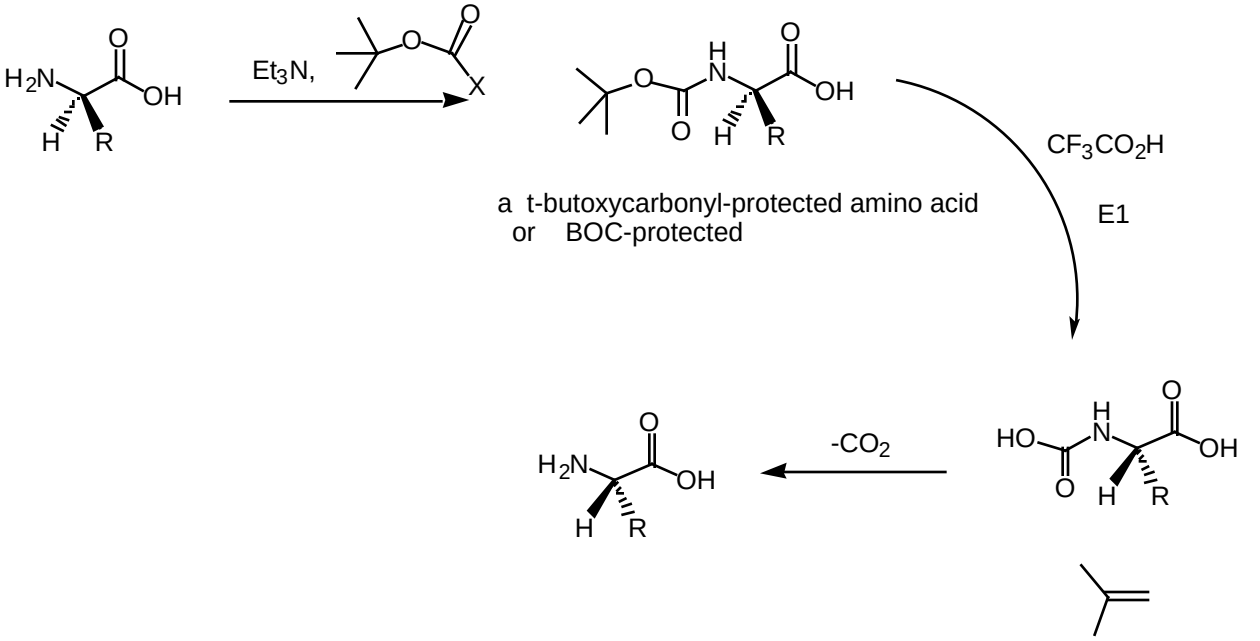
Modify the reactivity of that group

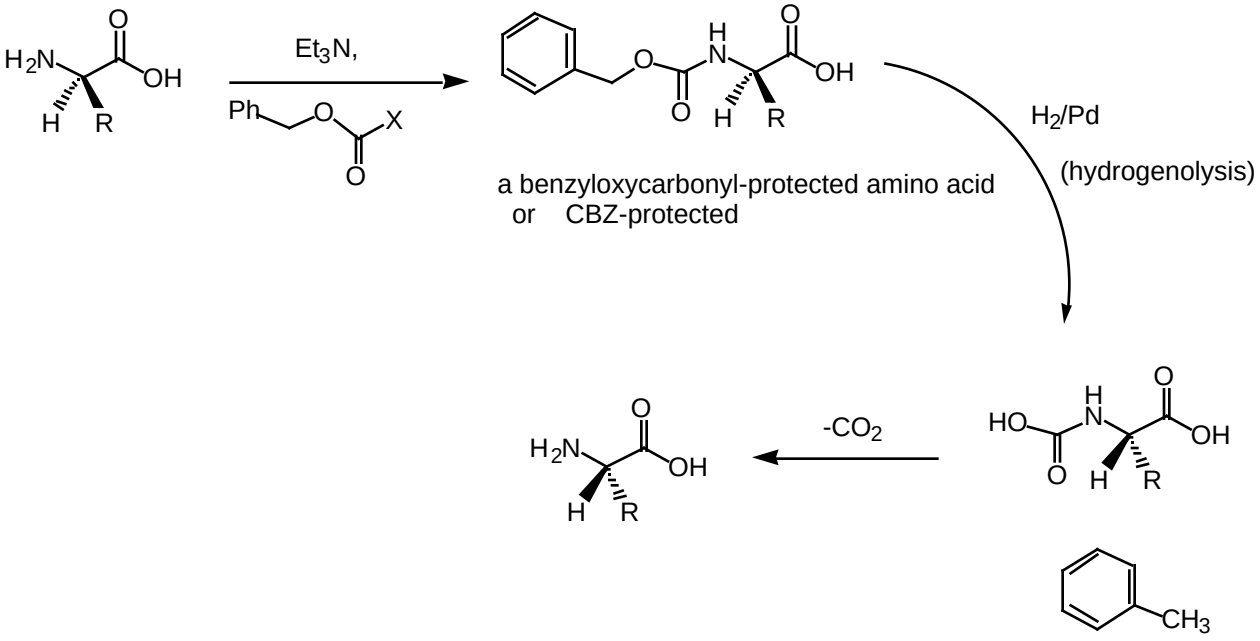
Stable to desired reaction conditions for a change elsewhere in the molecule

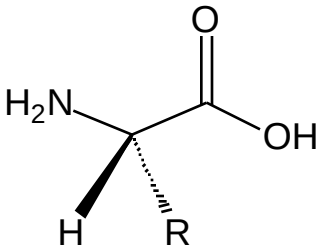
Easily removed to reveal the original functional group

For amino groups: form amides

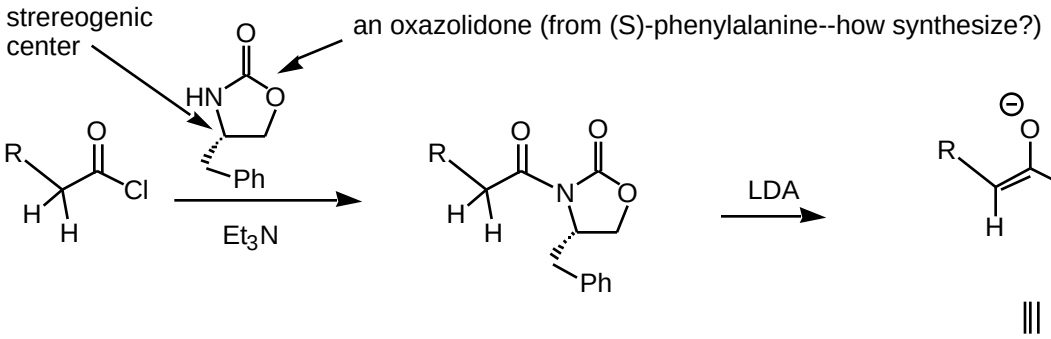
Two common examples:



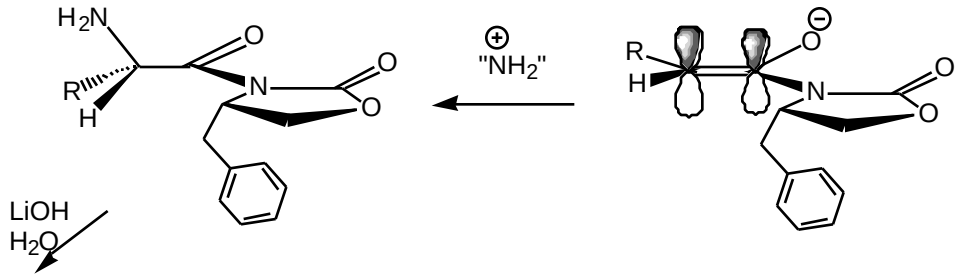


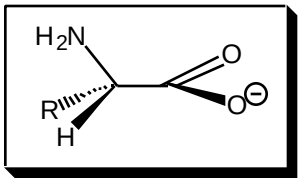


Add electrophilic nitrogen to asymmetric enolate:



transfer chirality from oxazolidone to the amino acid product

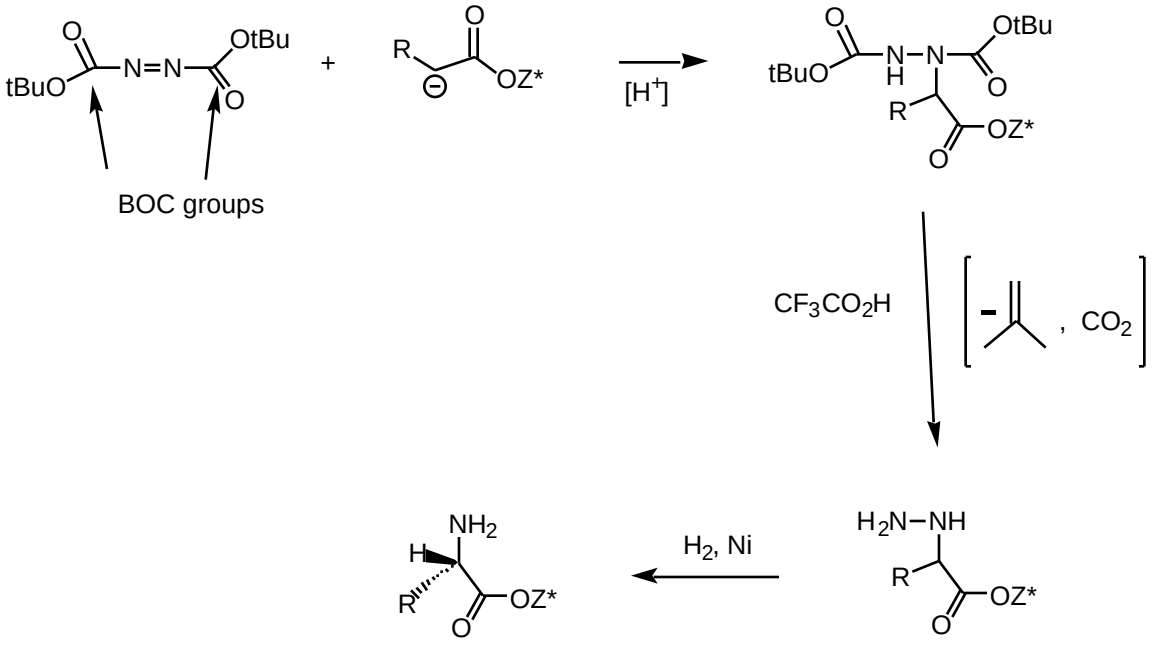




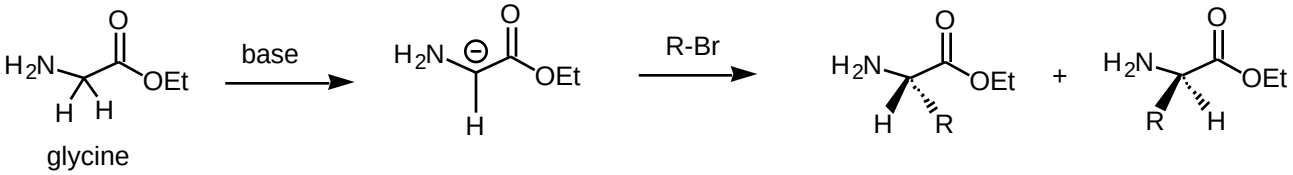
Other oxazolidone gives the other enantiomer.

What NH_2^+?

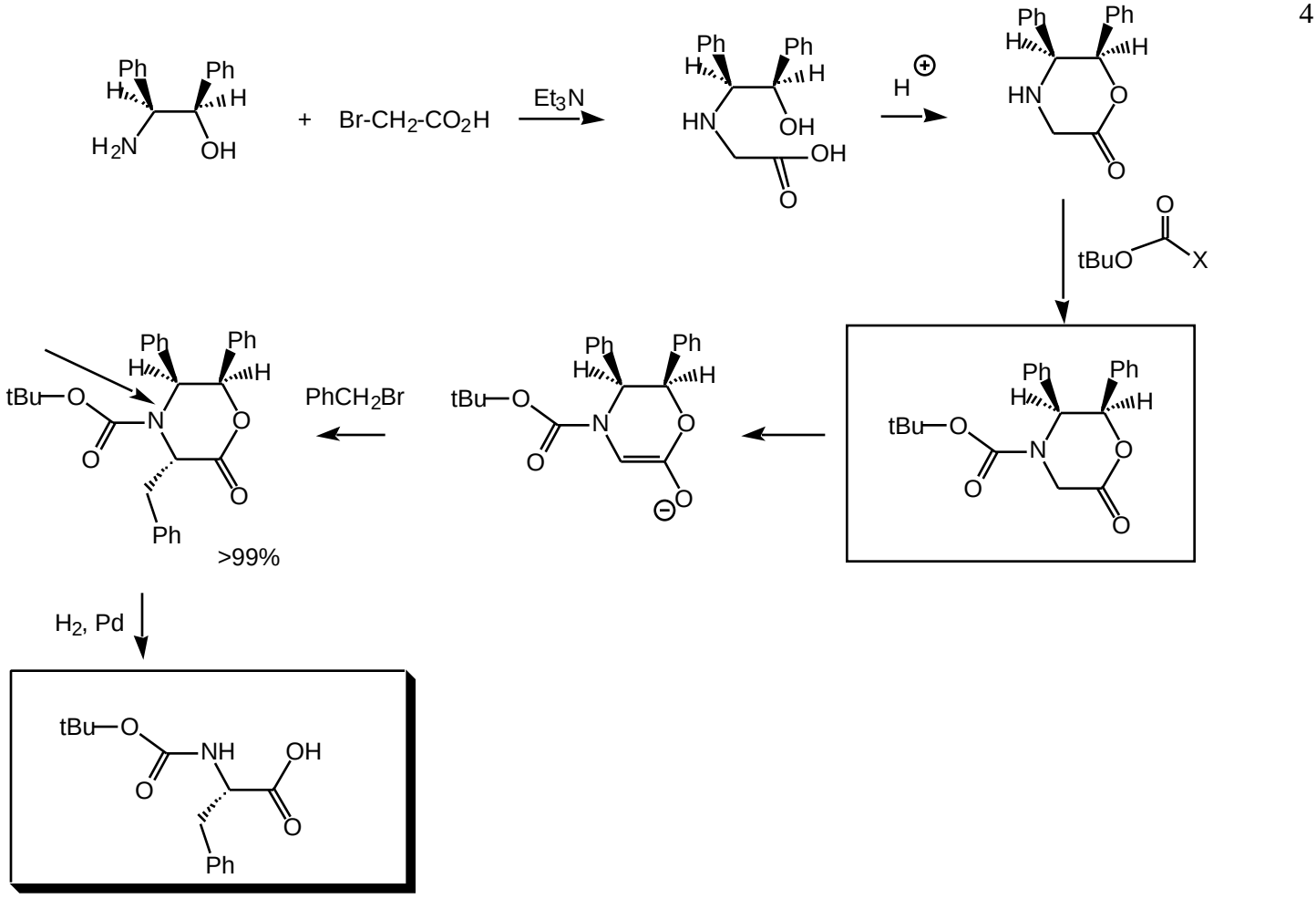
General:



Alternative: Add the side chain stereospecifically with the nitrogen already present.

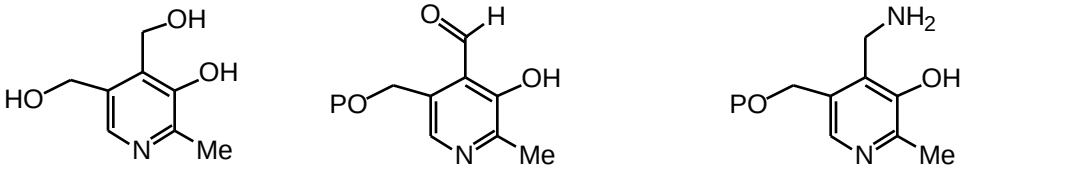


Make the glycine asymmetric:



BIO-synthesis of amino acids:

enzyme cofactors for introduction of amino groups:



pyridoxine (vitamin B_6)

pyridoxal-5'-phosphate [P = -OPO_2OH (-)]

pyridoxamine-5'-phosphate

Key process: