Epoxides cleaved by both acid and base

Base

$\text{CH}_3\text{CH}_2\text{O}^\ominus \overset{\text{Na}^\oplus}{\text{CH}_3\text{CH}_2\text{OH}} \rightarrow \text{OCH}_2\text{CH}_3$

In basic conditions, this is an Sn2 reaction where the nucleophile attacks the less substituted carbon of the three numbered rings.

Acid

$\text{H}_2\text{O}^\ominus \overset{\text{S}^\ominus}{\text{O}^\ominus \text{H}} \overset{\text{cat.}}{\text{CH}_3\text{OH}} \rightarrow \text{OH}$

In cases where stereochemistry is relevant, this reaction proceeds with inversion at the attacked C.
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Review

- only works if epoxide is not substituted (must have two H's on both carbons of the epoxide)
- MgBr works the same way
- C-C bond forming rxn which extends the chain by two carbon atoms
Li + CuCl → Cu + LiCl

* Skip higher order cuprate

Cuprates can be used in reactions with substituted epoxides for the synthesis of 1,2 diols.

H₃O⁺

H₂O + enant. trans diol

mCPBA
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\[
\text{NaHSO}_3 \text{ is a reducing agent which reduces the Os.}
\]

\[
\text{trimethylamine oxide (reoxidizes Os so we need less.)}
\]

low yield because of other rxn

Happy Thanksgiving!