

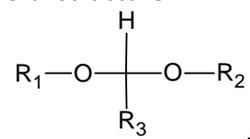
Answer on Question#39177-Chemistry-Organic Chemistry

Question

Acetals are stable to alkali, not to acid - Explain.

Answer

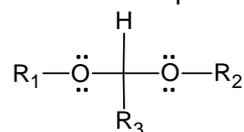
Acetals are ethers of the following general structure:



wherein $\text{R}_1, \text{R}_2, \text{R}_3$ – alkyl groups.

Not only acetals but any ethers do not react with an alkali but react with an acid.

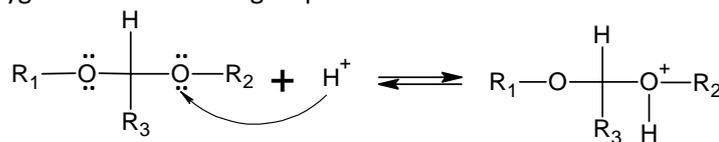
The oxygen atoms of the ether groups have two lone pairs of electrons:



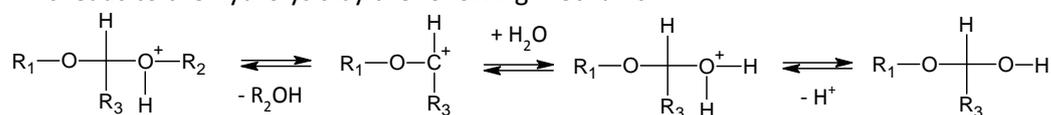
The lone pairs of electrons are nucleophilic, and thus ethers, including acetals, readily react with electrophiles and do not react with nucleophiles.

A hydroxyl ion OH^- is a nucleophile, that is why acetals, like other ethers, are stable to alkali.

A proton H^+ formed as a result of an acid dissociation is an electrophile, that is why it attaches to the nucleophilic oxygen atoms of ether groups:



This leads to the hydrolysis by the following mechanism:



The formed hemiacetal may hydrolyze further:

