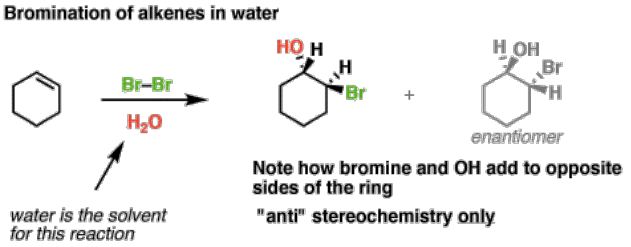
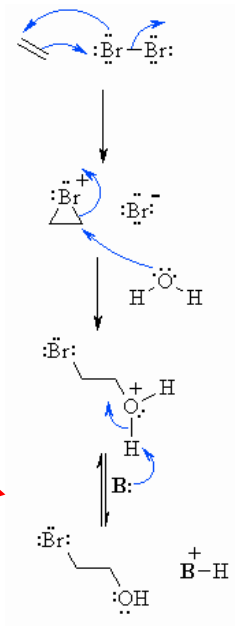
Addition of bromine in the presence of water

- When water is present in the reaction of Br_2 with a C=C bond, a 1,2-bromoalcohol (bromohydrin) is formed
- Mechanism similar but water acts as the nucleophile in the second step

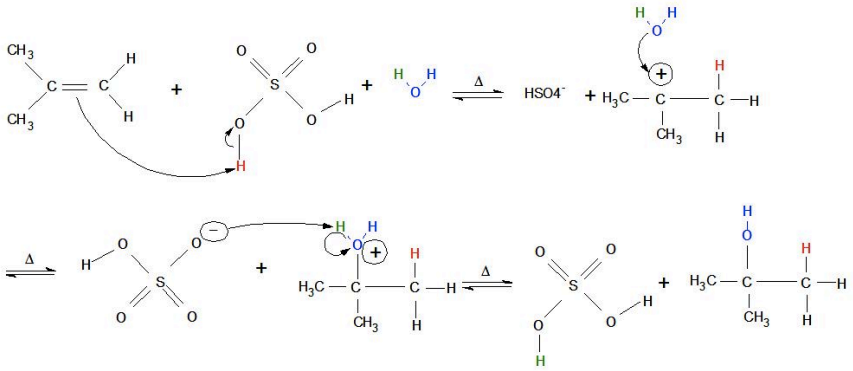


- If both Br^- and H_2O acted as a nucleophile would produce a mixture of bromohydrin and 1,2-dibromide
- Br^- stronger nucleophile but major product depends on the concentration of the nucleophile as this increases the rate of the ring opening
- Reaction with water is regioselective- will attack the more substituted C in the bromonium ion- this atom form a longer and weaker bond to the Br because better at stabilizing the positive charge (overcomes fact that sterically hindered)
- In the transition state for ring opening of the bromonium ion, breaking of the C-Br bond occurs to a greater extent than formation of the new C-O bond- described as a loose S_N2 transition state



Hydration reactions

- Alkenes react with water in the presence of a strong acid to form alcohols- water adds to the C=C bond
- The C=C bond is protonated to form a carbocation- regioselective for unsymmetrical alkenes- tertiary carbocation formed more readily- leads to selectively formed Markovnikov product
- A nucleophile then reacts with the carbocation- nucleophile can be water or the conjugate base of the acid- nature depends on concentration of the acid- when dilute water reacts, when concentrated conjugate base reacts
- Oxonium ion is formed and water reacts with this to form an alcohol
- All steps reversible- dehydration possible



Addition of borane to alkynes followed by oxidation

- Aldehydes/ketones formed from alkynes by reaction of the C=C bond with diborane followed by oxidation using hydrogen peroxide/ sodium hydroxide
- Terminal alkyne RCCH reacts for form aldehyde, internal alkyne RCCR reacts to form ketone
- Mechanism similar to that of addition of an alkene but stage 3 produces an enol that rearranges to form an aldehyde
- The equilibrium between an aldehyde/ ketone and an enol is called tautomerism