

Bromination Test

Functional Group(s): alkenes, alkynes, 1°, 2° benzylic carbons

Known(s): Alkyl bromide starting material; Alkene standard(s) for your reaction

Procedure

Set up a test tube rack containing 3-4 small (75mm X 12mm) test tubes. Be sure that the test tubes are clean and dry. Label the test tubes 1-3. In test tube 1, add 2-4 drops of the alkyl bromide, in test tube 2 add 2-4 drops of the reaction mixture and in test tube 3 add 2-4 drops of the alkene. (Use an additional test tube if you have two alkene standards). Add 1-2 drops of the Br₂ in CCl₄ solution to each test tube. Do not add an excess of the bromine reagent. The bromine reagent is brown or yellow-brown in color. Observe each tube for the dissipation of the brownish color and compare the results of the knowns with the unknowns.

Results

The dissipation of the brown color of the bromine reagent indicates that the tested compound contains an unsaturated hydrocarbon that is not aromatic. Benzylic carbon or nitrogen atoms that are either primary or secondary will also react with bromine and cause a dissipation of the brown color.

Theory

Reaction of bromine with alkenes or alkynes occurs through an electrophilic addition mechanism. The brown colored bromine reagent becomes incorporated into the organic hydrocarbon, producing a colorless product. If the bromine reagent is used in excess, or if no reaction occurs, the solution will remain brownish in color. Bromine may also react with benzylic atoms through a radical allylic halogenation mechanism. The pi bonds of the benzene ring do not react, however, the benzylic atom of toluene will be brominated in this reaction.

