

Reactions of butanols with hydrobromic acid essay sample

[Food & Diet](#), [Alcohol](#)



In this experiment, 1-butanol or 2-butanol will be converted to the corresponding alkyl bromide with HBr, while using sulfuric acid as a catalyst. The sulfuric acid will accelerate the chemical reaction without being consumed in the process, it will increase the concentration of the protonated alcohol, which then can form an alkyl bromide by either an SN1 or SN2 reaction.

The reaction for both mechanisms depends on the concentration of protonated alcohol and the catalyst should increase the rate of the reaction.

This could increase the amount of alkyl bromide produced, but it could increase the side reactions as well which would reduce product yield.

Therefore this experiment will test different ratios to determine the best cost ratio.

Procedure:

Reaction:

1. Assemble an apparatus for heating under reflux using a 50-mL round-bottomed flask, a water cooled reflux condenser, and a gas trap containing 1 M NaOH. The gas trap can be omitted if you are under a fume hood.
 2. Weigh 72.0 mmol of your assigned alcohol (1-butanol or 2-butanol) into the round-bottomed flask.
 3. Cool the flask in ice water and under the hood cautiously add 10.0 mL (89 mmol) of 48% aqueous hydrobromic acid. Then add your assigned volume of concentrated sulfuric acid.
 4. Drop in some boiling chips and heat the mix under reflux for one hour from the time the solution starts to boil.
- Separation:

5. Codistill the alkyl bromide with the water present in the reaction mix, using a simple distillation apparatus (no additional funnel) with a graduated cylinder as the receiver.
6. Stop the distillation when the distillate is no longer cloudy and the organic layer no longer increases in volume over a period of 5-10 minutes.
7. Add 10 mL of water to the distillate, shake the mix in a separatory funnel, and separate the layers cleanly. If you're not sure which is the organic layer, test a drop of each layer with a drop of water.
8. Cautiously wash the organic layer with 5 mL of cold concentrated sulfuric acid and save the top layer.
9. Then wash it with a 10-mL portion of water followed by a 10-mL of saturated aqueous sodium bicarbonate, saving the bottom layer each time.
10. Dry the alkyl bromide with a little anhydrous calcium chloride.
11. Decant and weigh the product at this point, and report the crude yield.

Purification and Analysis

12. Purify the alkyl bromide by simple distillation from a 25-mL boiling flask (small-scale distillation apparatus can be used).
13. Collect the product over a 3-4° range centered around the expected boiling point.
14. Measure the mass of the purified product.
15. Obtain infrared spectrum.
16. Turn in the product