14.7: DETERMINING ALCOHOL CLASSIFICATIONS IN THE LAB - ALTERNATE REACTIONS

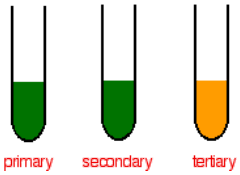
USING ALCOHOL REACTIVITY TO DISTINGUISH BETWEEN CLASSIFICATIONS

The presence of an alcohol can be determined with test reagents that react with the -OH group. The initial test to identify alcohols is to take the neutral liquid, free of water and add solid phosphorus(V) chloride. A a burst of acidic steamy hydrogen chloride fumes indicate the presence of an alcohol. Subsequent tests are needed to distinguish between alcohol classifications.

DETERMINING THE TERTIARY ALCOHOL

A few drops of the alcohol are added to a test tube containing potassium dichromate(VI) solution acidified with dilute sulfuric acid. The tube is warmed in a hot water bath.

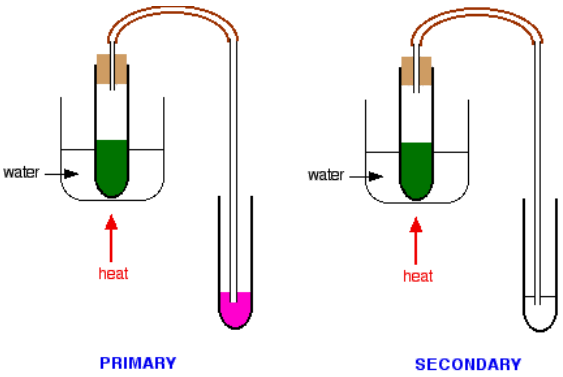
After heating, the following colors are observed:



In the case of a primary or secondary alcohols, the orange solution turns green. The Schiff's test will need to be performed to distinguish between the primary and secondary alcohols. With a tertiary alcohol, there is no color change.

SCHIFF'S REAGENT - DISTINGUISHING BETWEEN THE PRIMARY AND SECONDARY ALCOHOLS

Schiff's reagent is a fuchsian dye decolorized by passing sulfur dioxide through it. In the presence of even small amounts of an aldehyde, it turns bright magenta. It must, however, be used absolutely cold, because ketones react with it very slowly to give the same color. Heat obviously causes a faster color change, but is potentially confusing because of the competing ketone reaction. While warming the reaction mixture in the hot water bath, pass any vapors produced through some Schiff's reagent.



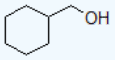
- If the Schiff's reagent quickly becomes magenta, then an aldehyde was produced from a primary alcohol.
- If there is no color change in the Schiff's reagent, or only a trace of pink color within a minute or so, then no aldehyde was produced and a primary alcohol is not present.

A secondary alcohol is identified by the color change with the acidified potassium dichromate(VI) solution and the absence of a color change with the Schiff's reagent might.

Exercise

13. The chromic acid oxidation test and Schiff's test are performed on the three alcohols shown below. Describe the expected test results.

a) 

b) 

c) 

Answer

13.

a) The chromic acid solution turns green, but the Schiff's reagent remains colorless.

b) The chromic acid solution turns green, and the Schiff's reagent turns magenta.

c) The chromic acid solution remains orance, and the Schiffs reagent remains colorless.

CONTRIBUTORS

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