

Organic derivatives of water biology essay



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Alcohol as one of the hydroxyl groups has also different kinds namely Primary, Secondary, Tertiary, Phenols and Ethers. Each kind has different characteristics and through several experiments and observations, each define characteristics will emerge. Lucas Test, Bayer's Test, Chromic Acid Oxidation and Ferric Chloride Test will be used. Solubility with water and sodium chloride are also used in this experiment. Bayer's test will produce brown precipitate if a reaction will undertake. For Lucas Test, cloudiness will occur. For Ferric Chloride Test, from yellow-orange color, the solution will become brown/black/purple if a reaction occurs. And for Chromic Acid Oxidation, from yellow-orange color, the solution becomes greenish/ bluish. Ether appears to be unreactive with the entire test made while Phenol appears to be the only reactive substance with Ferric Chloride Test among other alcohols. Tertiary alcohol appears only positive with Lucas test while the Primary and Secondary alcohol appears positively with Bayer's and Chromic Acid Oxidation. Meanwhile, secondary alcohol appears to be cloudy in Lucas test unlike with primary alcohol which appears to be unreactive with Lucas test. ABSTRACT

INTRODUCTION

An alcohol is one of the functional group which belongs to the hydroxyl group. They have two reactive covalent bonds, C-O bond and the O-H bond. (1) They also contain both polar (OH group) and nonpolar alkyl group which is a factor why alcohol tend to be water soluble. Water solubility decreases as alkyl chain length increases. (2) There are also different types of alcohol based on their position on the carbon chain. Primary alcohol is usually used as o topical disinfectant and is widely used as a solvent in pharmaceutical

arrangements. They are also used in alcoholic beverages fuel additive and used in organic synthesis. Secondary alcohol is usually used as a solvent for many natural resins. One of the main components for the manufacture of floatation agents, flavors and perfumes is from Tertiary alcohol. It is also an octane booster in gasoline and is a dehydrating agent. Having characteristics of volatile, slightly soluble in water, and miscible with ethanol, Ethers are used as an anesthetic and external cleanser prior to surgical operations. (3) And phenols, having the chemical formula of, are used as a precursor to many materials and useful compounds. The said kinds of alcohols are experimented with diverse test for as to know their different chemical characteristics aside from their different uses in the environment and to us human.

MATERIALS AND METHODS

10 drops of ethanol, 2-butanol, tert-butanol, phenol, diethyl ether, and 3 unknown samples are placed in different test tubes. A new set of these samples are prepared individually for each test. The test used were solubility in water, solubility in NaOH, Bayer's oxidation, Chromic acid oxidation, Lucas Test and Ferric Chloride test. For the solubility with water and NaOH, 10 drops of the samples was used. In Bayer's Oxidation, 10 drops of Bayer Reagent was used, like with the Ferric Chloride test in which 10 drops also of Ferric Chloride was used. For Lucas test, 20 drop of Lucas Reagent. While on Chromic Acid Oxidation, 10 drops of and 6 drops of concentrated was mixed to obtain the desired reaction. In comparison of the given amount in the pre-lab papers, the amount used in the experiment is doubled in order to have larger amount which helps in easier observation of reaction and results.

RESULTS AND DISCUSSION

Alcohols can be categorized as a functional group in which it has two reactive covalent bonds C-O bond and O-H bonds. Few examples of alcohol are used in the experiment namely the ethanol, 2-butanol, tert-butanol, phenol and diethyl ether. Each example is demonstrated in Figure 1.

Figure 1: Different Alcohols

There are also different classifications of Alcohols. First one would be the primary alcohol or the alcohol is attached to the to only one alkyl group. Next would be the secondary alcohol in which the alcohol is attached into two alkyl group. Other kind of alcohol would be the tertiary group in which the alcohol is attached into three alkyl groups. Phenols are alcohols attached into a benzene ring. (4) At for the last example used in the experiment, dimethyl ether is an oxygen atom linking the carbon of two hydrocarbon radical groups. In order to differentiate to identify these alcohols based on their nature and solubility. The results are noted in table as shown in Table 1.

Table 1: Solubility and Reaction Profile**Solubility in****Solubility in NaOH****Bayer's Oxidation****Chromic Acid Oxidation****Lucas Test****Ferric Chloride Test****Visible + Result****soluble****soluble****Brown Precipitate****Green- Blue Color****Cloudiness****Brown / Black/ Purple Color****Ethanol****++****++****+****++****—****—****2-Butanol**

+

–

+

++

+

–

Tert-butanol

+

–

–

–

++

–

Phenol

–

++

–

+

–

++

Diethyl Ether

–

+

–

–

–

–

Unknown 1

–

–

++

++

–

–

Unknown 2

–

–

–

–

–

–

Unknown 3

++

++

–

+

–

++

Legend:**++fast reaction/ completely soluble****+slow reaction/ slightly soluble****-no reaction**

Based on the results gathered, the profile of the unknown 1 shows that it was a primary alcohol. Primary alcohols appear to be positive in Bayer's Oxidation and Chromic Acid Oxidation. For the unknown 2, the data gathered shows that it was ether. Ether appears unsoluble and unreactive with different reagents and test. Phenols appeared to be reactive with Chromic Oxidation Test and Ferric Chloride Test. Bayer's reagent have an original color of deep purple and when a reaction happens, it leaves a brown precipitate. An example would be its reaction on Ethanol. Bayer's Test appears to be reactive for Ethanol for the reason that it can oxidize primary alcohol. The pertinent reaction of Bayer's Oxidation in Ethanol is shown in Figure 2.

Figure 2: Pertinent Reaction of Ethanol in Bayers' Oxidation

Chromic Acid are generated after mixing and. Chromic Acid originally has yellow orange solutions and after it becomes reactive, its color changes into a green-blue solution. 2-butanol is used mostly for natural resins

(components of industrial cleaners and paint removers). It is also an element in aroma of apples and pears which also can be found in poultry manure. 2-butanol is one of the samples which appear to be reactive with Chromic Acid. (5) The general reaction of 2-butanol in Chromic acid was shown in Figure 3.

Figure 3: General Reaction of 2-butanol in Chromic Acid Test

Tert-butanol is one of the main components for the manufacture of floatation agents, flavors and perfumes. It is also an octane booster in gasoline and is a dehydrating agent. (5) Tert-butanol appears to be reactive only with Lucas test (). Lucas Reagent appears to be clear but when it becomes reactive, it appears to be cloudy. The general reaction of tert-butanol in Lucas reagent is shown in Figure 4.

Figure 4: General Reaction of Tert-butanol in Lucas Test

Ferric Chloride has a yellow-orange color and changes into black/brown/purple color after it has reacted with. Phenol, which was used as antioxidants and disinfectants and is also mildly acidic, appears to be only one which was reactive with Ferric Chloride Test. (6) Phenols, compared to cyclic and acyclic alcohol, are more acidic for the reason that phenol molecules have weak tendencies to lose H^+ ion from the hydroxyl group. It also reacts completely with aqueous NaOH to lose H^+ , whereas most alcohols react only partially. It also has resonance stabilization of the phenoxide anion by the aromatic ring. (7) There is also kind of Phenols in which they are created by adding OH/hydroxyl group in an aromatic ring. These are called Polyphenols. They guard cells and body chemicals against damage rooted by free radicals, reactive

atoms that give tissue damage in the body. (8) The general reaction of Phenol in Ferric Chloride Test is shown in Figure 5.

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Figure 5: General Reaction of Phenol in Ferric Chloride Test