What teaches williamson ether synthesis

The results indicated from the percent yield indicate that there were errors made and product from methylphenoxyacetic acid was lost. It also can indicate that impurities were removed during recrystallization. The melting point concludes that the unknown cresol that was used in this experiment was in fact the meta-cresol. That was determined because the product received, methylphenoxyacetic acid, was identified to be in the meta position. The few degrees off that the methylphenoxyacetic acid collected in this experiment can be attributed to water that was still held within the crystals.

Discussion and Analysis

Cresol, chloroacetic acid, and KOH were reacted in order to form an ether, methylphenoxyacetic acid. The KOH was added into the reaction so that it initiate the reaction to occur. The reaction allowed for the deprotonation of the cresol and the methylphenoxyacetic acid and it formed the alkoxide ions. This initiated the nucleophilic and electrophilic occurrences that allow for an Sn2 reaction to take place The cresol alkoxide ions were then proponated whenever it was extracted with the ethyl acetate which made it move to an aqueous layer. The aqueous layer was extracted (twice to ensure most organic layer was kept) were and set aside while the organic layer that contained the the methylphenoxyacetic acid ion was kept. The organic layer was kept so that it could be proponated again but with potassium carbonate. The organic layer was collected and crystallized with HCl.

After obtaining the solid crystal form of methylphenoxyacetic acid, it was recrystallized through water so that impurities were removed. These procedures each played a key role in the synthesis of the ether, but due to to

the many procedures that included moving around the organic product, errors were made and product was lost. This is evident at the overall yield was 52. 9% and not 100%. Product was even lost during weighing when the initial scale used to weigh the product wasn’t working correctly and the product had to be moved.

During the extraction of the organic layer, it is possible that some of the organic layer was not collected even though the aqueous layer was ran through the separatory twice to try and obtain as much organic (product containing) layer. In identifying the unknown, which was the cresol used at the beginning of the reaction, a logical thought processes was used in that collecting the ether and determining the melting point of the ether (methylphenoxyacetic acid) would indicate which form of methylphenoxyacetic acid was created therefore determining which form of the cresol was used. This thought process was used to generate the hypothesis that the form of position of the ether would also indicate the form of the alkoxide. There were three options of what form the ether, methylphenoxyacetic acid, could come in, each indicating the position of substituents. There is meta, para, and ortho forms. The meta form of methylphenoxyacetic acid has a melting point of 101-105°C, the para form has a melting point of 140-142°C, and the ortho form has a melting point of ~154°C.

After conducting the melting point examination for the product that was retrieved in the lab the melting point was 101. 5-103. 2 indicating that the likely form of the methylphenoxyacetic acid was in the meta form. This determination led to the conclusion that the unknown cresol was also in the

meta form which was confirmed by Dr. Brown. This lab experiment could be improved and produce better outcomes if there were a way to minimize the amount of times the product had to be transferred or moved in order to calculate a better overall yield. The procedure provided as a bases could also be more clear in what it is calling for, such as removing the water after it was used for a cleanse, so that students who need more direction do not make errors that could lead to more impurities in their products. This was an error that was made in this experiment.

Conclusions

Williamson Ether Synthesis is a reaction process used to create ethers. The Williamson Ether reactions consist of an alkoxide that will react with a primary alkyl halide or a sulfonate ester. In this experiment, an unknown cresol was used as the alkoxide, chloroacetic acid as the alkyl halide, and the KOH as the strong base. l The hypothesis was not rejected; an unknown form alcohol used in a williamson ether synthesis can be determined via the melting point and form determination of the ether. This was proven true as the ether created through Williamson Ether Synthesis, methylphenoxyacetic acid, was determined to be in the meta form and the unknown substance was identified as meta as well.

The experiment educated on the importance of reading each step thoroughly as errors were made in the procedures; the water was never extracted after being used to clean, causing impurities. This experiment called for patience as there needed to be a waiting period for the crystals to dry. Initially, when being testing for melting point, the crystals of methylphenoxyacetic acid were melting immediately after being put into the apparatus at around 95°C.

It was then understood that it was because the crystals were not fully dried and contained water. As seen in the reagent table, water has a melting point of 0°C therefore it was lowering the melting point of the ether.