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*Chemical Comparison Of The Relative Efficiency Of The 2-Hydroxymethylphenol Synthesis Of Aspirin*

This project aimed to develop an alternative synthesis method for aspirin that uses 2-hydroxymethylphenol-B-D-glucopyranoside as a base compound instead of the usual reagents. The efficiency of the synthesis method was compared to the Bayer method as a benchmark and was analyzed using stoichiometric calculations, percent purity calculations, and analyzing the twelve principles of green chemistry. Laboratory standard organic synthesis procedures were used to formulate aspirin including fractional distillation. The purity was analyzed from melting point and acid-base titrations. To analyze the principles of green chemistry the EPA's SMART program was used to: calculate the amount of waste, determine the areas of concern associated with the reaction, and identify areas that could be improved. Based on the twelve principles of green chemistry it was discovered that the alternative synthesis method produced 100% waste as a percent of production volume. Furthermore, it produced 92% yield on average and had approximately 99% purity. The alternative synthesis method was determined to have 49.4% atom economy which is very low. From the EPA's SMART program it was determined that the areas of concern for the synthesis were related to the significant quantities of Tier 3 chemicals present and the excessive total waste present. The excessive waste present and the low atom economy mitigate the overall effectiveness of the synthesis even though it follows many of the other principles of green chemistry. However, the stoichiometric data and identity of the waste products seem to suggest that the glucose and water might be able to be reused in the synthesis, thus reducing the amount of total waste and increasing the atom economy.