Abstract

Green Chemistry is the utilization of a set of principles that reduces or eliminates the use or generation of hazardous substances in the design, experiment, manufacture and application of chemical products. The reason that Green chemistry is being adopted so rapidly around the world is because it is a solution for economic prosperity but is not harmful to the environment and human health.

Therefore, to practice the principles of green chemistry, we explored using vegetables as biocatalysts instead of chemicals for reduction and oxidation reactions. Vegetables are a renewable natural resource. Vegetables were bought from the market in Phnom Penh city. Vegetables were washed with water and then maintained vegetable in a 5.25% sodium hypochlorite aqueous solution for 20 min. Then vegetables were washed with ethanol and again with deionized water. After peeling vegetables were washed with ethanol and deionized water for the last time. Vegetables were cut into small thin pieces by grating or using a blender. After that, took out vegetable 20g, added water 80ml, and added starting material (ketones, aldehyde and alcohol) 100mg or 100. The reaction mixture was incubated on magnetic stirrer at room temperature for several days. The reaction mixture was extracted with ethyl acetate (EtOAc). The resulting product was analyzed with Thin-Layer Chromatography (TLC) and Gas Chromatography (GC). The results show that root and tuber vegetables gave the highest yield, whereas fruit vegetables gave an intermediate yield. Leafy vegetables and herbs and spices vegetables gave the lowest yield. Reduction of Acetophenone gave 67.6%, 75.6% and 63.5% of 1-phenylethanol by using carrot, taro and winged yam, respectively. Oxidation of 1-phenylethanol gave 95.6% and 83.9% of Acetophenone by using carrot and taro, respectively. In addition the reduction of Benzaldehyde gave the highest yield, 99.52%, of Phenylmethanol by using taro as the biocatalyst, but oxidation of phenylmethanol when using taro gave a poor yield.