Discussion:

The recovery yield of the 4-nitrobenzoic acid was about 88.4%, and the percent yield of the ethyl-4-nitrobenzoate was 80.259%. Both percentages show a pretty good recovery as typical recoveries are 70% or more for both the carboxylic acid and the ester. I could have had a higher yield for the ethyl-4-nitrobenzoate for a few reasons. At the beginning of the procedure, my ethyl-4-nitrobenzoate dissolved very quickly in the ethanol over a relatively low temperature. Because of this, I assumed that the solution was ready to crystalize. Due to this assumption, I took the solution off the heat at the first bubble I saw, which was my mistake. I should have let the solution achieve a gentil boil so the solution would have been more uniform (though the solution was clear when taken off the heat). After the solution was chilled and crystalized, I may have lost some of the crystals while vacuum filtering. The filtrate appeared to contain a few flakes, and when washing the crystals again with the filtrate (as instructed to by the lab manager), the same amount of flakes remained in the filtrate. Following this step, I washed the crystals twice more, but with a small amount of ethanol. This may have dissolved some of the crystals as I had used room-temperature ethanol for my second wash, but cold ethanol for my final wash. Finally, when attempting to record the mass of the crystals, I may have left some of the crystals on the sides of the Buchner funnel. The 4-nitrobenzoic acid procedure was done by my lab partner Adriana. The average melting point range recorded for the 4-nitrobenzoic acid was 216 C – 220 C, and the average melting point range for the ethyl-4-nitrobenzoate was 44 C - 50 C. I would consider both crystals pure as the melting points were close to the chemical’s actual melting points (237C and 59 C respectively), and their ranges were relatively small.

Conclusion:

In this lab, we aimed to recrystallize 4-nitrobenzoic acid and ethyl-4-nitrobenzoate while also determining their melting point ranges to find out if they were pure or not. The first part of the procedure included us dissolving each compound separately into hot ethanol, and continuously adding until a gentil boil was achieved and the solution became opaque. We then allowed the solution to cool enough to crystalize, by which we used the lab bench and then the ice bath. After crystallization had occurred, the crystals were extracted using vacuum filtration and then weighed. Some of the crystals were then kept in capillary tubes and placed in a melting point apparatus to determine their melting point ranges. I received an 88.4% recovery for the 4-nitrobenzoic acid, and an 80.259% recovery for the ethyl-4-nitrobenzoate. Though these values could have been higher, this lab was an overall success.