Simple Distillation and Gas Chromatography

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Results and Discussion

The purpose of this lab was to use the process of simple distillation in order to purify a mixture of volatile compounds. From the simple distillation process, four extractions were taken and put through the gas chromatography process. From the gas chromatography test, the presence of each compound was clearly presented on a graph. The compound heated was a mixture of hexane/octane. It took twenty minutes before any condensation formed in the distillation head. As the distillation head filled, the extractions were pipetted out while recording the starting and ending temperatures. The first fraction was in the temperature range of 23.3ºC-40.0ºC and was shown to be mostly composed of hexane from the gas chromatography. This is proven by the large peak being 96.89% of hexane at 0.54 minutes compared to the small peak of 3.11% octane at 1.03 minutes. The second fraction was collected, but was not put through the gas chromatography.

The third fraction collected started with the temperature of 37.3ºC and ended with the temperature of 31.4ºC. This extraction followed in the path of the first extraction and even increased with the percent of hexane present. At 0.54 minutes there was a 97.37% of hexane and at 1.04 minutes there was a 2.63% of octane. This proved that the distillation process was working because most of the extraction is supposed to be predominately hexane.

The fourth and final extraction was taken from the liquid remaining in the conical vial. Due to the previous extractions containing hexane majority, it would make sense that the conical vial would be mostly octane. This prediction was proven by the fourth gas chromatography test. The taller peak in this graph was 82.17% octane at 1.12 minutes and the smaller peak was 17.83% hexane at 0.61 minutes. This experiment was deemed successful due to the first two chromatography's having a larger presence of hexane over octane and the last chromatography having more octane than hexane, which matched the predictions for this experiment.

The data collected for hexane/octane was then compared with another group data who went through the same process except with a heptane/octane mixture. For the heptane/octane mixture, the amount of octane increased with each extraction taken. There is a larger difference in boiling points for the hexane/octane mixture than there is for the heptane/octane mixture. From the gas chromatography graphs of both mixtures, it could be concluded that the hexane/octane mixture had a better purification process from the distillation due to its prominent peaks. Due to this conclusion, it can be said that simple distillation works better on mixtures with a larger difference in boiling points. However, fractional distillation works better with similar boiling points of compounds.