Experiment 3: Isolation of Caffeine from Tea

I. Objectives

Caffeine was extracted from four tea bags. The caffeine was then confirmed using Thin Layer Chromatography, as well as the melting point determination, and the Retention Factor of the standard and the extract was computed and thus compared.

II. Introduction

The goal of the experiment was to obtain a percent yield of caffeine and confirm its presence through Thin Layer Chromatography (TLC). The process starts with adding 7g sodium carbonate to the 4 tea bags with 50mL water in a 150mL beaker. The purpose of the sodium carbonate is to prevent tannins to combine with caffeine. Sodium carbonate converts the tannins into their sodium salts (ionic), which are not soluble in solvents like methylene chloride so it remains in the aqueous layer during extraction, therefore, it allows purer caffeine to be extracted. The beaker is then heated for 20 minutes, but not vigorously as it may lead to frothing and thus sample loss. The beaker is cooled in an ice bath afterwards and the liquid is decanted into a separatory funnel. To obtain residue, the tea bags are pressed with a test tube and pour the liquid obtained into the separatory funnel. 10mL of water is added to the tea bags and the process of pressing with the test tube is repeated. Afterwards, the black solution was washed with methylene chloride five times. The system should not be shaken because emulsions are being prevented. Instead, inverting the funnel slowly or using a test tube to pop the emulsions may be used. Emulsions occur here because of the sationing, which have similar properties to soap. The organic layer is then collected and dridd over sodium sulfate and it is then decanted into a round bottom flask, heavy for disullation. The methylene chloride was then distilled with the round bottom flask in a heat bath until around 5mL is left. The solution is then transferred to a pre-versited beaker then the round bottom flask is rinsed with 2mL methylene chlor te then put into the same beaker. The solution is then boiled again using a water but to dry it but should be overheat the residue. It is then weighed and the second put, TLC, is then performed. This for exchromatograph to the beak provided by the second put, the second put at the

determine the purity of a substance. A TLC plate was obtained and a line was drawn from its two. It was then labeled at the bottom end to take note which is the extract and which is the standard. Using two separate capillary tube, spot the two labels from the standard and the extract. Afterwards, using a mixture of benzene/ether/acetic acid/methanol, submerge the TLC plate with the bottom touching the mixture. The mixture must not go over the bottom line. Finally, after it reaches the end mark, let it dry for a while and subject it to UV and draw the results on the TLC plate. The retention factor of each spot is then computed and compared. The retention factor of a particular material is the ratio of the distance the spot moved above the origin to the distance the solvent front moved above the origin.

III. Results and Discussions	
Wt. Beaker	33.70g
Wt. Beaker +Caffeine	33.77g
Wt. Caffeine	(33.77-33.70)=0.07g
%Caffeine	(0.07g/0.36g*100)=19.44%
	(0.36 because 0.09g per tea bag; there are 4 tea bags)
Retention Factor of Standard	(1 cm/2.8 cm)=0.36 cm
Retention Factor of Extract	N/A
Accuracy	N/A
Melting Point	236.6 °C

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