The concentration of Caffeine in Soft Drinks Available in the Ugandan Market

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Declaration

I, Muwanguzi Joshua, declare that this research work is my original work otherwise cited, and where such has been the case, reference has been made and that the same work has not been submitted for any academic award to any other academic institution.

Signature..... Date..09/04/2023.....

Muwanguzi Joshua

Approval

This research work has been submitted for examination and has been approved by my supervisor.

Dr. Egor Moses

Signature.....  ..... Date.....09/04/2023.....

Dedication

I dedicate my work to my brother Mr. Burete Gerald, for his endless efforts and moral support towards my education that saw me succeed in everything.

Acknowledgement

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List of Acronyms and Abbreviations

CNS	-	Central Nervous System
ELSD	-	Evaporative Light Scattering Detector
FDA	-	Food and Drug Administration
IUPAC	-	International Union of Pure and Applied Chemistry
NDA	-	National Drug Authority
UNBS	-	Uganda National Bureau of Standards
UV-Vis	-	Ultra Violet -Visible

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Abstract

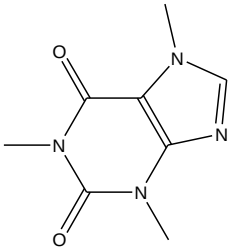
In the recent years, there has been an enormously high increase in the consumption of soft drinks. Such drinks are widely consumed by young people. This research was therefore done to determine the concentration of caffeine in five soft drinks since caffeine is one of the ingredients in these soft drinks. The determination of the amount of caffeine in these soft drinks was performed by a simple and fast UV spectrophotometric method. Carbon tetrachloride was used as the extracting solvent during the experiment at 270 nm wavelength while Sodium carbonate solution was used to dissolve the tannins in the soft drinks. Of all the five soft drinks, Novida was found to contain the least amount of caffeine (2.862 mg/100 mL), while Mountain Dew together with Pepsi-Cola contain the highest amount of Caffeine (28.994 mg/100 mL).

CHAPTER ONE: INTRODUCTION

1.1 Background

Caffeine is a naturally occurring alkaloid (Asma et al., 2016). It can be found in at least 63 plant species. Caffeine exits naturally in chocolate and in beans of some plants like cocoa. In coffee beans, caffeine concentration may range from (1.1-2.2 %), (3.5 %) in tea leaves, (1.5 %) in cola nuts and (0.03 %) in cocoa beans. Caffeine belongs to a class of organic compounds called methylxanthines (Hassan, Ashfaq, Khan, & Khan, 2020). The caffeine molecule has the chemical formula $C_8H_{10}N_4O_2$.

Caffeine is a common name for trimethyl xanthine and its IUPAC name is 1, 3, 7-trimethylxanthine or 3, 7-dihydro-1, 3, 7-trimethyl-1H-purine-2, 6-dione. It was first isolated in 1819 by a German scientist called Friedrich Ferdinand Runge (Asma et al., 2016). When purified, caffeine is intensely bitter white powder (Gupta & Gupta, 2016). Pure caffeine exists as odorless, fleecy masses, white, glimmering needles of powder. The molecular weight of caffeine is 194.14 g while its melting point is 236 °C (Mumin, Akhter, Abedin, & Hossain., 2006).



caffeine

Structure of caffeine

Caffeine (figure 1) is the most versatile compound in the sense that almost every human being is exposed to this compound via various beverages and medicine. This means that caffeine is a common ingredient of many beverages produced in Uganda such as soft drinks, energy drinks, coffee and a cup of tea made at home. Caffeine is widely used in many soft drinks as flavoring agent and is deliberately added to make people addictive to these drinks (Tautua, Martin, & Diepreye, 2013). It is a well-established fact that caffeine acts as a stimulant to the CNS and increases the activity of the brain through its adenosine antagonist (Diego, Juan, Juliano, & Marcos, 2017).

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