Qualitative analysis of Constituents of cold drinks: A Review

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Abstract-*Soft drinks are complex mixtures containing different variety of substances such as coloring compounds, flavoring agents, acidifiers, sweeteners preservatives. Research study shows all the soft drinks contain sugar both reducing and non reducing which are responsible for its sweetness. Carbon dioxide which gives frizzy effect as an ultimate taste quencher was present in most of soft drinks. Phosphorous, benzene, alcohol, citric acid, heavy metals and pesticides was present in most of the soft drink. Soft drink is not beneficial for health .Drinking soft drink regularly really is slow poisoning. The current review summarizes research carried out on Qualitative analysis of Constituents of cold drinks.*

Keywords-Soft drinks, sugar, Heavy metal, Benzene, Citric acid, HPLC

I. INTRODUCTION

"Soft drinks" is a term used for beverages that doesn't contain alcohol ("hard" liquor). If you really know what the contents of soft drinks are, you would not think it is "soft". It is really "hard" on our health.

Soft drinks have become so much a part of modern living, especially in major cities around the world. It particularly appeals to the younger generation who drinks soft drinks in place of traditional juice and water. No wonder the people love drinking soft drinks too–they give the refreshing feeling and seem to quench thirsts on a blistering hot day. Vending machines are making the "killing" easier. [1] Soft Drinks Impact on Health is getting adverse day by day. Due to popularity, instead of reaching a cup of coffee, people are drinking soft drinks for a quick buzz. Hence every day thousands of people are being admitted in hospitals, just due to over consumption of these soft drinks. [2]

II. QUALITATIVE ANALYSIS OF CONSTITUENTS OF COLD DRINKS

Aloh, G. S. et.al carried out research on Estimation of Sugar in soft drinks [3]. Sugar analysis was carried out along with the determination of parameters like pH, density and taste. An abundant source of both glucose and fructose is the disaccharide sucrose.[4] The method used for the analysis is Knight and Alien EDTA method. This method is suitable for the determination of low reducing sugar content. Sucrose itself is not a reducing sugar and hence cannot be tested directly with Benedict solution. Hence, it must first be hydrolyzed to its monomers. Sucrose, under appropriate condition is hydrolyzed to glucose and fructose which are reducing sugars. This is affected by a strong acid (HCI). This acid incorporate water into the, disaccharide and causes its hydrolysis into its constituent monosaccharide (Fructose and glucose). It is this sugar that the test (Knight and Alien EDTA method) employs. They concluded that

(i) The only type of sugar in these soft drinks is sucrose, a non- reducing sugar whose presence was confirmed on hydrolysis in the presence of trace of strong acid (HCI).

(ii) Though the quantity of sugars in these soft drinks is within acceptable limits, the quantity of sugar in relation to the standard is generally reduced.

(iii) These soft drinks are general highly acidic.

(iv) These soft drinks are indeed of low density.

Engwa Azeh Godwill et.al discussed about Determination of some soft drink constituents and contamination by some heavy metals in Nigeria.[5] They were qualitatively analyzed for the presence of sugar, carbon dioxide, alcohol and phosphate while the acidity, pH, and heavy metals concentration were quantified. The presence of sugar, carbon dioxide, phosphates and acidity were determined according to the procedures of AOAC. For the determination of heavy metal contamination in soft drink is based on two units of measurements; the maximum contaminant level goal (MCLG) and maximum contaminant level (MCL). The MCLG and MCL are measured in milligrams per liter (mg/L) which is equivalent to parts per million. Analysis Data obtained were subjected to statistical analysis by mean comparison using analysis of variance (ANOVA) test and values of $p \leq 0.05$ were considered to be significantly different.

They concluded that Qualitative analysis showed the presence of sugar, phosphate, alcohol, and carbon dioxide in

the soft drinks .Reducing Sugar was abundantly present. All the soft drinks were acidic with low pH ranging from 3 to 5 with a mean of3.6 and the acid concentration was relatively low between3 and 12 g/L with a mean of 8.1 g/L. Although low acid concentration could be of importance in killing gastrointestinal bacteria in the body, low pH could cause teeth erosion. [6,7] Heavy metal analysis showed the presence of cadmium, lead and mercury.

Quality control should be ensured during production and the quality of sugar and water used for soft drink production be evaluated for the presence of heavy metals at the level of purification and sterilization.

Ritu et.al studied on Aspartame Determination in Soft Drinks. Aspartame is an artificial sweetener used as a substitute for sugar in many soft drinks.[8] It is composed of aspartic acid, phenylalanine and methanol. An Acceptable Daily Intake (ADI) of aspartame is 40-50 mg/kg body weight/day. It has also some beneficial effects, as helps the diabetics improve their quality of life and is tooth friendly. Higher level of aspartame leads to various side effects such as physical weakness, decrease in night vision, insomnia, mental depression, anxiety, feeling aggressive, diarrhea and weight loss etc. On its own, aspartame is not known by medical literature to cause weight gain or weight loss Although researchers have theorized that aspartame contributes to hunger or increases appetite psychologically. [9] broad reviews and regulators conclude that aspartame has no appreciable effect on appetite [10]. Though there are many technique for its estimation but the present work will focused on its estimation in the fruit juices by colorimetric method.

They concluded that colorimetric method is easy, cheap and can be done in any lab. Colorimetric method shows best absorbance at 406 nm. They took 10 sample and find out the absorbance values and their mean value. These values are compared with standard curve and find out corresponding concentration. The result showed that Coca cola showed highest aspartame con. And Mountain dew shows least aspartame con.

Dr. S.S. Jahagirdar et.al carried out research on Comparative Study of Water Quality Parameters of Different Brands of Soft Drinks.[11] The analysis included different testing carried in chemistry lab viz. pH, Acidity, Dissolved Oxygen, Chlorides, Sodium (Na) & Potassium (K) content, Electrical conductivity & Total Dissolved Solids (TDS). Water quality tests were conducted for samples as per standard methods. The pH of all the soft drinks ranges from 2.95 to 4.46. This range is lower than the BIS range for drinking water (6.5-8.5) and fall outside of the acceptable values. Soft drinks are generally acidic because of the presence of citric acid and phosphoric acid. Soft drinks containing high mineral acidity are not fit for drinking purpose. The results obtained were correlated with Bureau of Indian Standards (BIS). It has been noticed from the results of testing that most of the soft drinks exceeds drinking water standards given by BIS.

They conclude that Most of the soft drinks were having very low pH and high acidity which is highly undesirable and are strong enough to dissolve teeth and bones. Also high content of chloride and sodium can be harmful which contributes to various illnesses and diseases. Rather than drinking such sugary soft drinks it's better to drink traditional Indian drinks.

Eid I, Brima and Anass M. Abbas studied on Determination of Citric acid in Soft drinks, Juice drinks and Energy drinks using Titration.[12] Citric acid improve flavor taste and maintain stability. However higher conc. May cause damage to tooth enamel. Acid base titration was used to determine Citric acid concentration in all samples. Potentiometric titration was also used to check the accuracy of acid base titration in the case of colored samples.

They conclude Titration method is simple, accurate, precise, and rapid method to determine citric acid content of commercially available soft drinks and juice drinks. Their results showed a range of concentrations in different sample types (juice drinks, soft drinks and energy drinks). 22% of the samples were shown citric acid concentration higher than 3 g/L. Higher concentrations were reported in energy drinks compared to other two types. The data of this study can be used to formulate public health awareness. More studies are needed to evaluate the availability of citric acid.

Brian De Borba and Jeff Rohrer carried out research on Rapid Determination of Phosphate and Citrate in Carbonated Soft Drinks Using a Reagent-Free Ion Chromatography System. A separate chromatographic assay is required to determine the amount of citric acid added to the beverage. Ion chromatography (IC) can simultaneously determine phosphoric and citric acids in soft drinks by measuring the corresponding anions, phosphate, and citrate. The introduction of Thermo Scientific™ Dionex™ Reagent-Free™ IC (RFIC™) systems has significantly improved the automation and ease-of-use of IC compared to other available methodologies.

They concluded that An RFIC method using a low capacity hydroxide-selective Dionex Ion Pac Fast Anion III column with suppressed conductivity detection is a simple, rapid, accurate, precise, and rugged approach for the

simultaneous determination of phosphate and citrate in carbonated soft drinks. The RFIC method is a significant improvement to the AOAC colorimetric assay by eliminating the use of additional reagents and unnecessary. Dilutions of samples that can result in poor precision and accuracy.

Violeta Nour et.al studied on Chromatographic Determination Of Caffine Contents in Soft and Energy Drinks Available on the Romanian Market. [14] Caffeine is a stimulant that is commonly found in many foods and drinks that we consume. Concerns exist about the potential adverse health effects of high consumption of dietary caffeine, especially in children and pregnant women. Filtered samples were injected for HPLC analysis according to the method developed and validated in our previous study.[15] The caffeine contents in energy drink samples ranged from 16.82 mg/100 mL to 39.48 mg/100 mL However, the analyzed carbonated soft drink samples presented much lower caffeine contents since its mean concentration level was of 12.33 mg/100 mL. The analyzed samples from the carbonated soft drink group showed caffeine content in the range of 9.79 – 14.38 mg/100 mL. Comparatively, an\average 8-ounce cup of coffee has about 100 mg caffeine. [16]

They conclude that content levels of caffeine are within or even significantly lower than the maximum authorized levels. Like all caffeinated foods and beverages, energy drinks can be consumed safely in moderation. The collective evidence from both scientific reviews and clinical studies concludes that moderate consumption of 300 mg caffeine per day is safe, even for more sensitive members of the population, such as children and pregnant women.

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