Dr. BRR. GOVERNMENT COLLEGE, JADCHERLA, MAHABUBNAGAR (Dist.)

Student Study Project

2021 -22

DEPARTMENT OF CHEMISTRY

Topic

Soft Drink Analysis

Conducted by students

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PURPOSE:

In recent days soft drinks brands have been put in to various questions regarding their purity news flashed that they contain harmful Pesticides which aroused interest in knowing about the composition of these drinks consumed highly worldwide.

I wanted to conform if the claims were true another fact that made me to do so was this that I am in touch with the Quantitative analysis. So, I chose this project on determination of contents of cold drinks out of curiosity.

INTRODUCTION

Soft drinks are complex mixtures containing variety of substance such as coloring compounds, flavoring agents, acidifiers sweeteners, preservatives and caffeine.

The era of cold drinks began in 1952 but the industrialization in India marked its beginning with launching of Limca and gold Spot by Parley group of Companies. since, the beginning of cold drinks was highly profitable and during many multinational companies launched their brands in idea like Pepsi and Coke. Now a day, it is observed in general that majority of people viewed Sprite, Fanta and Limca to give feeling of lightness, while Pepsi and Thums up to activate pulse and brain.

THEORY

Cold drinks of different brands are composed of alcohol ,carbohydrates , carbon dioxide, phosphate ions etc.These soft drinks give feeling of warmth lightness and have a tangy taste which is liked by everyone. carbon dioxide is responsible for the formation of froth on shaking the bottle. The carbon dioxide gas is dissolved in water to form carbonic acid which is also responsible for the tangy taste. Carbohydrates are the naturally occurring organic compounds and major source of energy to our body. General formula of carbohydrates is $C_x(H_2O)_Y$.

On the basis of their molecule size carbohydrates are classified as:-

1)Monosaccharide

2) Disaccharides and

3)Polysaccharides.

Glucose is a monosaccharide with formula $C_6H_{12}O_6$.it occurs in free state in the ripen grapes in bones and also in many sweet fruits. it is also present in human blood to the extent of about 0.1%.Sucrose is one of the most useful disaccharides in our daily life.

it is widely distributed in nature in juices, Seeds and also in flower of many plants. the main source of sucrose is sugar cane juice which contain 15-20% Sucrose and sugar beet which has about 10-17% sucrose. The molecular formula of sucrose is $C_{12}H_{22}O_{11}$.

It is produced by a mixture of glucose and fructose .it is non-reducing in nature whereas glucose is reducing. cold drinks are a bit acidic in nature and their acidity can be measured by finding their P^H value. the P^H values also depend upon the acidic contents such as citric acid and Phosphoric acid.

AIM: Comparative Study and Qualitative Analysis of different brands of cold drinks available in market.

Apparatus:-

Test Tubes

Test Tube Holder

Test Tube Stand

Stop Watch

Beaker

Burner

P^H Paper Tripod Stand

China Dish

Wire Gauge

Chemical Required:-

iodine Solution

potassium Iodide

Sodium Hydroxide

Lime Water

Fehling's A&B Solution

Concentrated Nitric Acid

Benedict Solution

Ammonium Molybdate.

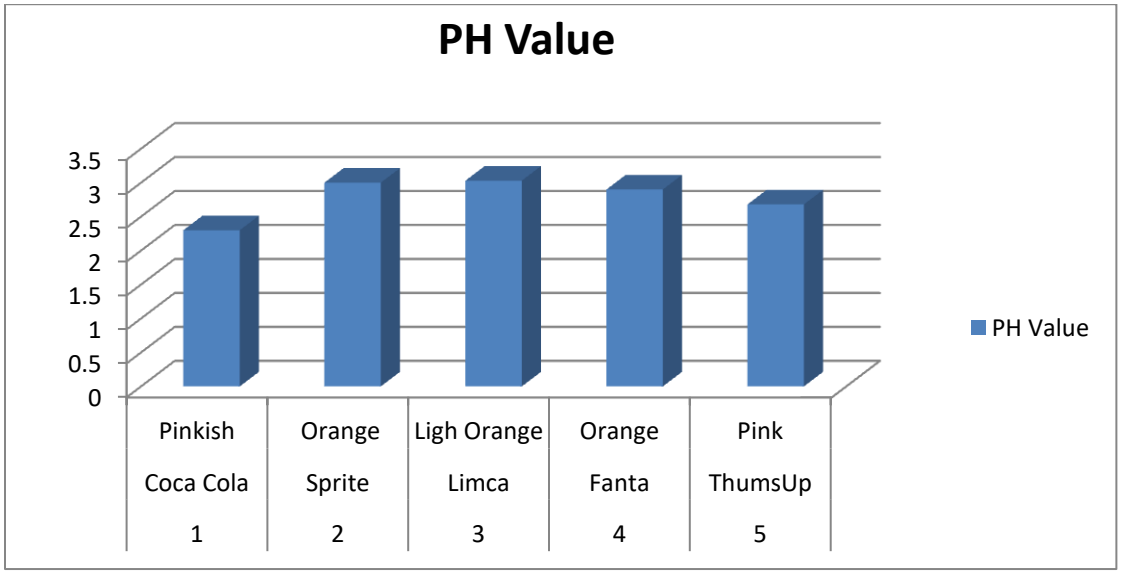
Detection of P^H

Experiment: Small samples of cold drinks of different brands were taken in a test tube and put on the P^H paper. The change in color of P^H paper was noticed and was compared with standard P^H scale.

Observation:

Sl.No	Name Of the Drink	Color Change	P^H Value
1	Coca Cola	Pinkish	2.3
2	Sprite	Orange	3

3	Limca	Ligh Orange	3.03
4	Fanta	Orange	2.9
5	ThumsUp	Pink	2.68



Inference:

Soft drinks are generally acidic because of the presence of citric acid and phosphorus acid . P^H values of cold rinks of different brands are different due to the variation in amount of acidic content.

TEST FOR CARBON DIOXIDE

Experiment: As soon as the bottles were opened one by one the sample the passed through line water .the line water termed milky

Observation:

Sl.No	Name Of the Drink	Time Taken (Sec)	Conclusion
1	Coca Cola	28	CO_2 is Present
2	Sprite	20	CO_2 is Present
3	Limca	38	CO_2 is Present
4	Fanta	36	CO_2 is Present
5	Thumsup	26	CO_2 is Present

All the soft drinks contain dissolved carbon dioxide in Water.. The carbon dioxide(CO_2) dissolves in water to form carbonic acid, which is responsible for its tangy taste.

$Ca(OH)_2(s)+CO_2(g)$----------CaCO3(s)+H2O(l)

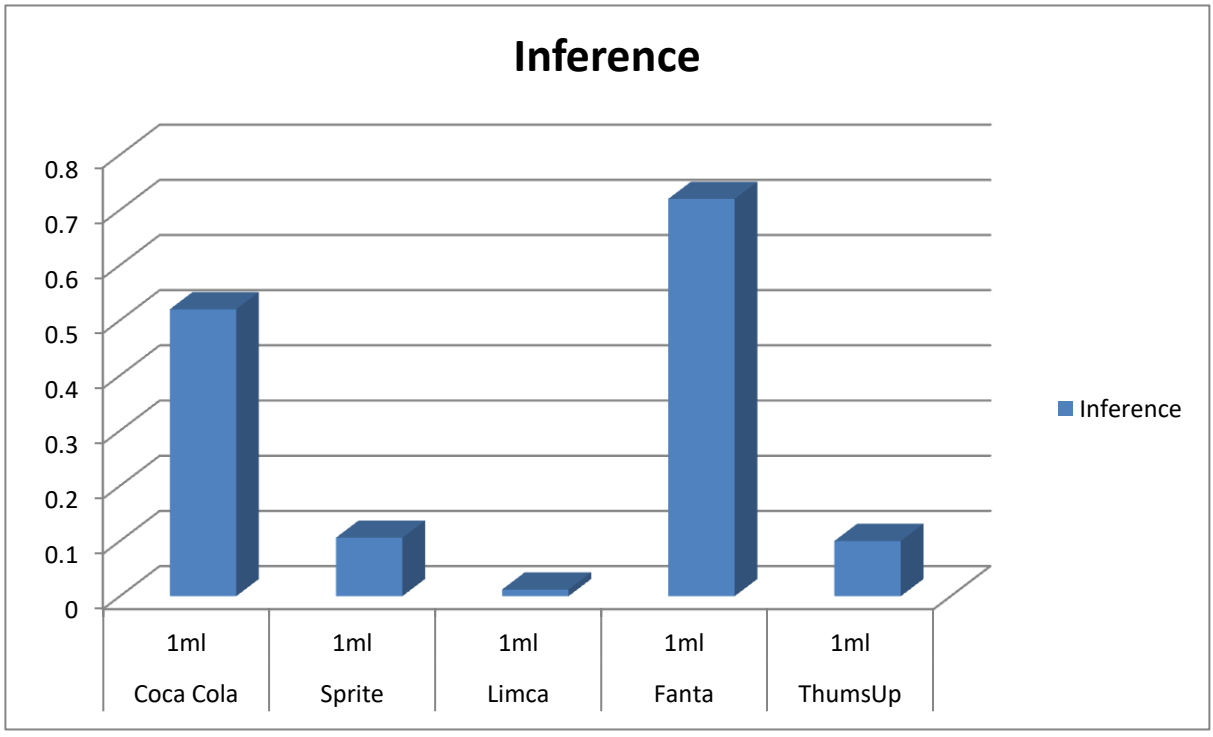
Test For Glucose

Experiments: Glucose is a reducing sugar acid. its presence is detected by the following test:-

1.Benedict''s Reagent Test: Small Samples of cold drinks of different brand were taken in a test tube and a few drops of Benedicts reagent were added. The test tube was heated for few seconds. Formation of reddish color confirmed the presence of glucose in cold drinks.

Observation:

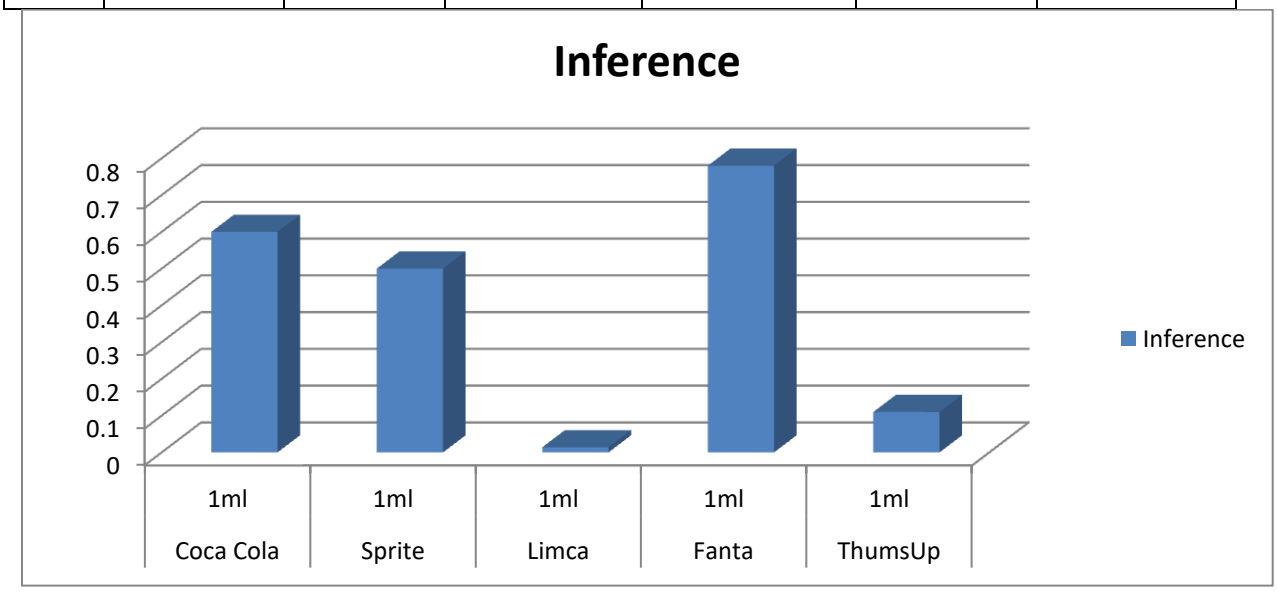
S.No	Name Of the Brand	Quantity of drink Taken	Regent usedfor testing	Observation	Inference	Conclusion
1	Coca Cola	1ml	Benedict's Reagent	reddish color precipitate	0.52gm	glucose is present
2	Sprite	1ml	Benedict's Reagent	reddish color precipitate	0.106gm	glucose is present
3	Limca	1ml	Benedict's Reagent	reddish color precipitate	0.012gm	glucose is present
4	Fanta	1ml	Benedict's Reagent	reddish color precipitate	0.72gm	glucose is present
5	Thums Up	1ml	Benedict's Reagent	reddish color precipitate	0.1gm	glucose is present



2.Fehling Reagent Test: Small samples of cold drinks of different brands were taken in a test tube and a few drops of Fehling's A Solution and Fehling's B Solution was added in equal amount .The test tube was heated in water bath for 10 minutes. Appearance of brown precipitate confirmed the presence of glucose in cold drinks.

Observation:

S.No	Name Of the Brand	Quantity of drink Taken	Regent usedfor testing	Observation	Inference	Conclusion
1	Coca Cola	1ml	Fehling reagent	reddish color precipitate	0.6gm	glucose is present
2	Sprite	1ml	Fehling reagent	reddish color precipitate	0.5gm	glucose is present
3	Limca	1ml	Fehling reagent	reddish color precipitate	0.014gm	glucose is present
4	Fanta	1ml	Fehling reagent	reddish color precipitate	0.78gm	glucose is present
5	ThumsUp	1ml	Fehling reagent	reddish color precipitate	0.11gm	glucose is present



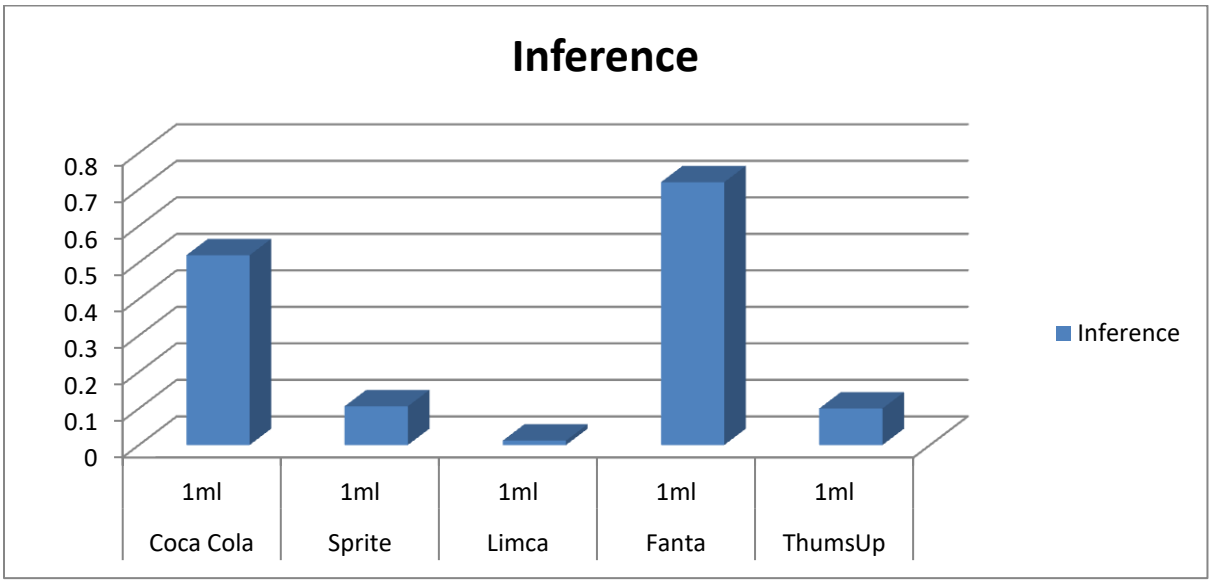
Inference: All sample gave positive test for Glucose with Fehling's(A&B) Solutions.hence,all the cold rinks contain glucose.

Test for Sucrose:

Experiment: 5ml samples of each brand of cold drinks were taken in separate china dishes and were heated very strongly until changes occur. black colored residue left confirmed the presence of sucrose in cold drinks.

Observation:

S.No	Name Of the Brand	Quantity of drink Taken	Observation	Inference	Conclusion
1	Coca Cola	1ml	Black Residue	0.52gm	Sucrose is present
2	Sprite	1ml	Black Residue	0.106gm	Sucrose is present
3	Limca	1ml	Black Residue	0.012gm	Sucrose is present
4	Fanta	1ml	Black Residue	0.72gm	Sucrose is present
5	ThumsUp	1ml	Black Residue	0.1gm	Sucrose is present



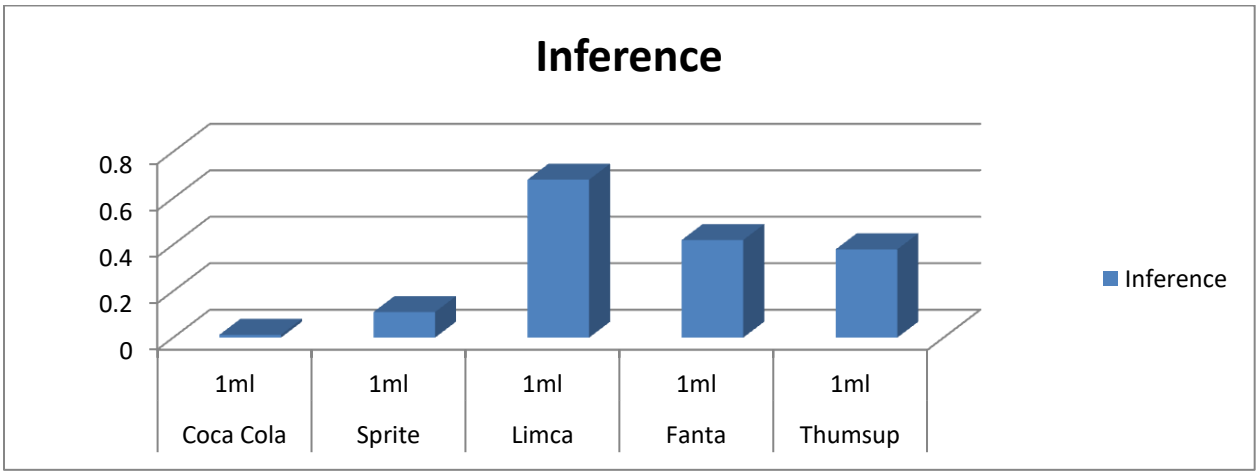
Inference: All the brands of cold drinks contain sucrose . but, amount of sucrose varies in each brand of drink. Fanta contains highest amount of sucrose.

Test For Phosphate:

Experiment: Small samples of each brand of cold drinks were taken in separate test tubes and Ammonium Molybdate followed by concentrated Nitric Acid was added to it. The solution was heated. Appearance of Canary-Yellow precipitate confirmed the presence of phosphate ions in cold drinks.

Observation:

S.No	Name Of the Brand	Quantity of drink Taken	Chemicals used for testing	Observation	Inference	Conclusion
1	Coca Cola	1ml	Ammonium molybdate& Con.nitric acid	Canary yellow precipitate	0.012ppm	Phosphate is Present
2	Sprite	1ml	Ammonium molybdate& Con.nitric acid	Canary yellow precipitate	0.11ppm	Phosphate is Present
3	Limca	1ml	Ammonium molybdate& Con.nitric acid	Canary yellow precipitate	0.68ppm	Phosphate is Present
4	Fanta	1ml	Ammonium molybdate& Con.nitric acid	Canary yellow precipitate	0.42ppm	Phosphate is Present
5	Thumsup	1ml	Ammonium molybdate& Con.nitric acid	Canary yellow precipitate	0.38ppm	Phosphate is Present



Inference: All the soft drinks samples gave positive test for phosphate ions. Hence, all the cold drinks contain phosphate

Test for Alcohol:

Experiment: Small samples of each brand of cold drinks were taken in separate test tubes and Iodine followed by KI and NaOH Solution was added to each test tube. Then the test tubes were heated in hot water bath for 30 minutes. Appearance of yellow colored precipitate confirmed the presence of alcohol in cold drinks.

The tests suggest that tha alcohol levels are as low as 10mg in every litter and this works out around 0.001% alcohol.

Small amount of alcohol may be present in a soft drinks .but,alcohol content must be lessthan 0.5% of the total volume of the drink.

Observation:

Sl.No	Name of the drink	Observation	Conclusion
1	Coca Cola	yellow precipitate	Alcohol is Present
2	Sprite	yellow precipitate	Alcohol is Present
3	Limca	yellow precipitate	Alcohol is Present
4	Fanta	yellow precipitate	Alcohol is Present

Inference: All the Cold drinks samples gave positive test for alcohol. hence, all the cold drinks contain alcohol.

$CH_3CH_2OH + 4I_2 + 6NaOH$----------$CH_3I + HCOONa + 5NaI + 5H_2O$

DIS-ADVANTAAGES OF COLD DRINKS:

- Soft drink are little more harmful than sugar solution. As they contain sugar in large amount which cause problems in diabetes patients.
- Soft drink can cause weight gain as they interfere with the bodys natural ability to dissolve the calcium so they are also harmful for our bones.
- Soft drink contain "phosphoric acid'' which has a P^H of 2.8 So they can dissolve a nail in about 4 days.
- Soft drink have also ability to remove blood so they are very harmful to our body.

USES OF COLD DRINKS:

- Cold drinks can be used as toilet cleaners.
- They can removed rust spots from chrome car hampers
- They clean corrosion from car battery terminals.
- Soft drinks are used as an excellent detergent to remove grease from clothes.

- They can lose a rusted boil.

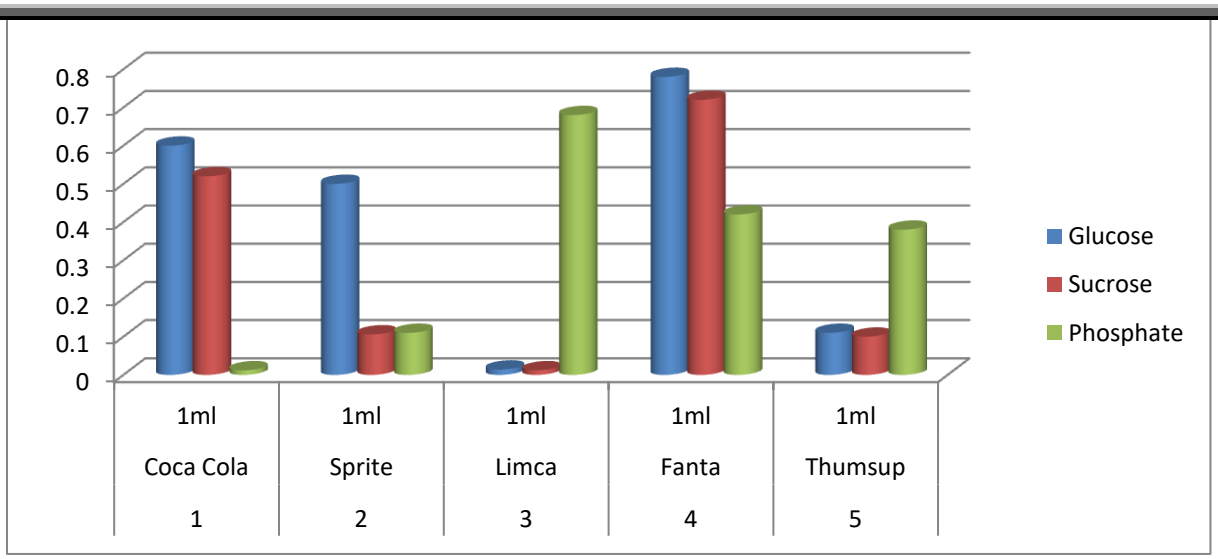
Precautions:

Some of the precautions which need to be taken care of are:-

- Concentrated solutions should be handled with immense care.
- Hands should be washed thoroughly after performing each expaeriment.
- If possible,one should wear hand gloves to prevent from any possible damage.
- If chemicals come into contact with your skin or eyes,flush immediately with copious amounts of water.
- Never leave burners unattended. Turn them off whenever your workstation.
- Never point a test tube or any vessel that you are hearing at yourself or your neighbor.

Conclusion

S.No	Name Of the Brand	Quantity of drink Taken	Glucose	Sucrose	Phosphate
1	Coca Cola	1ml	0.6gm	0.52gm	0.012ppm
2	Sprite	1ml	0.5gm	0.106gm	0.11ppm
3	Limca	1ml	0.014gm	0.012gm	0.68ppm
4	Fanta	1ml	0.78gm	0.72gm	0.42ppm
5	Thumsup	1ml	0.11gm	0.1gm	0.38ppm



After conducting several tests, it was concluded that the different brands of cold drinks namely:

Coca Cola,Sprite,Limca,Fanta,thumsup all are contains glucose ,alcohol, sucrose, Phosphate and Carbondioxide. All cold drinks are acidic in nature on comparing P^H value of different brands.

- Coca cola is the most acidic and Limca is least acidic of all the five brands taken.
- Among the five samples of cold drinks taken, Sprite has the maximum amount of dissolved CO2 and Fanta has the minimum amount of dissolved CO2.
- Most of the soft drinks contain one or more of three common acids –citric acids, carbonic acids and phosphoric acid.
- for example, Fanta drinks are not good for our body at all .because they contain veryhigh levels of sugar and fooding colour,excess citric acid ,phenylalanine as well as a host of artificial preservatives.

Bibliography

- Following books and websites were a source for my project.
- Comprehensive chemistry Lab manual
- www.Google.com
- www.Wikipedia.com

www.Unoregon.edu