DETERMINATION OF ALCOHOLIC DRINKS CONSUMPTION IN YOLA IN RESPECT TO ETHANOL

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APROJECT PRESENTED TO THE DEPARTMENT OF SCIENCE LABORATORY TECHNOLOGY, COLLEHGE OF SCIENCE AND TECHNOLOGY ADAMAWA STATE POLYTECHNIC YOLA, IN PARTIAL FUFILMENT OF THE REQUIREMENT FOR THE AWARD OF NATIONAL DIPLOMA IN SCIENCE LABORATORY TECHNOLOGY.

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APPROVAL PAGE

This is to certify that the project work was examined in the department of Science and Laboratory Technology as part of the requirements for the award of National Diploma in Science and Laboratory Technology.

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DEDICATION

To the glory of God Almighty i dedicate this project whose constant love and blessings made this work a success.

ACKNOWLEDGEMENTS

All glory and honour to God Almighty, for his over flowing love and grace which enabled me to carry out this work successfully to the end.

My appreciation goes to my supervisor Mr. Zaro L. Barsisa for his patience and his most helpful suggestions, corrections and advices. And also to my lecturers of Science and Laboratory Technology Department for their help and support.

Finally to my parents Mr. and Mrs. Emmanuel Linus Hunniokani not forgetting my grandfather Mr. Enoch Godobe Bugye, brothers and sisters (Faith, Pwamori, Hillary and Tapiyadi) and my family members, friends and course mates all i can say is that i am overwhelmed by your undying love and support, may God continue to bless you all.

ABSTRACT

The purpose of this research is aimed at the determination of alcoholic drinks consumption in Yala in respect to ethanol. Samples of alcoholic drinks were collected and experimented on to determine the level of ethanol in each of the drinks. The procedure and results were carefully checked in case of an error.

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CHAPTER ONE

1.0 INTRODUCTION

Alcohol is not an ordinary commodity but a toxic substance in terms of its direct and indirect effects on a wide range of body organs and systems as well as being identified as one of the most harmful risks to health (Babor, 11: 2004). It is known to be causing many diseases such like disorders and social consequences (Document WHO/MSD/MSB/00.4, 36). The World Health Assembly of May 2012 adopted resolution WHA58.26 to public health problems caused by harmful use of alcohol. The resolution recognized that the patterns, context and overall level of alcohol consumption influence the health of the population as a whole, and that harmful drinking is among the foremost underlying causes of disease, injury, violence, disability, social problems and premature deaths (Document WHO/MSD/MSB/00.4, 38).

Ethanol also commonly called ethyl alcohol, drinking alcohol, or simply alcohol is the principal type of alcohol found in alcoholic beverages, produced by the fermentation of sugars by yeasts. It is a neurotoxic psychoactive drug and one of the oldest recreational drugs used by humans. It can cause alcohol intoxication when consumed in sufficient quantity.

Ethanol is a volatile, flammable, colorless liquid with a slight chemical odor. It is used as an antiseptic, a solvent, a fuel, and, due to its low freezing point, the active fluid in post-mercury thermometers. Its structural formula, CH_3CH_2OH, is often abbreviated as C_2H_5OH, C_2H_6O or EtOH.

Ethanol is a liquid alcohol that is manufactured by the fermentation of a wide variety of biological materials. These materials include grains such as wheat, barley, corn, wood, and sugar cane.

Agricultural crops - particularly grains - are likely to be used because they have both high productivity and high levels of carbohydrates needed for ethanol manufacture.

Ethanol is best produced from lower value grains such as barley, corn and feed wheat. Higher value "bread" wheats would remain in ample supply for export sales, when Canada begins major ethanol manufacturing. Also, poor quality (weather damaged, immature) grains which are less suitable for either human or livestock use are excellent for ethanol production.

Corn and starch based crops are the most common medium used in ethanol production. This indicates that once ethanol is in high demand, the prices of these crops will increase. For this reason other alternatives are being studied. Among these is the use of domestic cellulosic biomass feedstocks such as herbaceous and woody plants, agricultural and forestry residues, and a large portion of municipal solid waste and industrial waste streams.

ADVANTAGES OF ETHANOL

- **Green Fuel Production –** The production of ethanol only creates few greenhouse emissions as compared to other fuels. And since ethanol is produced from corn, the greenhouse emissions are reduced by thirteen percent. This is according to the studies conducted by many researchers. As for this reduction, it is increased through the use of improved technology and sources such as switch grass (Wikipedia 2015).

- **A Balance in Positive Energy** – Although a lot of critics believed that there must be more energy needed in producing ethanol, the study has revealed that the fuel outsourced from corn generates a balance in positive energy. By means of ethanol production, there are more valuable products and by-products to get such as corn oil (Wikipedia 2015).

- **Less Pollutants Being Produced** – One of the major advantages of ethanol is that in burning the fuel, there are only less pollutants being produced.

- **Reduced Need on Depending on Oil** – Another big advantage of ethanol is the reduced need to depend mostly on oil. Oil is mainly sourced out for running operated machinery and or for travel. This may be a better option other than spending too much on oil.

DISADVANTAGE OF ETHANOL

- **Increased Price of Most Corn** – In the United States, ethanol is being manufactured from corn. This mainly results for an increased price on most corn. This makes ethanol fuel a bit or far expensive.
- **Large Arable Land is Required** – In producing for the crops needed for ethanol, a large arable land is being required. There must be more crops to be provided that often lead to problems like fertilizer, salinity, deforestation and soil erosion.

- **Environmental Problems that may Arise** – Due to the production of ethanol, it is expected that there will be more environmental problems that may arise. This is because of the waste that comes from fermentation liquors. And since there are many environmental problems that may arise, the health of people is mainly affected.
- **Advanced Modification on Current Engines** – The present-day or typical engines mainly require advanced modification. This must be done to be able for them to fit on highly-concentrated ethanol. For sure, it may mean of more expenses and modification costs that create a hole in their pocket.
- **Being Highly Corrosive** –Being highly corrosive is another disadvantage of ethanol. In effect, the engines that are created to operate on it fail sooner, than what is expected.

USES OF ETHANOL

Ethanol is miscible (mixable) in all proportions with water and with most organic solvents. It is useful as a solvent for many substances and in making perfumes, paints, lacquer, and explosives. Alcoholic solutions of nonvolatile substances are called tinctures; if the solute is volatile, the solution is called a spirit (Sanford 2001).

Commercial Alcohols have grown to be the largest manufacturer and supplier of industrial grade alcohol (ethyl alcohol or ethanol) in Canada. Its 1700 customers use the product in industrial applications (such as solvents, detergents, paints, printing inks, photo-chemical applications, latex processing, dyes, etc.), the beverage market, medicinal, pharmaceutical and food products and is the sole Canadian manufacturer and supplier to the fuel market in central and eastern Canada (Sanford 2001).

Fuel Ethanol

Although ethanol has been traditionally thought of as a beverage product for use in spirits, beer and wine, ethanol is an important, viable alternative to unleaded gasoline fuel. Ethanol is used as an automotive fuel; it can be used alone in specially designed engines, or blended with gasoline and used without any engine modifications (Mantooth 2001).

Motorboats, motorcycles, lawnmowers, chain saws etc. can all utilize the cleaner gasoline/ethanol fuel. Most importantly, the millions of automobiles on the road today can use this improved fuel.

Farmers, cities, counties, and rural electric co-op fleets, plus snowmobile racers and fishing guides in the U.S. use ethanol blends exclusively with no performance problems. Adjustments may be required for air intake. It is important to consult your owner's manual.

Fuel ethanol what has been called "gasohol" - the most common blends contain 10% ethanol mixed with 90% gasoline (E10) (McCarver-May 1997).

Because the ethanol is a high-octane fuel (2.5 - 3 points above the octane of the blending gasoline) with high oxygen content (35% oxygen by weight), it allows the engine to more completely combust the fuel, resulting in fewer emissions. Since ethanol is produced from plants that harness the power of the sun, ethanol is also considered a renewable fuel. Therefore, ethanol has many advantages as an automotive fuel.

E85 is a federally designated fuel that is composed of 85% ethanol and 15% gasoline. Currently there are thousands of E85 vehicles on the roads in America, driving millions of miles every year. E85 vehicles are flexible fuel vehicles, meaning they will run on whatever is in the tank, from 100% gasoline to 85% ethanol, but run best on E85 (McCarver-May 1997).

Ethanol is a water-free alcohol and there for can withstand cooler temperatures. Its low freezing point has made it useful as the fluid in thermometers for temperatures below -40°C, the freezing point of mercury, and for other low temperature purposes, such as for antifreeze in automobile radiators.

Using Ethanol in Engines

When the use of ethanol began in 1979 most automobile manufacturers did not even address alcohol fuels. As soon as each manufacturer tested their vehicles, they approved the use of a 10% ethanol blend. Today, all manufacturers approve the use of ethanol and some even recommend ethanol use for environmental reasons.

A number of tests have been done with ethanol in small engines as well. One of them was done at the Lake Area Vo-Tech at Watertown, South Dakota, where they put a lifetime of use on seven different models of small utility equipment. They acquired matched sets of each of the seven models, and ran one on an ethanol blend and the other on an unleaded gasoline. After each test, each motor was torn down for laboratory analysis. The most significant difference was that the ethanol blend engines had slightly fewer carbon deposits (McCarver-May 1997).

The Detroit Lakes Technical College at Detroit Lakes, Minnesota studied the "Hydroscopic effects of a marine environment on ethanol blended gasoline", and concluded that the amount of water an ethanol blend will absorb from the atmosphere is minimal, and should not be a concern.

The Economics of Ethanol

There are many benefits to the economy when building, producing and selling ethanol. These are discussed in the following sections.

HEALTH EFFECTS

Ethanol, the active ingredient of alcoholic beverages, has been part of the human diet and the human environment for thousands of years. It is produced by fermentation by fungi and other microorganisms, and is found at low levels in the blood and breath of persons who do not drink alcohol. Ethanol is widely ingested in alcoholic beverages, usually with only mild effects. However, at sufficiently high doses, ethanol can cause toxic effects in humans, both short-term (such as inebriation) and long-term (such as cirrhosis of the liver). If ethanol becomes a common fuel additive, there may be opportunities for exposure by inhalation: ethanol vapors might be inhaled at gasoline stations or in automobiles, for example. Thus, concern has been raised about the possible health consequences of using ethanol for this purpose (Choong 1995).

The scientific literature contains virtually no reports of injury to humans from inhaled ethanol. The apparent lack of harm may be attributable to rapid metabolism of ethanol and the difficulty in significantly raising blood ethanol concentrations by inhalation exposure, which keep internal doses extremely low except in unusual situations, such as heavy exercise in the presence of concentrated vapors.

A report written by Sarah R. Armstrong concludes the following: It is highly unlikely that exposure to airborne ethanol associated with gasoline use could produce toxic effects. The reasons for this are (a) the tiny doses that might be received, which might not be observable in light of endogenous levels of ethanol in blood, (b) the body's rapid elimination of ethanol, and (c) the relatively large doses of ethanol and high blood levels of ethanol associated with toxic effects in people. No data in the scientific literature support the hypothesis that chronic exposure to nonirritating levels of ethanol in air could cause significant elevation of blood ethanol concentrations (unless exposed individuals are exercising at the time), or that a risk of cancer or birth defects would be created. A recent survey of the literature regarding the inhalation toxicity of ethanol by the Swedish Institute for Environmental Medicine reached similar conclusions, namely that "a high blood concentration of ethanol is needed for the development of adverse effects" and "ethanol at low air concentrations should not constitute a risk for the general population".

1.1 BACKGROUND OF THE STUDY

Ethanol also commonly called ethyl alcohol, drinking alcohol, or simply alcohol is the principal type of alcohol found in alcoholic beverages, produced by the fermentation of sugars by yeasts. It is a neurotoxic psychoactive drug and one of the oldest recreational drugs used by humans. It can cause alcohol intoxication when consumed in sufficient quantity (Wikipedia 2015).

Ethanol is a volatile, flammable, colorless liquid with a slight chemical odor. It is used as an antiseptic, a solvent, a fuel, and, due to its low freezing point, the active fluid in post-mercury thermometers. Its structural formula, CH_3CH_2OH, is often abbreviated as C_2H_5OH, C_2H 6O or EtOH.

Ethanol is the systematic name defined by the International Union of Pure and Applied Chemistry (IUPAC) for a molecule with two carbon atoms (prefix "eth-"), having a single bond between them (suffix "-ane"), and an attached functional group-OH group (suffix "-ol"). The prefix *ethyl* was coined in 1834 by the German chemist Justus Liebig.[16] *Ethyl* is a contraction of the French word *ether* (any substance that evaporated or sublimated readily at room temperature) and the Greek word *ὕλη* (*hyle*, substance). The name *ethanol* was coined as a result of a resolution that was adopted at the International Conference on Chemical Nomenclature that was held in April 1892 in Geneva, Switzerland.

The term "alcohol" now refers to a wider class of substances in chemistry nomenclature, but in common parlance it remains the name of ethanol. Ultimately a medieval loan from Arabic *al-kuḥl*, use of *alcohol* in this sense is modern, introduced in the mid 18th century. Before that time, Middle Latin *alcohol* referred to "powdered ore of antimony; powdered cosmetic", by the later 17th century "any sublimated substance; distilled spirit" use for "the spirit of wine" (shortened from a full expression *alcohol of wine*) recorded 1753. The systematic use in chemistry dates to 1850 (Kevin 2009).

Ethanol is a 2-carbon alcohol. Its molecular formula is CH_3CH_2OH. An alternative notation is $CH_3–CH_2–OH$, which indicates that the carbon of a methyl group ($CH_3–$) is attached to the carbon of a methylene group ($–CH_2–$), which is attached to the oxygen of a hydroxyl group (–OH). It is a constitutional isomer of dimethyl ether. Ethanol is sometimes abbreviated as EtOH, using the common organic chemistry notation of representing the ethyl group (C_2H_5-) with Et.

1.2 STATEMENT OF PROBLEM

The medical science in the contemporary society has discovered intoxicant (alcohol) to be a toxic substance in terms of its direct and indirect effects on a wide range of body organs and systems. It is one of the most harmful risks to health with at least 61 identified causes: injury, illness or death and for 38 of these conditions, sufficient evidence for a direct causal association has been shown in a benchmark study with hazardous or harmful use of alcohol (WHO,6: 2006). Adverse effects of alcohol have been demonstrated for many disorders, including liver cirrhosis, mental illness, several types of cancer, pancreatitis and damage to the fetus among pregnant women. Alcohol consumption is also strongly related to social consequences such as drink-driving injuries and fatalities, aggressive behaviour, family disruptions and reduced industrial productivity (WHO, 7: 2006).

However, the consumption of alcohol (and other intoxicants has been on increase in the present day society in both the developed and the underdeveloped countries. Approximately, about 2 billion people worldwide consume alcohol and at least 1% of whom (around 76 million) have been estimated to be suffering from alcohol consumption disorders (WHO, 2: 2006). In countries with high prevalence of alcohol consumption, occupational productivity is seriously affected by "hangover" related absenteeism and poor job performance. Hence, alcohol-related problems are the end result of a complex interplay between individual consumption of alcohol and the cultural, economic, physical, environmental, political and social contexts (WHO,8: 2006).

1.3 AIMS AND OBJECTIVES OF THE STUDY

The main aim and objective is the determination of alcoholic drinks consumption in Yola in respect to ethanol.

Other objectives of the study include.

i. To determine the alcoholic drinks consumption in yola

ii. To determine the amount of ethanol in alcoholic drinks

1.4 RESEARCH QUESTION

In relations to the research the following questions were asked?

I. What is the rate of alcoholic drinks consumption in Yola?

II. What is the amount or rate of ethanol in alcoholic drinks?

1.5 SIGNIFICANCE OF THE STUDY

The significance of this research work is the determination of alcoholic drinks consumption in Yola in respect to Ethanol.

Generally, the study is theoretically and practically important in contributing to existing literature and to serve as reference to students, researchers and interested groups alike.

1.6 SCOPE AND LIMITATION OF THE STUDY

The study is delimited to the determination of alcoholic drinks consumption in Yola in respect to Ethanol

This study met with some predicaments which constituted much set back to its operation. They are as follows:-

- The time available for this research work was so in sufficient that the jacks of the work which we would have deduced in were skipped.

- It was not possible to get all the pieces of information and material for the study
- Lack of finance militate the seriously against the smooth running of this research work which hindered the facilitation as it should be. I am suggesting that the above limitation be noted and addressed by future researchers

1.7 DEFINITION OF TERMS

i. **Alcohol:** a colourless volatile flammable liquid which is the intoxicating constituent of wine, beer, spirits, etc. Also called **ethanol, ethyl alcohol.** [C2H5OH.]

ii. **Ethanol:** or simply **alcohol** is the principal type of alcohol found in alcoholic beverages, produced by the fermentation of sugars by yeasts.

iii. **Consumption:** the action or process of consuming.

CHAPTER TWO

2.1 LITERATURE REVIEW

Alcohol is as old as human history and its consumption in different socio-cultural milieus extends beyond the last ten thousand years (Smart, 2007). Its consumption has been considered normal, especially when drunk without outright intoxication in Africa and other arts of the globe. Wine, beer, spirit and other fermented alcoholic beverages were drunk in traditional societies and some of these beverages are still used in this modern era for different purposes. In Africa, these and other alcoholic beverages such as *palm wine, burukutu,* etc. were consumed for pleasure soon after brewing or tapping (Odejide et al, 1999; Odejide, 2006) and were rarely traded in the market (WHO, 2002). Though alcoholic beverages have been consumed for hundreds of years, the pattern and purpose of consumption vary considerably among societies and even within communities. Excess consumption was not widely tolerated in many societies while few communities permitted it (Willis, 2006). For example, abuse attracted negative sanctions as recorded in the biblical Old and New Testaments (Seller, 1985; 1987).

Drinking of alcohol was culturally tolerated as part of ceremonial lives of many ethnic groups in what is now known as Nigeria, especially in communities where it was not forbidden by religion prior to the advent of colonialism (Heap, 1998; Obot, 2000). A unique feature of this area that is now known as Nigeria was that different locally produced alcoholic beverages distinguished ethnic groups. In the north, *pito* and *burukutu* were commonly consumed. In the south, palm wine tapped from the palm tree (Obot, 2000) was popular while the native gin locally called *ogogoro, kai-kai* (Demehin, 1984; Korieh, 2003), *akpuru-achia*, or *Sapele water*, distilled from the fermented palm wine was widely consumed, especially in the Niger-delta area. Though there were no written rules prohibiting females and adolescents from drinking in this traditional era1 (Odejide, 2006), consumption was the reserve of men and played a crucial role in political, religious and socio-economic relationships (Oshodin,1995). In this era, alcohol played complex roles in religious and communities' rituals and served as a conduit for social cohesion. Because of these ceremonial functions, adult males were expected to drink being served by the youth. Alcohol was a key requirement for a bridal price to be paid in order to consummate marriages in many villages. It was consumed at almost all ceremonies including cultural festivals, chieftaincy enthronements, child dedications and even funerals (Oshodin, 1995).

Alcohol did not just play the role of fostering social cohesion as people drank locally brewed beverages together in groups. According to Korieh (2003), it was also a tool for 'imperial control' and a revenue source for Western Traders. It was also used by 'traditional rulers to exert power over their subjects' (Bowdich, cited in Willis, 2006 p.5). With colonisation and the influx of western cultures, alcoholic beverages from western countries became readily available to old and young, male and female, on a commercial basis.

In recent decades, the pattern, quantity and reason for consumption are changing rapidly, especially among youths (Chikere & Mayowa, 2011). This has resulted in an increased burden of alcohol-related problems, estimated to exceed those relating to tobacco consumption: alcohol misuse can result in death of the user (and non-users, due to drunk driving and other related accidents) and often disability in early years among young people (Jernigan, 2001). It is against this backdrop that this review critically explores the changing patterns of alcohol consumption in Nigeria and its consequences for contemporary Nigerian society. Adopting the public health approach, the aim is to bring to light the changing patterns of alcohol consumption, the factors that necessitate the changes and to advocate for prompt action to remedy the situation through policy and other regulatory measures. The next sections deal with an exploration of the new patterns of consumption and the factors that facilitated these changes. This is followed by the consequences of the new patterns and concluding remarks where the possible remedies are pointed out.

2.2 ALCOHOL

Alcohol is the most widely abused psychoactive drug in the United States today. Slang terms include booze, bubbly, firewater, joy juice, sauce, liquid courage, and many others. Legal for those aged 21 and over, drinking is a deeply rooted aspect of our culture. While there are many types of alcohol (an entire class of chemicals), the type that is found in drinks and medicines is known as 'ethyl alcohol' or 'ethanol.' A yeast enzyme changes the simple sugars that are found in grapes, potatoes, or corn into ethanol – the alcohol found in beer, malt liquor, wine, liquors such as vodka and whiskey, wine coolers, and liqueurs like Irish cream. Though many consider alcohol to have stimulant effects, it is actually classified as a depressant – a substance that slows the central nervous system. Other purposes for ethyl alcohol include uses as a chemical solvent, a local anesthetic, and an irritant.

When a person drinks an alcoholic beverage, it is very unlikely that he or she is actually drinking pure alcohol; pure alcohol is extremely potent and takes only a few ounces to raise a person's blood alcohol level into the danger zone.

2.2.1 THE ETHANOL CONCENTRATION FOR COMMON TYPES OF ALCOHOLIC DRINKS

I. Beer: 4-6%

II. Malt liquor: 5-8%

III. Wine: 7-15%

IV. Wine coolers: 5-10%

V. Champagne: 8-14%

VI. Hard liquor (Distilled spirits - vodka, rum, whiskey, etc.): 40-95%

VII. Grain Alcohol: 95-97.5%

A standard drink contains 12 grams of pure ethanol – approximately the amount found in one 12 oz. beer, one 5 oz. glass of wine, or one 1.5 oz. 'shot' of hard liquor.

I. Beer 12 Oz. (1 Can or Bottle)

II. Wine 5 Oz. (1 Glass)

III. Hard Liquor 1.5 Oz. (1 Shot) (Jung 2010).

In general, it takes the average drinker's body one hour to metabolize one drink. As the amount of alcohol consumed exceeds the body's ability to metabolize it, the user's blood alcohol concentration (BAC) increases, and he or she begins to feel the effects of alcohol intoxication. As one's BAC continues to increase, the user will experience different levels of intoxication.

2.2.2 EFFECTS OF ALCOHOL

The effects of drinking depend on a variety of factors, including, but not limited to the:

- Amount of alcohol consumed
- Time taken to consume it
- Individual's gender, weight, body size, and percentage of body fat
- Amount of food in the stomach
- Use of medications, including non-prescription drugs
- Mindset of the individual at the time of consumption
- Setting in which the drinking takes place

Also, mixing alcohol with other drugs can drastically increase the damaging effects of drinking. For example, combining alcohol with narcotics (i.e., heroin, Oxycontin®, methadone) can cause slowed breathing, heart attack, and death. For some, even the combination of alcohol and aspirin can be extremely dangerous (Ekpenyong 2014).

Short-Term Effects

The short-term effects of drinking alcohol can cause numerous adverse effects on the user, including:

- Slowed reaction times and reflexes
- Poor motor coordination
- Blurred vision
- Slurred speech
- Lowered inhibitions and increase in risk behavior
- Lowered reasoning ability, impaired judgment
- Memory loss

- Confusion, anxiety, restlessness
- Slowed heart rate, reduced blood pressure
- Slowed breathing rate
- Heavy sweating
- Nausea and vomiting
- Dehydration – a leading cause of condom breakage
- Coma
- Death from respiratory arrest (Ekpenyong 2014).

A person who consistently uses alcohol over a period of time will develop a tolerance to the effects of drinking; that is, it takes progressively more alcohol to achieve the same effects. Over time, that person may grow dependent on alcohol, and in some cases this can lead to a vicious cycle of addiction.

Long-Term Effects

Over time, heavy drinking can cause permanent damage to the user's body and brain. Several factors affect the severity and extent of this damage, including the drinker's age and gender as well as the duration and extent of abuse.

The physical damage caused by sustained alcohol abuse includes:[4]

- Liver damage
- Accumulation of fat in the liver
- Cirrhosis – heavy scarring of the liver prevents blood flow; usually fatal
- Alcoholic hepatitis – swelling of liver cells, causing blockage; sometimes fatal
- Liver cancer

- **Heart damage**
- High blood pressure
- Coronary disease – narrowing of the arteries, leading to heart attack or death
- Enlarged heart
- Irregular heartbeat, which can lead to heart attack or death
- Decreased blood flow to the arms and legs
- Stroke – blocked blood flow to the brain

- **Brain damage**
- Lowered cognitive abilities
- Destruction of brain cells, producing brain deterioration and atrophy
- Mental disorders – increased aggression, antisocial behavior, depression, anxiety
- Damage to sense of balance, causing more accidental injuries

- **Bone damage**
- Bone growth that normally takes place in teenage years is stunted
- Osteoporosis – severe back pain, spine deformity, increased risk of fractures

- **Pancreas damage**
- Pancreatitis – inflammation of the pancreas, causing abdominal pain, weight loss, and sometimes death

- **Cancer**
- Alcoholism increases a person's chances of developing a variety of cancers of the pancreas, liver, breasts, colon, rectum, mouth, pharynx, and esophagus.

- **Sexual problems**
- Reduced sperm count and mobility, as well as sperm abnormality
- Menstrual difficulties, irregular/absent cycles, and decreased fertility
- Early menopause

- **Birth defects**
- Drinking any alcohol during pregnancy can cause permanent, severe damage, by putting the child at risk for Fetal Alcohol Syndrome (Jung 2010).

2.2.3 Alcohol-Related Problems

- Premature aging
- Heartburn, nausea, gastritis, and ulcers
- Poor digestion and inflammation of the intestines
- Malnutrition
- Water retention
- Weakened vision
- Skin disorders
- Korsakoff's Syndrome – amnesia and delirium after long-term alcohol abuse

Symptoms of Alcohol Poisoning

- Person is passed out and extremely difficult to wake
- Cold, clammy, pale or bluish skin
- Slow or irregular breathing

- Vomiting; person vomits while passed out

2.2.4 Alcohol and Gender

Women are more vulnerable than men to the negative effects of drinking. Women have less total body water and less alcohol dehydrogenase – the stomach enzyme involved in metabolizing alcohol. As a result, the female body takes longer to break down alcohol. Also, the fluctuations in hormone levels that women experience during the menstrual cycle can make a woman more susceptible to the effects of drinking. And because alcohol increases estrogen levels, birth control pills or other medications containing estrogen can increase intoxication (Groves 2007).

Two-thirds of alcoholics are men; however, the negative effects of heavy drinking are more severe for women. Female alcoholics are more likely to suffer alcohol-related damages and diseases than alcoholic men.

Alcoholism Warning Signs

There are several indicators that can signify a budding alcohol problem. The Mayo Clinic lists twelve warning signs of problematic drinking:

- Drinking alone or in secret
- Inability to limit amount of alcohol consumed
- Experiencing blackouts
- Making a ritual of having drinks before, with or after dinner and becoming annoyed when this ritual is disturbed or questioned
- Losing interest in hobbies or activities that used to bring pleasure
- Feeling a need or compulsion to drink

- Irritability when normal drinking time approaches, especially if alcohol is not available
- Keeping alcohol in unlikely places at home, at work or in the car
- Gulping drinks, ordering doubles, becoming intoxicated intentionally to feel good or drinking to feel "normal"
- Having legal problems or problems with relationships, employment or finances
- Building a tolerance to alcohol so that an increased number of drinks is necessary to feel alcohol's effects
- Experiencing physical withdrawal symptoms, such as nausea, sweating and shaking, when not drinking

CHAPTER THREE

3.0 INTRODUCTION

The ethanol content of a solution of ethanol in water can be measured by oxidising the ethanol to ethanoic acid with an excess of acidified potassium dichromate. The amount of unreacted dichromate is determined by adding potassium iodide solution and titrating the resulting iodine with a standard solution of sodium thiosulfate.

$$2Cr_2O_7^{2-} + 16H^+ + 3C_2H_5OH \longrightarrow 4Cr3+ + 11H2O + 3CH3COOH$$

$$Cr_2O_7^{2-} + 14H^+ + 6I \longrightarrow 2Cr3+ + 3I2 + 7H2O$$

$$2S_2O_3^{2-} + I_2 \longrightarrow S_4O_6^{2-} + 2I$$

Alcoholic beverages such as wine or beer contain other oxidisable substances, so a modification of this method is required. Fortunately, the interfering substances are less volatile than ethanol. The alcoholic beverage is placed in a small beaker above the dichromate solution. Water and ethanol slowly evaporate and as the ethanol comes in contact with the dichromate it first dissolves, and then is oxidised. More ethanol evaporates until eventually all the ethanol from the beverage has left the sample and reacted with the dichromate. Since this transfer takes time it is necessary to leave the sample in the flask, in a warm place, overnight.

3.1 CHEMICALS AND EQUIPMENT

- Acid dichromate solution

To Prepare: Wear safety glasses. To 125 mL of water in a 500 mL conical flask, add (carefully and with constant swirling) 70 mL of concentrated sulfuric acid. Caol under the tap and add 0.75 g of potassium dichromate. Dilute to 250 mL with distilled water.

- Sodium thiosulfate solution

To Prepare: Weigh accurately about 7.44 g of Na2S2O3.5H2O into a 1.0 L volumetric flask. Dissolve in water and dilute to the mark.

- Potassium iodide solution (5g in 25 mL of water.)
- 250 mL conical flasks with rubber stoppers
- sample holder (5 mL beaker or small glass vial)
- 10.0 mL and 1.0 mL pipette
- Burette
- beer or wine
- starch solution (1%)
- incubator (optional)

3.2 METHOD

1. Dilute beer samples 1:20 (10.0 mL in 200.0 mL) and wine samples 1:50 (20.0 mL n 1000.0 mL).
2. Transfer 10.0 mL of the acid dichromate solution to a 250 mL conical flask with matching rubber stopper.
3. Pipette 1.0 mL of the diluted beverage sample to the sample holder (5 Ml beaker or glass vial).
4. Suspend the sample holder over the dichromate solution and hold in place with the rubber stopper (figure 1).
5. Store the flask overnight at 25-30 °C (an incubator is ideal).
6. Next morning, allow the flask to come to room temperature and then loosen the stopper carefully and remove the sample holder. Rinse the walls of the flask, add about 100 mL of water and 1 mL of potassium iodide solution; swirl to mix.

7. Prepare 3 blank titrations by adding 10.0 mL of acid dichromate solution to a conical flask, adding 100 mL of water and 1 mL of potassium iodide solution and swirl to mix.
8. Fill a burette with sodium thiosulfate solution.
9. Titrate each flask with sodium thiosulfate. When the brown iodine colour fades to yellow (figure 2), add 1 mL of starch solution and keep titrating until the blue colour disappears (figures 3-5). Do the blank flasks first, and repeat until concordant results are reached. Then do the alcohol samples.

3.3 CALCULATIONS

1. Calculate the concentration of the thiosulfate solution (or standardise the thiosulfate solution using potassium iodate solution).
2. Calculate the number of moles of thiosulfate reacting with the blank solutions (ie reacting with 10.0 mL of acid dichromate).
3. $n(Cr_2O_7^{2-}) = 1/6n(S_2O_3^{2-})$ Calculate the number of moles of dichromate in the blank solutions.
4. Calculate the number of moles of unreacted dichromate in each sample solution.
5. Calculate the number of moles of dichromate which reacted with ethanol in each sample solution.
6. $n(C_2H_5OH) = 3/2n(Cr_2O_7^{2-})$ Calculate the number of moles of ethanol in each sample solution.
7. Remembering the dilution factor used, calculate the percentage of ethanol (g/100 mL) in the beverage tested.

CHAPTER FOUR

DISCUSSION OF THE FINDINGS

4.0 INTRODUCTION

In this chapter calculations and experiments were carried out using some selected Alcoholic drinks.

4.1 PRACTICAL RESULT

1. SAMPLE HARP

Readings

Burete	1^{st}	2^{nd}	3rd
Final	17.4	17.5	17.3

1. Average volume of sodium Thiosulphate

$$= \frac{17.4 + 17.5 + 17.3}{3}$$

$$= \frac{52.2}{3} = 17.4\ cm^3$$

1^{st} 17.4 – 17.4 = 0

2^{nd} 17.5 – 17.4 = 0.1

3^{rd} 17.3 – 17.4 = -0.1

Number of sodium thiosulphate $= \frac{\text{reacting mass}}{\text{Molar mass}}$

$$= \frac{7.44}{N_2 S_2 O_3}$$

$$= \frac{7.44}{23x2+32x2+16+3}$$

$$= \frac{7.44}{46+64+48}$$

$$= \frac{7.44}{158}$$

$$= 0.047 \text{ mole}$$

The ratio of sodium thiosulpahte to Ethanol is 2 for 1 one mole of sodium thiosulpahte use is 0.25 mole of Alcohol (C_2H_5OH)

1: 0.25

4: 1 = 7.44

Sodium thriusulphate

4

Number of gram of alcohol

Alcohol C_2H_5OH

1

$(C_2H_5OH) = \frac{7.44}{4}$

Number of mole = $\frac{\text{reacting mole}}{\text{Molar mass}}$

$= \frac{1.86}{C_2H_5OH}$

$= \frac{1.86}{12x2+1x5+16+1}$

$= \frac{1.86}{46}$

= 0.04 mole

The result is going to be multiply by 20 because of the dilution factor

∴ 0.04 x 20 = 0.8 mole

To convert it in the bottle

Total volume of Bottle = 33cl

Total volume of Alcohol = 5.15 %

$\frac{5.15 \times 33}{100} = 1.69951$

To convert it to littre

$= \frac{1.6995}{100} = 0.016995$ L

To make the percentage of 100 ml

First gram of Ethanol (C_2H_5OH) = 1.86 per 100 ml

Per 100 ml = $\frac{1.86}{20}$ = 0.00744 ml

Conclusion

The bottle is 1.6995 ml

This implies that the sample from the bottle has ore aqueous solution of Ethanol in the sample use in the experiment.

2. **SAMPLE PASSION**

Readings

Burete	1st	2nd	3rd
Final	17.4	17.5	17.3

1. Average volume of sodium Thiosulphate

$$= \frac{17.4 + 17.5 + 17.3}{3}$$

$$= \frac{52.2}{3} = 17.4\ cm^3$$

1st 17.4 – 17.4 = 0

2nd 17.5 – 17.4 = 0.1

3rd 17.3 – 17.4 = -0.1

Number of sodium thiosulphate $= \frac{\text{reacting mass}}{\text{Molar mass}}$

$$= \frac{7.44}{N_2 S_2 O_3}$$

$$= \frac{7.44}{23x2+32x2+16x3}$$

$$= \frac{7.44}{46+64+48}$$

$$= \frac{7.44}{158}$$

$= 0.047$ mole

The ratio of sodium thiosulpahte to Ethanol is 2 for 1 one mole of sodium thiosulpahte use is 0.25 mole of Alcohol (C_2H_5OH)

1: 0.25

4: 1 = 7.44

Sodium thriusulphate

4

Number of gram of alcohol

Alcohol C_2H_5OH

1

$(C_2H_5OH) = \frac{7.44}{4}$

Number of mole $= \frac{\text{reacting mole}}{\text{Molar mass}}$

$= \frac{1.86}{C_2H_5OH}$

$= \frac{1.86}{12x2+1x5+16+1}$

$= \frac{1.86}{46}$

= 0.04 mole

The result is going to be multiply by 20 because of the dilution factor

: . 0.04 x 20 = 0.8 mole

To convert it in the bottle

Total volume of Bottle = 33cl

Total volume of Alcohol = 5.15 %

$\frac{5.15 \times 33}{100} = 1.69951$

To convert it to littre

$= \frac{1.815}{100} = 0.01815$ **L**

$= \frac{0.8}{100} = 0.008$ m/L

To make the percentage of 100 ml

First gram of Ethanol (C_2H_5OH) = 1.86 per 200 ml

Per 100 ml = $\frac{1.86}{2}$ = 0.93 ml

Ethanol concentration = $\frac{0.93}{100}$ x 0.08 = 0.00744 ml

Conclusion

The bottle is 1.815 ml

This implies that the sample from the bottle has ore aqueous solution of Ethanol than the sample use in the experiment.

3. SAMPLE 33 EXPORT

Readings

Burete	1st	2nd	3rd
Final	17.4	17.5	17.3

1. Average volume of sodium Thiosulphate

$$= \frac{17.4 + 17.5 + 17.3}{3}$$

$$= \frac{52.2}{3} = 17.4\ cm^3$$

1st 17.4 – 17.4 = 0

2nd 17.5 – 17.4 = 0.1

3rd 17.3 – 17.4 = -0.1

Number of sodium thiosulphate $= \frac{\text{reacting mass}}{\text{Molar mass}}$

$= \frac{7.44}{N_2 S_2 O_3}$

$= \frac{7.44}{23x2+32x2+16+3}$

$= \frac{7.44}{46+64+48}$

$= \frac{7.44}{158}$

= 0.047 mole

The ratio of sodium thiosulpahte to Ethanol is 2 for 1 one mole of sodium thiosulpahte use is 0.25 mole of Alcohol (C_2H_5OH)

1: 0.25

4: 1 = 7.44

Sodium thiosulphate

4

Alcohol C_2H_5OH

1

Number of gram of alcohol

$(C_2H_5OH) = \frac{7.44}{4}$

Number of mole $= \frac{\text{reacting mole}}{\text{Molar mass}}$

$= \frac{1.86}{C_2H_5OH}$

$= \frac{1.86}{12x2+1x5+16+1}$

$= \frac{1.86}{46}$

$= 0.04$ mole

The result is going to be multiply by 20 because of the dilution factor

∴ 0.04 x 20 = 0.8 mole

To convert it in the bottle

Total volume of Bottle = 33cl

Total volume of Alcohol = 5.15 %

$\frac{5.15 \times 33}{100} = 1.69951$

To convert it to littre

$= \frac{1.6995}{100} = 0.0165$ L

$= \frac{0.8}{100} = 0.008$ m/L

To make the percentage of 100 ml

First gram of Ethanol (C_2H_5OH) = 1.86 per 100 ml

Per 100 ml = $\frac{1.86}{2} = 0.93$ ml

Conclusion

The bottle is 0.0165 ml

The practical sample is 0.00744

This implies that the sample from the bottle has ore aqueous solution of Ethanol in the sample use in the experiment.

4. SAMPLE SMIRNOFF ICE

Readings

Burete	1st	2nd	3rd
Final	17.4	17.5	17.3

1. Average volume of sodium Thiosulphate

$= \frac{17.4 + 17.5 + 17.3}{3}$

$= \frac{52.2}{3} = 17.4\ cm^3$

1st 17.4 − 17.4 = 0

2nd 17.5 − 17.4 = 0.1

3rd 17.3 – 17.4 = -0.1

Number of sodium thiosulphate = $\frac{\text{reacting mass}}{\text{Molar mass}}$

$= \frac{7.44}{N_2 S_2 O_3}$

$= \frac{7.44}{23x2+32x2+16+3}$

$= \frac{7.44}{46+64+48}$

$= \frac{7.44}{158}$

= 0.047 mole

The ratio of sodium thiosulpahte to Ethanol is 2 for 1 one mole of sodium thiosulpahte use is 0.25 mole of Alcohol (C_2H_5OH)

1: 0.25

4: 1 = 7.44

Sodium thiosulphate 4 Alcohol C_2H_5OH 1

Number of gram of alcohol (C_2H_5OH) = $\frac{7.44}{4}$

Number of mole = $\frac{\text{reacting mole}}{\text{Molar mass}}$

$= \frac{1.86}{C_2H_5OH}$

$= \frac{1.86}{12x2+1x5+16+1}$

$= \frac{1.86}{46}$

= 0.04 mole

The result is going to be multiply by 20 because of the dilution factor

:. 0.04 x 20 = 0.8 mole

To convert it from bottle

Total volume of the Bottle = 33cl

Total volume of Alcohol = 5.15 %

$\frac{5.15 \times 33}{100} = 1.69951$

To convert it to littre

$= \frac{1.6995}{100} = 0.01815L$

$= \frac{0.8}{100} = 0.008$ m/L

To make the percentage of 100 ml

First gram of Ethanol (C_2H_5OH) = 1.86 per 100 ml

Per 100 ml = $\frac{1.86}{2} = 0.93$ ml

Conclusion

The bottle is 0.815 ml

The practical sample is 0.00744

This implies that the sample from the bottle has ore aqueous solution of Ethanol in the sample use in the experiment.

5. SAMPLE GUINESS

Readings

Burete	1st	2nd	3rd
Final	17.4	17.5	17.3

1. Average volume of sodium Thiosulphate

$= \frac{17.4 + 17.5 + 17.3}{3}$

$= \frac{52.2}{3} = 17.4\ cm^3$

1st 17.4 – 17.4 = 0

2nd 17.5 – 17.4 = 0.1

3rd 17.3 – 17.4 = -0.1

Number of sodium thiosulphate $= \frac{\text{reacting mass}}{\text{Molar mass}}$

$= \frac{7.44}{N_2 S_2 O_3}$

$$= \frac{7.44}{23x2+32x2+16+3}$$

$$= \frac{7.44}{46+64+48}$$

$$= \frac{7.44}{158}$$

= 0.047 mole

The ratio of sodium thiosulpahte to Ethanol is 2 for 1 one mole of sodium thiosulpahte use is 0.25 mole of Alcohol (C_2H_5OH)

1: 0.25

4: 1 = 7.44

Sodium thiosulphate

4

Number of gram of alcohol

Alcohol C_2H_5OH

1

$(C_2H_5OH) = \frac{7.44}{4}$

$$\text{Number of mole} = \frac{\text{reacting mole}}{\text{Molar mass}}$$

$$= \frac{1.86}{C_2H_5OH}$$

$$= \frac{1.86}{12x2+1x5+16+1}$$

$$= \frac{1.86}{46}$$

= 0.04 mole

The result is going to be multiply by 20 because of the dilution factor

: . 0.04 x 20 = 0.8 mole

To convert it in the bottle

Total volume of Bottle = 33cl

Total volume of Alcohol = 5.15 %

$$\frac{5.15 \times 33}{100} = 1.69951$$

To convert it to littre

$= \frac{1.6995}{100} = 0.0165$ L

$= \frac{0.8}{100} = 0.008$ m/L

To make the percentage of 100 ml

First gram of Ethanol (C_2H_5OH) = 1.86 per 100 ml

Per 100 ml = $\frac{1.86}{2}$ = 0.93 ml

Conclusion

The bottle is 2.475 ml

The practical sample is 0.00744

This implies that the sample from the bottle has ore aqueous solution of Ethanol in the sample use in the experiment.

6. SAMPLE HEINEKEN

Readings

Burete	1st	2nd	3rd
Final	17.4	17.5	17.3

1. Average volume of sodium Thiosulphate

$= \frac{17.4 + 17.5 + 17.3}{3}$

$= \frac{52.2}{3} = 17.4\ cm^3$

1st 17.4 – 17.4 = 0

2nd 17.5 – 17.4 = 0.1

3rd 17.3 – 17.4 = -0.1

Number of sodium thiosulphate $= \frac{\text{reacting mass}}{\text{Molar mass}}$

$= \frac{7.44}{N_2 S_2 O_3}$

$= \frac{7.44}{23x2+32x2+16+3}$

$= \frac{7.44}{46+64+48}$

$$= \frac{7.44}{158}$$

= 0.047 mole

The ratio of sodium thiosulpahte to Ethanol is 2 for 1 one mole of sodium thiosulpahte use is 0.25 mole of Alcohol (C_2H_5OH)

1: 0.25

4: 1 = 7.44

Sodium thiosulphate 4 — Alcohol C_2H_5OH 1

Number of gram of alcohol — $(C_2H_5OH) = \frac{7.44}{4}$

$$\text{Number of mole} = \frac{\text{reacting mole}}{\text{Molar mass}}$$

$$= \frac{1.86}{C_2H_5OH}$$

$$= \frac{1.86}{12x2+1x5+16+1}$$

$$= \frac{1.86}{46}$$

= 0.04 mole

The result is going to be multiply by 20 because of the dilution factor

:. 0.04 x 20 = 0.8 mole

To convert it in the bottle

Total volume of Bottle = 33cl

Total volume of Alcohol = 5.15 %

$$\frac{5.15 \times 33}{100} = 1.69951$$

To convert it to littre

$$= \frac{1.6995}{100} = 0.0165\ L$$

$$= \frac{0.8}{100} = 0.008\ m/L$$

To make the percentage of 100 ml

First gram of Ethanol (C_2H_5OH) = 1.86 per 100 ml

Per 100 ml = $\frac{1.86}{2} \approx$ 0.93 ml

Conclusion

The bottle is 0.0165 ml

The practical sample is 0.00744

This implies that the sample from the bottle has ore aqueous solution of Ethanol in the sample use in the experiment.

7. **SAMPLE STAR**

Readings

Burete	1st	2nd	3rd
Final	17.4	17.5	17.3

1. Average volume of sodium Thiosulphate

$$= \frac{17.4 + 17.5 + 17.3}{3}$$

$$= \frac{52.2}{3} = 17.4\ cm^3$$

1st 17.4 – 17.4 = 0

2nd 17.5 – 17.4 = 0.1

3rd 17.3 – 17.4 = -0.1

Number of sodium thiosulphate $= \frac{\text{reacting mass}}{\text{Molar mass}}$

$$= \frac{7.44}{N_2\ S_2\ O_3}$$

$$= \frac{7.44}{23x2+32x2+16+3}$$

$$= \frac{7.44}{46+64+48}$$

$$= \frac{7.44}{158}$$

= 0.047 mole

The ratio of sodium thiosulpahte to Ethanol is 2 for 1 one mole of sodium thiosulpahte use is 0.25 mole of Alcohol (C_2H_5OH)

1: 0.25

4: 1 = 7.44

Sodium thiosulphate	Alcohol C_2H_5OH
4	1
Number of gram of alcohol	$(C_2H_5OH) = \frac{7.44}{4}$

Number of mole = $\frac{\text{reacting mole}}{\text{Molar mass}}$

$= \frac{1.86}{C_2H_5OH}$

$= \frac{1.86}{12x2+1x5+16+1}$

$= \frac{1.86}{46}$

= 0.04 mole

The result is going to be multiply by 20 because of the dilution factor

:. 0.04 x 20 = 0.8 mole

To convert it in the bottle

Total volume of Bottle = 33cl

Total volume of Alcohol = 5.15 %

$\frac{5.15 \times 33}{100} = 1.69951$

To convert it to littre

$= \frac{1.6995}{100} = 0.0165$ L

$= \frac{0.8}{100} = 0.008$ m/L

To make the percentage of 100 ml

First gram of Ethanol (C_2H_5OH) = 1.86 per 100 ml

Per 100 ml = $\frac{1.86}{2} = 0.93$ ml

Conclusion

The bottle is 0.01683 ml

The practical sample is 0.00744

This implies that the sample from the bottle has ore aqueous solution of Ethanol in the sample use in the experiment.

8. SAMPLE ORIJIN

Readings

Burete	1^{st}	2^{nd}	3rd
Final	17.4	17.5	17.3

1. Average volume of sodium Thiosulphate

$$= \frac{17.4 + 17.5 + 17.3}{3}$$

$$= \frac{52.2}{3} = 17.4\ cm^3$$

1^{st} 17.4 – 17.4 = 0

2^{nd} 17.5 – 17.4 = 0.1

3^{rd} 17.3 – 17.4 = -0.1

Number of sodium thiosulphate $= \frac{\text{reacting mass}}{\text{Molar mass}}$

$$= \frac{7.44}{N_2 S_2 O_3}$$

$$= \frac{7.44}{23x2+32x2+16+3}$$

$$= \frac{7.44}{46+64+48}$$

$$= \frac{7.44}{158}$$

= 0.047 mole

The ratio of sodium thiosulpahte to Ethanol is 2 for 1 one mole of sodium thiosulpahte use is 0.25 mole of Alcohol (C_2H_5OH)

1: 0.25

4: 1 = 7.44

Sodium thiosulphate Alcohol C_2H_5OH

4

Number of gram of alcohol

1

$(C_2H_5OH) = \frac{7.44}{4}$

Number of mole = $\frac{\text{reacting mole}}{\text{Molar mass}}$

= $\frac{1.86}{C_2H_5OH}$

= $\frac{1.86}{12x2+1x5+16+1}$

= $\frac{1.86}{46}$

= 0.04 mole

The result is going to be multiply by 20 because of the dilution factor

:. 0.04 x 20 = 0.8 mole

To convert it in the bottle

Total volume of Bottle = 33cl

Total volume of Alcohol = 5.15 %

$\frac{5.15 \times 33}{100}$ = 1.69951

To convert it to littre

= $\frac{1.6995}{100}$ = 0.0165 L

= $\frac{0.8}{100}$ = 0.008 m/L

To make the percentage of 100 ml

First gram of Ethanol (C_2H_5OH) = 1.86 per 100 ml

Per 100 ml = $\frac{1.86}{2}$ = 0.93 ml

Conclusion

The bottle is 1.98 ml

The practical sample is 0.00744

This implies that the sample from the bottle has ore aqueous solution of Ethanol in the sample use in the experiment.

9. **SAMPLE STAR RADDLER**

Readings

Burete	1st	2nd	3rd
Final	17.4	17.5	17.3

1. Average volume of sodium Thiosulphate

$$= \frac{17.4 + 17.5 + 17.3}{3}$$

$$= \frac{52.2}{3} = 17.4\ cm^3$$

1st 17.4 – 17.4 = 0

2nd 17.5 – 17.4 = 0.1

3rd 17.3 – 17.4 = -0.1

Number of sodium thiosulphate $= \frac{\text{reacting mass}}{\text{Molar mass}}$

$$= \frac{7.44}{N_2 S_2 O_3}$$

$$= \frac{7.44}{23x2+32x2+16+3}$$

$$= \frac{7.44}{46+64+48}$$

$$= \frac{7.44}{158}$$

= 0.047 mole

The ratio of sodium thiosulpahte to Ethanol is 2 for 1 one mole of sodium thiosulpahte use is 0.25 mole of Alcohol (C_2H_5OH)

1: 0.25

4: 1 = 7.44

Sodium thiosulphate

4

Number of gram of alcohol

Alcohol C_2H_5OH

1

$(C_2H_5OH) = \frac{7.44}{4}$

Number of mole = $\frac{\text{reacting mole}}{\text{Molar mass}}$

= $\frac{1.86}{C_2H_5OH}$

= $\frac{1.86}{12x2+1x5+16+1}$

= $\frac{1.86}{46}$

= 0.04 mole

The result is going to be multiply by 20 because of the dilution factor

:. 0.04 x 20 = 0.8 mole

To convert it in the bottle

Total volume of Bottle = 33cl

Total volume of Alcohol = 5.15 %

$\frac{5.15 \times 33}{100}$ = 1.69951

To convert it to littre

= $\frac{1.6995}{100}$ = 0.0165 L

= $\frac{0.8}{100}$ = 0.008 m/L

To make the percentage of 100 ml

First gram of Ethanol (C_2H_5OH) = 1.86 per 100 ml

Per 100 ml = $\frac{1.86}{2}$ = 0.93 ml

Conclusion

The bottle is 0.66 cm

The practical sample is 0.00744

This implies that the sample from the bottle has ore aqueous solution of Ethanol in the sample use in the experiment.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 SUMMARY

In chapter one of this research work the background of the study was discussed, the aim of the research is the determination of alcoholic drinks in Yola in respect to Ethanol. The research is to help future researchers and the recommendations can serve in reducing future occurrence of similar problem if worked upon.

The chapter also includes statement of the problem where the reason for undertaking the research was discussed.

Chapter two contains literature review; the related materials relating to the research topic were reviewed. Also the chapter contains the Alcohol, Ethanol Concentration for common types of Alcoholic drinks, Effects of Alcohol, Alcoholic related problems and Alcohol and gender.

Chapter three contains research methodology; the chapter discussed the research design and the methods used in data collection; it was in this chapter that questionnaires were distributed by the researcher and it was the tool used in collecting the data of this work which paved a way for chapter four.

Chapter four contains the Discussion of the findings, and the practical results.

Finally, chapter five include summary, and conclusion and recommendation

5.2 CONCLUSION

In this study, a sample analysis for the determination of ethanol content in alcoholic drinks. A sample solution (0.25 mL) is mixed with adequate amount (1 mL) of aqueous solution. The study method we developed can be applied to alcoholic beverages with different alcoholic contents, and with the advantages of simple sample pretreatment procedures, rapidity and accuracy.

5.3 RECOMMENDATIONS

Based on the conclusions reached, the following recommendations were imperative:

a. Government should institute public campaigns and awareness in order to create intensive information bank for public on the dangers of alcohol consumption on human health, family and society. This will help correct wide spread negative perception about alcohol consumption.

b. There should be effective regulation on registration, production, distribution, place of sales including high tax rate to serve as discouragement to the sellers and drunkards in order to minimize the burden of indebtedness among drunkards in Adamawa state.

c. There should be modalities of educating society members, especially the family to cope and manage the drunkards such that family as well as societal impact can be greatly reduced.

d. Civil organizations as well as other sources of law should explicitly take a stand on the ideal effect of alcohol consumption on human health.

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