

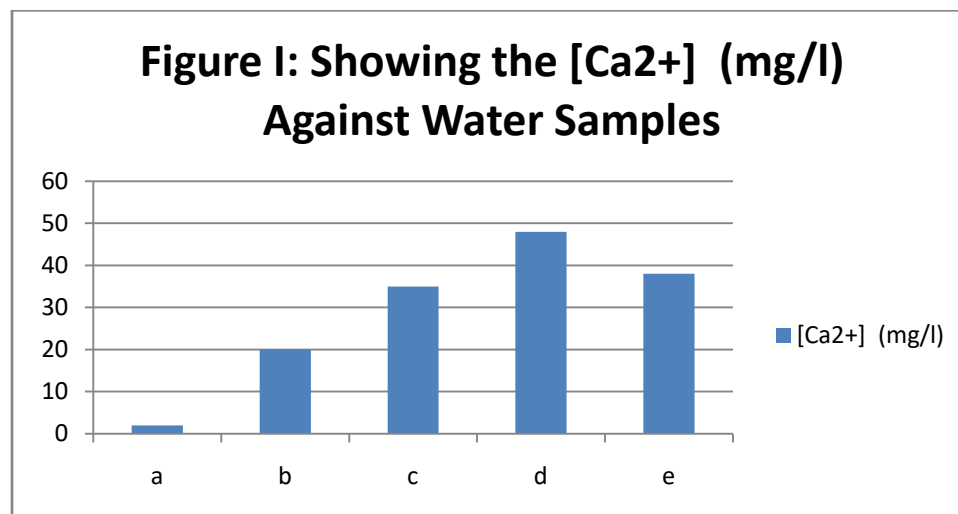
C	5.80
D	5.50
E	5.45

CALCIUM IONS (Ca²⁺) DETERMINATION IN WATER SAMPLE.

The values obtained for samples **b, c, d** and **e** were very high and that obtained for **sample a** very low. The presence of high quality of calcium in the drinking water sources at B, C, D and E indicates that the water sources are hard for drinking purposes. According to **Dominic,(1972)**, the high levels does not indicates that calcium is coming from anthropogenic sources. There is a strong correlation existing between calcium and magnesium results at the various sites under investigation. Calcium is also base status mineral like that of magnesium and expected to be low in acidic water. Calcium contributes to the water hardness with bicarbonate forming temporal and permanent hardness.

Table 3 :

SAMPLE POINTS	[Ca²⁺] (mg/l)
a	2
B	20
C	35
D	48
E	38



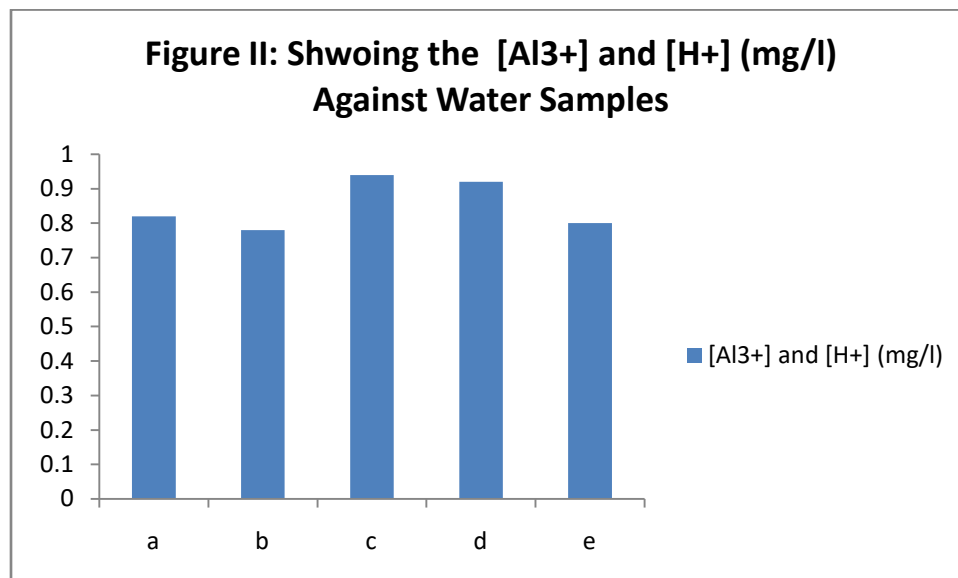
WHO GUIDELINES STANDARD FOR CLASSIFICATION OF EXCHANGEABLE CALCIUM

CLASS	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH
Exchangeable Calcium (mol/kg)	< 0.5	0.5 – 2.0	2.0 – 4.0	4.0 – 6.0	> 6.0

DETERMINATION OF EXCHANGEABLE ACIDITY OF HYDROGEN AND ALUMINIUM The data obtained for **samples that** were extremely high as compared to the world health organization standards which are 0.2mg/l. The results obtained using 0.02MNaOH shows that high quantity of aluminum was present and when 0.02MHCl was used, there were no traces of aluminum and hydrogen present in the samples. The lack of exchangeable aluminum in the samples was as a result of lack of alum (aluminum sulphate in the drinking water sources).

Table 4.

SAMPLE POINTS	[Al ³⁺] and [H ⁺] (mg/l)
A	0.82
B	0.78
C	0.94
D	0.92
E	0.80

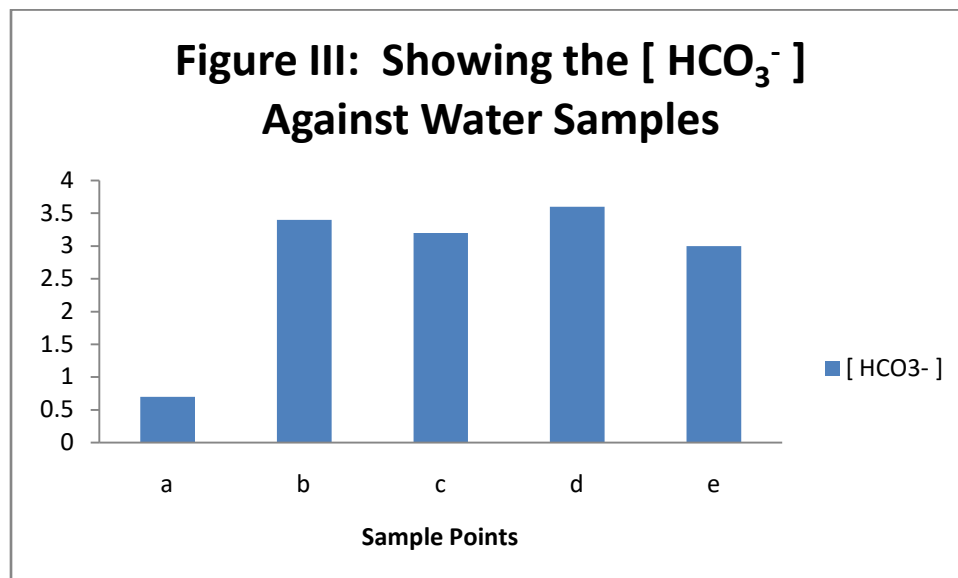


DETERMINATION OF CARBONATE AND BICARBONATE IN THE WATER SOURCES

The results obtained for bicarbonate in four of the water sources, that is, **b, c, d** and **e** were extremely high and in fact not within the world health organization guideline values. The high values of HCO_3^- in the water samples tend to maintain the P^{H} value 6.5 to 8.5 and this shows buffer effects.

The sample point **a** has low bicarbonate concentration. Because of low HCO_3^- concentration, there is no buffering effects and contributes to the low P^{H} value. At low P^{H} , the bicarbonate is converted to carbon dioxide which dissolves in portable water to form carbonic acid (Amodixyl et al, 1991).

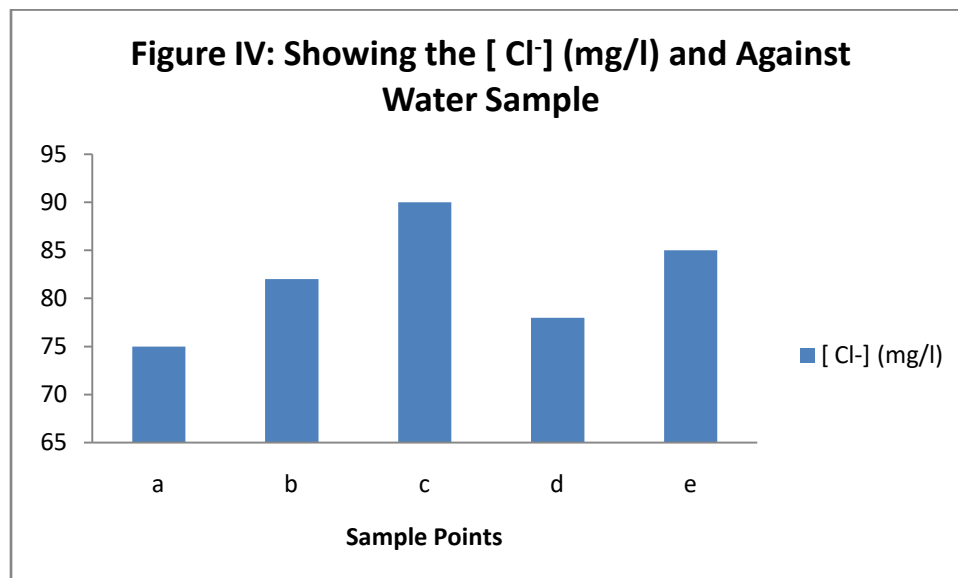
SAMPLE POINTS	[HCO_3^-]
a	0.7
b	3.4
c	3.2
d	3.6
e	3.0



DETERMINATION OF CHLORIDE IONS CONCENTRATION IN WATER SAMPLE

The results obtained for **a**, **b**, **c**, **d** and **e** are extremely high in the water samples as compared to the World Health Organization guideline values (1984 and 1993), that is, 250mg/l. The high level of chloride ions in the water sources was as a result of the industrial waste from Punjab and the few agricultural practices carried within the community under investigation. The seepage of industrial waste from the factory can result in to contamination of the portable water sources within the water sources closer to the factory.

SAMPLE POINTS	[Cl ⁻] (mg/l)
a	75
b	82
c	90
d	78
e	85



CONCLUSION AND RECOMMENDATION

CONCLUSION:

Before conclusion(s), the basic assumptions/hypotheses stated earlier were considered for any agreement or disagreement between the experimental results and the manufacturing results.

- ✓ **Assumption 1** says that the main or key intoxicating species in the alcoholic beverages analyzed must be an alcohol, ethanol, C₂H₅OH. Thus if this is true, then there should have been agreement amongst experimental results and manufacturing results. This point can even be turned round to be wrong because even the 50ml labels on the plastic containers were all wrong or not correct. So assumption 1 does not hold. This same argument can be technically applied to **assumptions numbers 2 and 3**.

- ✓ **For assumption 4**, the alcohol performs its best functions or intended purposes if, and only if, it does not react to produce product(s) that will destroy its normal functions. If any chemical reaction occurs, then the volume and hence the concentration of the alcohol will decrease. Because the rate of a chemical reaction is a time – dependent quantity, then concentration or volume of the alcohol must have been decrease with the long time of storage and distribution. Thus ,if this assumption makes sense, then the beverages are chemically not fit for consumption by humans because the nature of the product(s) formed is yet unknown.

- ✓ **The final assumption 7** is the most justifiable because there are complete or total deviations amongst the experimental readings and those provided by the manufacturer(s).

But turning the table round, the data from the experiment are indications of some amount of precision (of experimental data). It can finally be concluded that:

- The manufacturer (**the Punjab distillery company**), located in Kenema, have provided wrong labeling of their products, especially those in plastic containers.
- The key or main intoxicating substances in the alcoholic beverages produced by the Punjab Distillery Company (in Kenema) is or are not **only alcohol or ethanol** but there must be other chemical substance(s) which provides intoxicating effects other than alcohol.
- The chemical with this intoxicating effect must have boiling temperature greater than that of ethanol and also its density must be greater than alcohol which gives the greater intoxicating effect, and may be chemically questionable for consumption purposes.

RECOMMENDATIONS:

The following recommendations as an **URGE** from the experimental findings to the ministry of health and sanitation and to any of the authorities or stakeholders who receive and goes through this work:

- That the Punjab distillery company should stop its operations or stop the production activities until more sophisticated experimental results are achieved.
- That there should be trained and qualified chemists or analytical chemists to investigate composition of the beverages and subsequently identify the **“key intoxicating” species predicted in the conclusions’**.
- That the company has to be fined, or charges should be levied on it for cheating people because of wrong labeling of their containers being sold to retailers and consumers.
- That the ministry of health and sanitation should make or construct **by-laws** that will enforce the regular visiting of those distillery units within the country, by specialized analytical chemists. This will help rescue the fate of the future generation.
- That any other analytical method to access the safeness of the alcoholic beverages manufactured by the Punjab distillery company should be put in place with immediately effect so as to avert any further problem in the future.

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