MAGNESIUM AND CALCIUM ESTIMATION FROM FRESH MILK SAMPLES IN NASHIK REGION BY A SIMPLE METHOD.”

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ABSTRACT

Four different fresh milk samples were collected from local market. Knowing the benefits of heavy metals present in fresh milk, the aim of this research is to determine the heavy metal like Magnesium and calcium present in fresh milk samples from Nashik district region. The estimation of Magnesium and calcium is done by a simple method i.e. volumetrically, and the results are tabulated.

KEYWORDS: heavy metal, fresh milk, Magnesium and calcium.

INTRODUCTION

Milk is one of the important food for human nutrients and contains all the macronutrients namely proteins, carbohydrates, vitamins (A, B and D) and trace elements particularly Calcium, Magnesium, Zinc and Tin. In India adults need calcium between 1,000 and 1,500 milligrams (mg) per day. You can get this amount in your diet by consuming foods and drinks that have calcium in them. Food products that are particularly high in calcium include cow milk, yoghurt, cheese , green vegetables such as spinach and broccoli. Ever growing Agricultural and Industrialization processes have increased concentration of toxicants like heavy metals in the environment as a result; they have been taken up by plants and animals into their system which causes further distribution of toxicants to human beings.

Knowing toxicity of heavy metals present in fresh milk, the confirmation of their presence and corresponding quantities are necessary to access the commercial product being marketed are safe to use. In this work it is aimed to access the presence of the heavy metals like, Magnesium and calcium in fresh milk available in local market.
Role of Magnesium and Calcium
Mg Reduces muscle tension, lessen pain associated with migraine headaches and Improve sleep & adverse neurological disorder such as anxiety and depression. Magnesium is needed for more than 300 biochemical reactions in the body. It helps to maintain normal nerve and muscle function, supports a healthy immune system, keeps the heart beat steady, and helps bones remain strong. It also helps regulate blood glucose levels and aid in the production of energy and protein. Most dietary magnesium comes from vegetables, such as dark green, leafy vegetables.

Ca is essential macronutrients for human which represents approximately 2% of body weight of adult, It promotes strong bones, lowers the blood pressure, Transmission of nerve impulse, control the muscle contraction, Regulation of hormones, enzyme production and activity (Regulation of digestion, fats metabolism, energy production). Blood clotting and wound healing. A Hypocalcaemia (low blood calcium) not usually occur due to low calcium intake, Hypocalcaemia can cause numbness and tingling in fingers, muscles, cramps, convulsions, lethargy and mental confusion.

METHODS AND MATERIALS
Determination of Mg: (Volumetric method)
REAGENTS – 1] 0.1 M EDTA-Dissolve 37.23 gm. EDTA.2H2O in distilled water and make the volume up to 1000ml, 2] EBT Indicator – Dissolve 0.2 gm. of dye in 15 ml of triethanolamine and 5 ml absolute ethanol, 3] 0.1M ZnSO4 solution- Dissolve 2.874 gm. of ZnSO4 in 100 ml distilled water 4] Buffer solution- Add 142 ml conc. Ammonia and 17.5 gm. NH4Cl then diluted in 250 ml volumetric flask with distilled water.

Determination of Calcium Oxide (Volumetric method)
Following chemicals are used for determination of above said elements.


Procedure- 25 ml. sample, dry at low flame in evaporating dish & ash it in a muffle furnace. Dissolve the ash in HCl & add 50 ml water. Allow to stand on water bath for few minutes & filter in 250 ml beaker. Wash the insoluble residue with hot water & collect the washing in same beaker. Adjust the pH of sol.to 4.4-4.6 by acetic acid drop by drop &boil the sol. While
hot add, saturated ammonium oxalate sol till the ppt. formation & the add excess. Heat to boiling the sol. allow to stand for 3 hrs. or longer. Decant the clear sol. through an ash less filter paper. Pour 25 ml. of hot water on the ppt. & again decant the clear sol. through filter paper. Dissolve any ppt. remaining on filter paper by washing with hot dil. HCl into the original beaker while boiling hot by addition of ammonium hydroxide & a little saturated ammonium oxalate sol. Allow to stand for 3hrs. or longer. Filter through the same filter paper& wash with hot water. Wash the filter paper with dil. H₂SO₄ acid & titrate at a temperature not less than 70 degree Celsius with std. KMnO₄ sol.

**Preparation of KMnO₄ solution** :- Part 1: Prepare 0.025N Na₂C₂O₄ sol. (Eq. wt.67), (Weigh accurately 0.335 grm. Na₂C₂O₄ dil. with water into 250 ml volumetric flask)

*Standardization of 0.025N KMnO₄ sol.:* Weigh accurately 0.158 g of KMnO₄ dil. with water into 250 ml volumetric flask. The end pt. of titration is permanent faint pink color.

**Procedure:** Measure accurate 25ml fresh milk in a evaporating dish ,dry at low flame then after drying ash it in a muffle furnace about 5-6 hrs ,add 25ml dil. HCl in ash ,boil for 5 min., cool & filter it. Wash the residue with dis. water & add washing in the filtrate. Add 2g NH₄Cl to the filtrate & dissolve by stirring. Add excess NH₄Cl to form ppt. Filter & collect the filtrate. The filtrate is treated with (NH₄)₂CO₃ sol. for ppt. of grp. (IV) metals & kept on water bath for 15 min.25 ml filtrate taken in a beaker, add 75 ml dis. Water & 2 ml buffer sol. is added & also add 2-3 drops of EBT indicator. Titrate with 0.1M EDTA sol. until color changes red to blue. Carry out the titration under slightly warm condition (40°C).

**CALCULATIONS for Mg.**

1ml (0.1M EDTA=2.432mg of Mg)

SAMPLE NO.1:
ZnSO₄.7H₂O=EDTA

\[
\text{M}_1\text{V}_1=\text{M}_2\text{V}_2
\]

\[
0.1 \times 10 = \text{M}_2 \times 10.4
\]

\[
\text{M}_2 = 0.096\text{M}
\]

1ml of 0.1M EDTA=2.432mg of Mg

\[
21.1 \times 0.096 \times 2.432 / 1 \times 0.1
\]

49.26 mg of Mg
RESULT
21.1ml of 0.096 M EDTA (100g of sample)=49.26mg of Mg
Same procedure is followed for other three samples and the results are tabulate as in the table.

CALCULATIONS for Ca
1-Exact normality of KMnO4 Solution-
N=0.024N
2-Calcium % by weight=2.8xVxN/W
Where,
V=volume of standard KMnO4 used for titration
N=Normality of std.KMnO4 solution
W=Weight of the sample taken for test
SAMPLE NO.1:
1ml of 0.025N KMnO4=2.004mg of Ca
1ml of 0.024N KMnO4=?
0.024x(2.004x2)/0.025
3.847mg of Ca
1ml of 0.024N KMnO4=3.847mg of Ca
26.1ml of 0.024N KMnO4=?
26.1x3.847/0.024
41.836mg of Ca
4.26gm of sample=41.836mg of Ca
100gm of sample=?
41.836x100/4.26
982.06mg of Ca

RESULT
100gm of sample=982.06mg of Calcium
Same procedure is followed for other three samples and the results are tabulate as

<table>
<thead>
<tr>
<th>Sample No</th>
<th>Amount of Calcium in mg in 100 gm. milk sample</th>
<th>Amount of Magnesium in mg in 100 gm. milk sample</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>982.06</td>
<td>49.26 mg of Mg</td>
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<tr>
<td>2</td>
<td>876.00</td>
<td>42.49 mg of Mg</td>
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<tr>
<td>3</td>
<td>788.10</td>
<td>21.47 mg of Mg</td>
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<td>4</td>
<td>838.82</td>
<td>26.84 mg of Mg</td>
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REFERENCES