Spect. Deter. of Calcium in some LL FF Milk in Saudi Arabia market By FAAS (Using MSA)

Introduction:

Milk contains a wide array of nutrients, including vitamins, minerals, protein, healthy fats and antioxidants. Keep in mind that its nutritional content can vary depending on many factors. Milk is a rich source of quality protein that contains all nine essential amino acids. It may help reduce age-related muscle loss and promote muscle repair after exercise. Milk contains a variety of nutrients that benefit bone health, such as calcium, vitamin D, phosphorus and magnesium. Studies suggest that consuming milk and dairy products may prevent osteoporosis and reduce the risk of fractures. Adding milk, especially whole milk, to your diet may prevent weight gain.

What is/are:

Calcium?

Importance of Calcium for Human health?

MSA?

Used Concentration Unit?

Used λ_{MAX}?

Experiment Object?

Calcium:

The chemical element Calcium (Ca), atomic number 20, is the fifth element and the third most abundant metal in the earth's crust. The metal is trimorphic, harder than sodium, but softer than aluminum. A well as beryllium and aluminum, and unlike the alkaline metals, it doesn't cause skin-burns. It is less chemically reactive than alkaline metals and then the other alkaline-earth metals.

Calcium ions solved in water form deposits in pipes and boilers and when the water is hard, that is, when it contains too much calcium or magnesium. This can be avoided with the water softeners. In the industry, metallic calcium is separated from the melted calcium chloride by electrolysis. This is obtained by treatment of carbonated minerals with chlorhydric acid, or like a sub product of the carbonates Solvay process.

In contact with air, calcium develops an oxide and nitride coating, which protects it from further corrosion. It burns in the air at a high temperature to produce nitride.

The commercially produced metal reacts easily with water and acids and it produces hydrogen which contains remarkable amounts of ammonia and hydrocarbides as impurities.

Importance of Calcium for Human health:

The reviews below specifically looked at the effect of calcium on various health conditions:

1- Lowering high blood pressure.

2- High-dose supplements can cause hypercalcemia (toxic level of calcium in the blood) that can cause blood to clot or the arteries to harden, leading to cardiovascular disease.

3- Calcium is one of the most important nutrients required for bone health.

4- The World Cancer Research Fund and the American Institute for Cancer Research, they reported strong evidence that calcium supplements of more than 200 mg daily and intake of high-calcium dairy foods will likely decrease the risk of colorectal cancer.

5- High intake of calcium foods decreased the risk for kidney stones in human.

MSA:

The standard additions method (often referred to as "spiking" the sample) is commonly used to determine the concentration of an analyte that is in a complex matrix such as biological fluids, soil samples, etc. The reason for using the standard additions method is that the matrix may contain other components that interfere with the analyte signal causing inaccuracy in the determined concentration. The idea is to add analyte to the sample ("spike" the sample) and monitor the change in instrument response. The change in instrument response between the sample and the spiked samples is assumed to be due only to change in analyte concentration. The procedure for standard additions is to split the sample into several even aliquots in separate volumetric flasks of the same volume. The first flask is then diluted to volume with the selected diluent.

A standard containing the analyte is then added in increasing volumes to the subsequent flasks and each flask is then diluted to volume with the selected diluent. The instrument response is then measured for all of the diluted solutions and the data is plotted with volume standard added in the x-axis and instrument response in the y-axis. Linear regression is performed and the slope (m) and y-intercept (b) of the calibration curve are used to calculate the concentration of analyte in the sample.
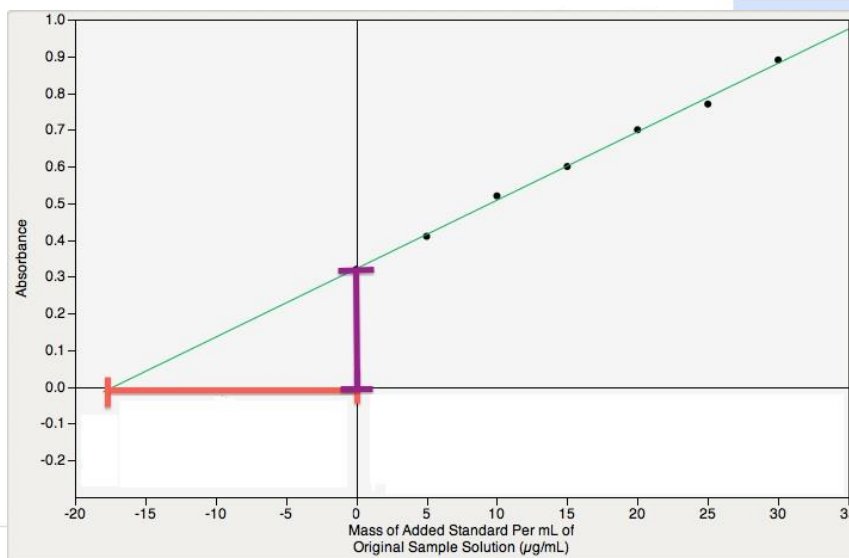
Used Concentration Unit:

the weight of solute usually in grams is divided by volume of solution which is usually in milliliters and multiplying by 100.

$$\% \, (w/v) = \frac{Wt. \, of \, solu. \, (g \, ...)}{Vol. \, of \, soln. \, (mL \, ...)} \, x \, 100$$

Used λ_{MAX}:

422.7nm

Experiment Object:

1- Determination of [%w/v] Calcium and in different FF LL Commercial Milk Samples.

2- Determination of (ppm) concentration of Calcium in the Milk Samples.

3- Full comparison of Calcium concentrations in different milk trade names.

Expermental:

1- Chose a milk brand for your group.

2- Prepare **50ml** Of [100 ppm] (Ca^{2+}) from [$CaCl_2$]$_{(S)}$ using <u>distilled water</u>.

3- Prepare next (all in **50ml** Volumetric Flask):

NO	1	2	3	4	5	Blank
50ml						
Ext.Given Milk (ml)	1	1	1	1	1	NIL
Ca^{2+}_{100ppm} (ml)	0	2.5	5	7.5	10	NIL

4- Fill All Flasks in (3) with <u>distilled water</u> and **Shake Well**.

5- Move to the next Laboratory and determine the [%W/V] of Ca in the <u>**milk.**</u>

Calculations:

$$\text{Number of Ca}^{2+}\text{ moles} = \frac{C_M \ X \ 50}{1000}$$

$$\text{Weight of Ca}^{2+}\text{ (gram)} = \text{Number of moles } X \text{ Mwt.}$$

$$\%w/v = \frac{Number\ of\ grams}{5} X\ 100$$

Results:

No	Added C_{Ca} (ppm)	Added C_{Ca} (M)	Abs.
Blank	0	0	0
1	0	0	A_1
2	C_2	C_2	A_2
3	C_3	C_3	A_3
4	C_4	C_4	A_4
5	C_5	C_5	A_5

Calibration Graph: