

Estimation of Calcium Hardness in water by Flame Photometry

Expt No.

Date:

Principle

The estimation of calcium is based on the emission spectroscopy, which deals with the excitation of electrons from ground state to higher energy state and coming back to its original state with the emission of light. Trace amount of calcium can be determined by flame emission photometry at a wavelength of 423 nm. The intensity of light at 423 nm is proportional to the concentration of the element. After careful calibration of photometer with solution of known composition, it is possible to correlate the intensity of a spectral line of unknown solution with the amount of an element present that emits the particular radiation.

Reagents:

- 1) Distilled water
- 2) Calcium stock solution: 1000 ppm (Dissolve 2.497 g CaCO_3 in 1-2 mL Conc. HCl and dilute to 1L accurately).
- 3) Prepare five different concentrations of calcium solution in the range of 100 ppm – 200 ppm in 50 mL standard flasks by making up with distilled water.
- 4) Along with these solutions, prepare given unknown sample in another 50 mL std. flask.

Apparatus:

Burette, graduated pipette, beakers, rubber bulb, standard volumetric flasks (50 mL), flame photometer and its accessories.

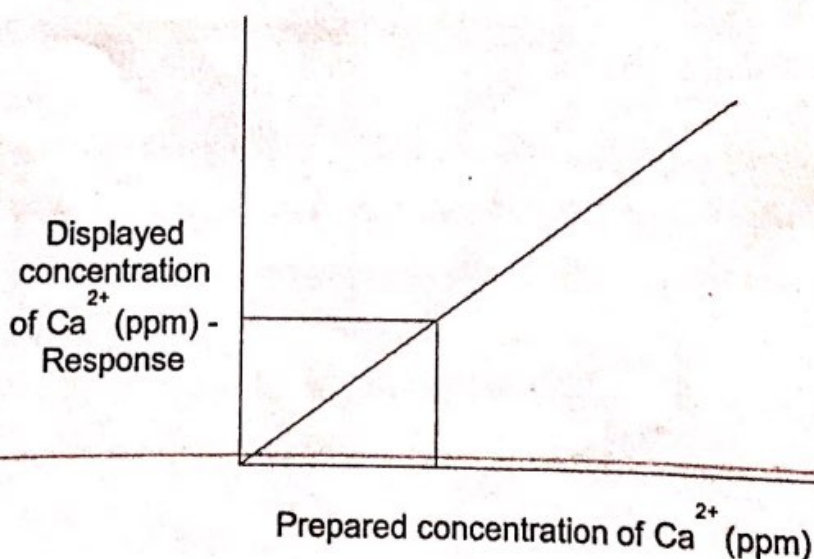


Table-1: Experimental Data

S. No	Concentration (X axis)	Response (Y axis)
1.	180	181.00
2.	160	155.80
3.	140	143.38
4.	120	121.94
5.		
6.	Unknown	154.49

Result:

The amount of calcium present in the given water sample = 150 ppm

0.1. mm

Evaluation of result

Sample number	Experimental value	Actual Value	Percentage of error	Marks awarded
			0.1	(8/8) V. Good 2/11/2/12

Procedure:

Setting the instrument for estimation of Calcium

- 1) Start the electrical supply and switch on the air supply. Stabilize the air and the needle should be steady at the mark to maintain about 0.5 Kg/cm² pressure.
- 2) Switch on the gas and maintain the gas fuel mixture so that blue flame is seen through the viewing window.
- 3) Adjust the flame so that the flame is seen as 5 cones each in two parallel rows.
- 4) Follow the operating instructions of the instrument.

- 5) Following the instructions seen on the screen, carry out calibration using the five diluted solutions of calcium. Stop when "CALIBRATION OVER" display comes.
- 6) Then select "SAMPLE" from the menu.
- 7) Each one of the solutions should be aspirated as sample and the concentration reading displayed by the instrument should be noted down.
- 8) A plot should be made as prepared concentration vs displayed concentration.
- 9) Simultaneously record the concentration of calcium from the given unknown (Treated water or tap water) by introducing unknown as sample and report the result.

SCALE

Along x-axis : $\Delta B.D = 20 \text{ units}$
Along y-axis : $\Delta B.D = 20 \text{ units}$

