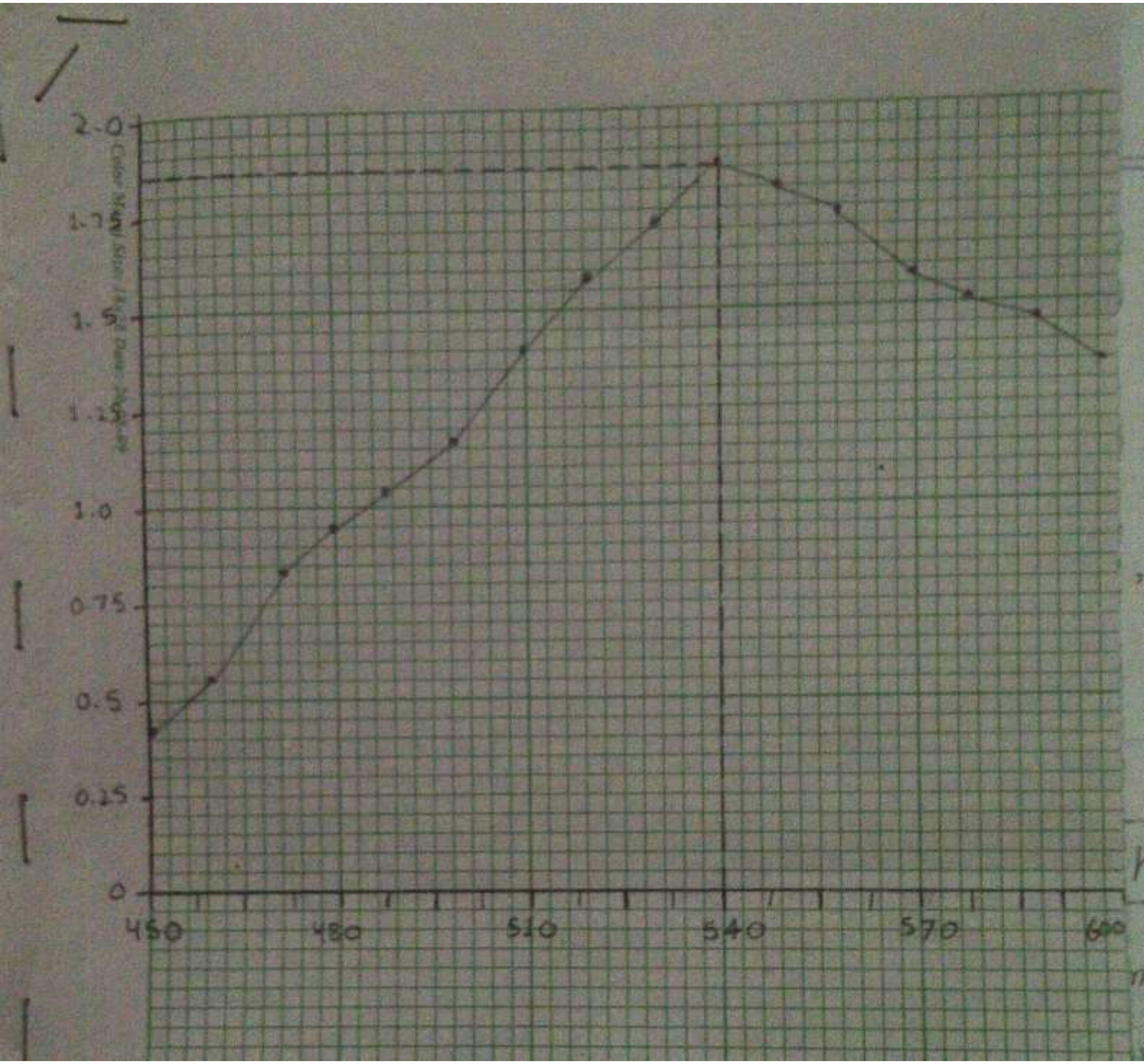
Determination of Maximum Wavelength of Cr^{+6} Complex With Diphenylcarbazide (DPC)



Basic Principle:

It is Ultra Violet (UV) visible absorption spectrophotometry.

Chemicals Required:

0.1M Cr^{+6} solution, 0.01% DPC solution and 0.2N H_2SO_4.

Observations and Calculations:

No.	Wavelength	Absorbance	No.	Wavelength	Absorbance
1.	450 nm	0.4	9.	530 nm	1.71
2.	460 nm	0.56	10.	540 nm	1.83
3.	470 nm	0.78	11.	550 nm	1.80
4.	480 nm	0.89	12.	560 nm	1.76
5.	490 nm	1.09	13.	570 nm	1.68
6.	500 nm	1.21	14.	580 nm	1.57
7.	510 nm	1.43	15.	590 nm	1.49
8.	520 nm	1.62	16.	600 nm	1.31

Result:

The λ_{max} value of Cr^{+6} DPC complex is at 540 nm.

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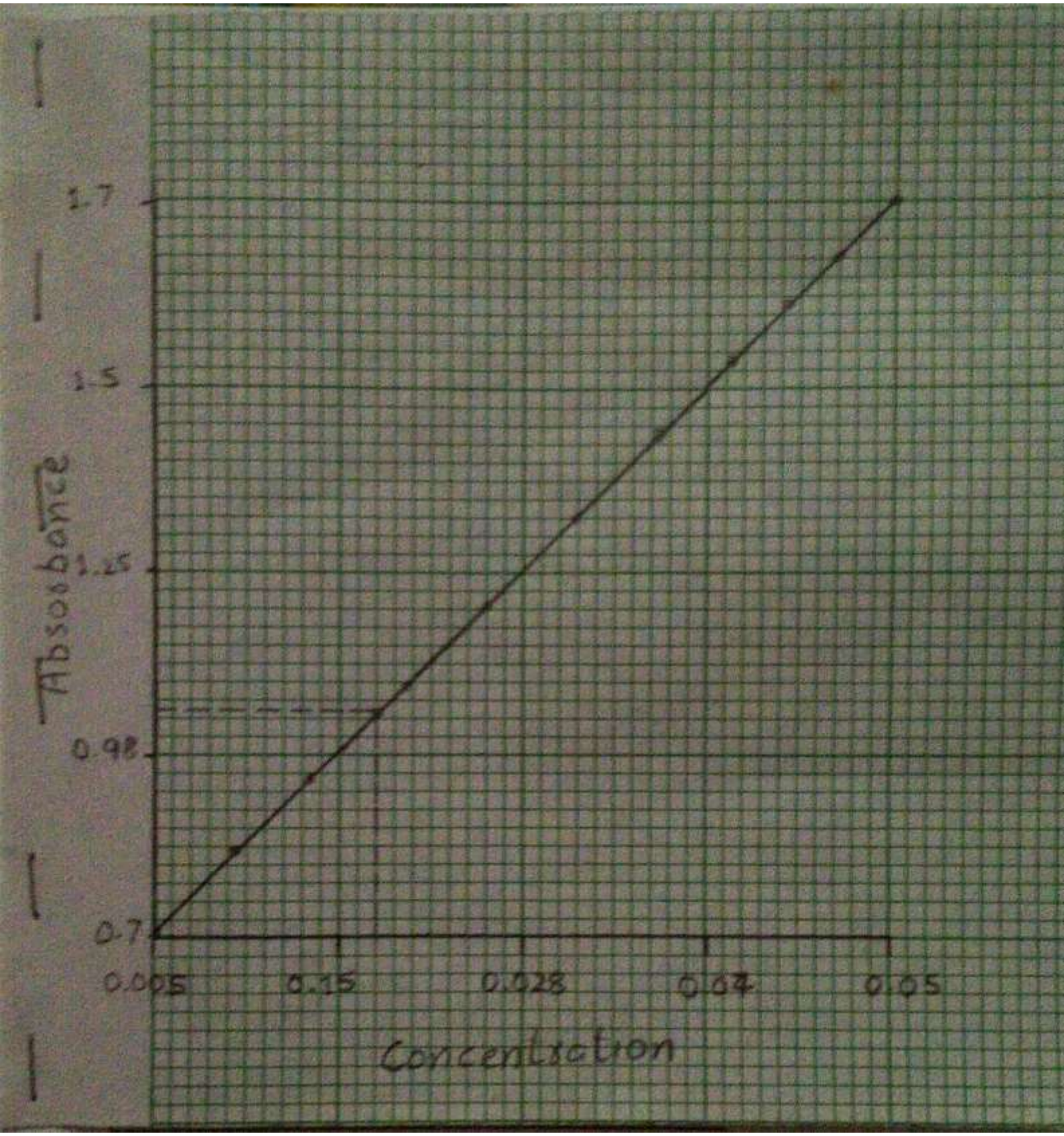
Spectroscopic Determination of Cr^{+6} Ions By Using Diphenylcarbazide in Water Sample



Basic Principle:

It is UV visible absorption spectroscopy

Chemicals:

0.1 M stock solution of Cr^{+6} ions, 1% DPC solution, Acetone, Acetic acid and distilled water.

Preparation of Stock Solution:

$$M = \frac{\text{mass in grams}}{\text{molar weight}} \times \frac{1}{\text{volume of solution in } dm^3}$$

$$0.1 = \frac{x}{294} \times \frac{1}{0.275} \qquad x = 0.275 \times 294 \times 0.1 = 8.085 \text{ gm}$$

8.085 gm $K_2Cr_2O_7$ + Water upto 275 ml = 0.1 M $K_2Cr_2O_7$

Preparation of Standard:

$$M_1V_1 = M_2V_2$$

$$0.1 \times V_1 = 0.005 \times 100$$

$$V_1 = \frac{0.005 \times 100}{0.1} = 5 \text{ ml}$$

5 ml stock solution + water upto 100 ml = 0.005 M
10 ml " " + " " " = 0.01 M
15 ml " " + " " " = 0.015 M
20 ml " " + " " " = 0.02 M
25 ml " " + " " " = 0.025 M
30 ml " " + " " " = 0.03 M

35 ml stock solution + Water upto 100 ml = 0.035 M

40 ml " " + " " " " = 0.04 M

45 ml " " + " " " " = 0.045 M

50 ml " " + " " " " = 0.05 M

Preparation of DPC Solution:

1 gm DPC + 100 ml acetone + CH_3COOH

Observations:

S. No	Co^{+6} Concentration	Absorbance
1.	0.005 M	0.78
2.	0.01 M	0.88
3.	0.015 M	0.98
4.	0.02 M	1.08
5.	0.025 M	1.18
6.	0.03 M	1.28
7.	0.035 M	1.39
8.	0.04 M	1.47
9.	0.045 M	1.58
10.	0.05 M	1.7
11	Sample	1.06

28-11-16

Result:

The concentration of Co^{+6} ions in the given solution (sample) is 0.02 M.