Advanced Pharmaceutical Analysis

5th Stage

Lab 2

Qualitative & Quantitative Analysis of the active ingredient(s) in the pharmaceutical product

UV-Visible spectroscopy is applied for both qualitative (Identification) and quantitative (Assay) analysis.

Qualitative Analysis (Identification):

UV- Visible Spectrophotometry can help to identify the active ingredient in Pharmaceutical Products.

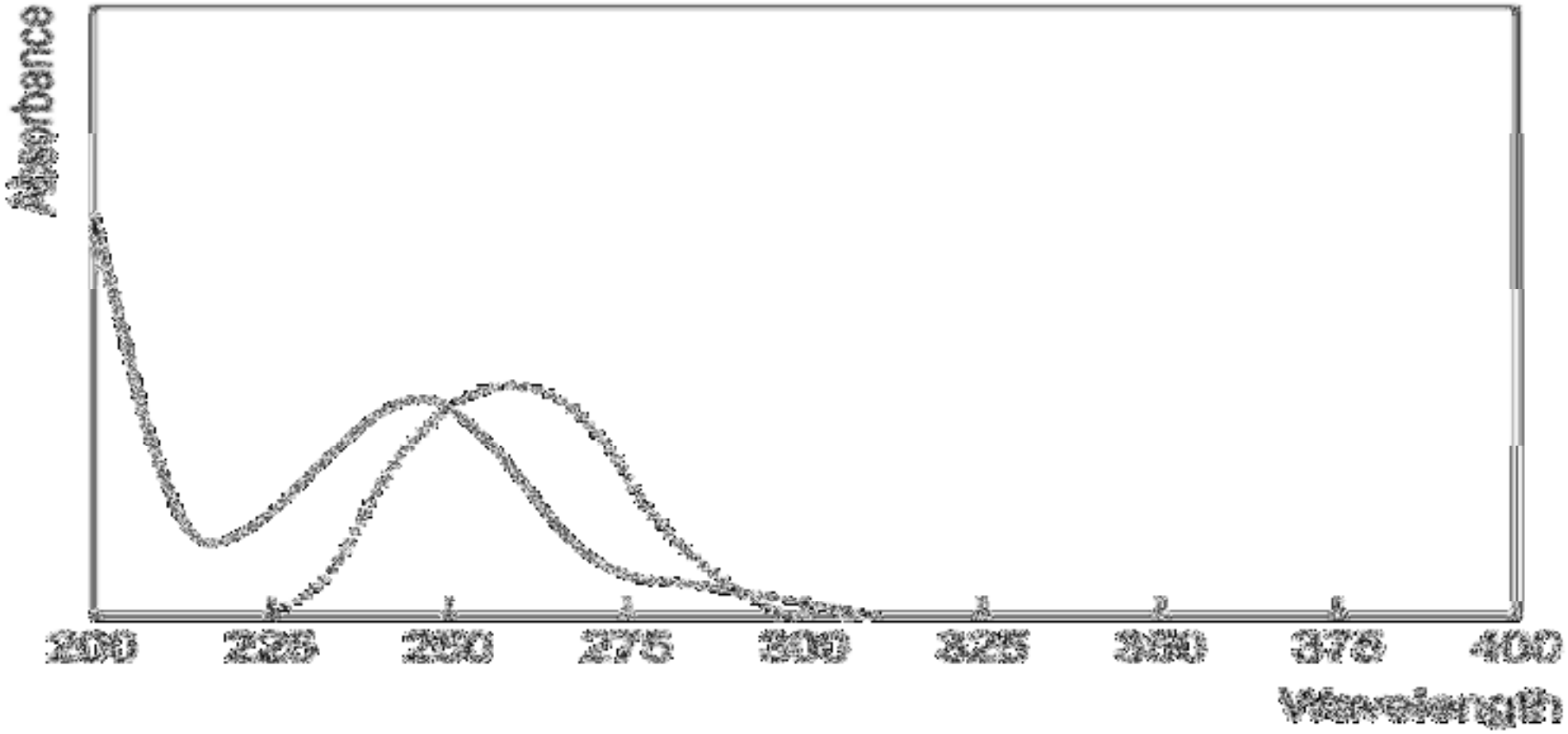
This method is used for the compounds that can absorb UV or Visible Light. Otherwise, there is no peaks (A) will appear.

Identification is done by comparing the absorption spectrum of the test (sample) with the absorption spectrum of the standard.

The Spectrophotometer can rapidly scan a range of wavelengths and record absorbance at each wavelength.

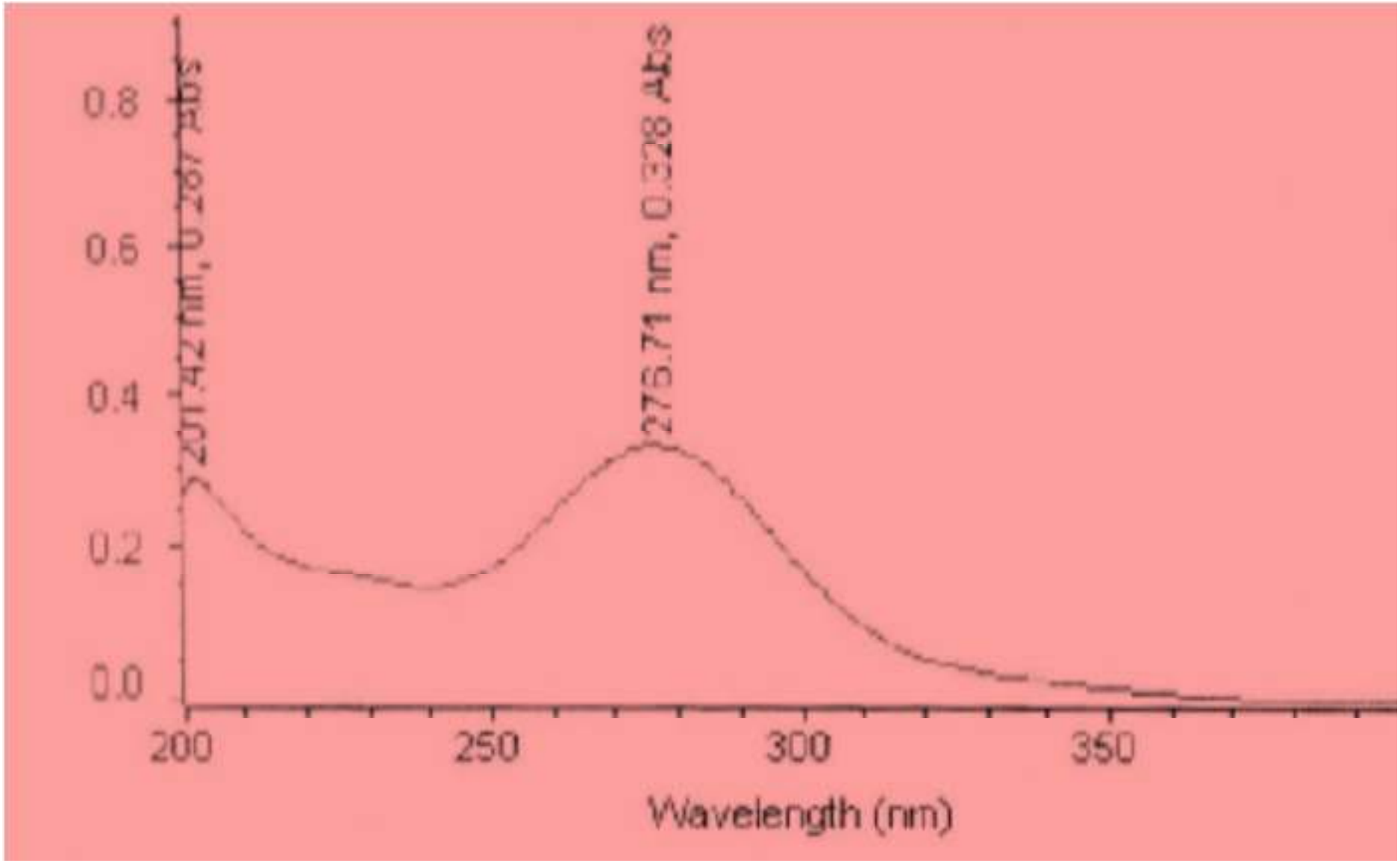
Example 1: Ultraviolet Spectrum Of Paracetamol :

- Aqueous acid: λ max 245 nm (—);
- Aqueous alkali: λ max 257 nm (.....).

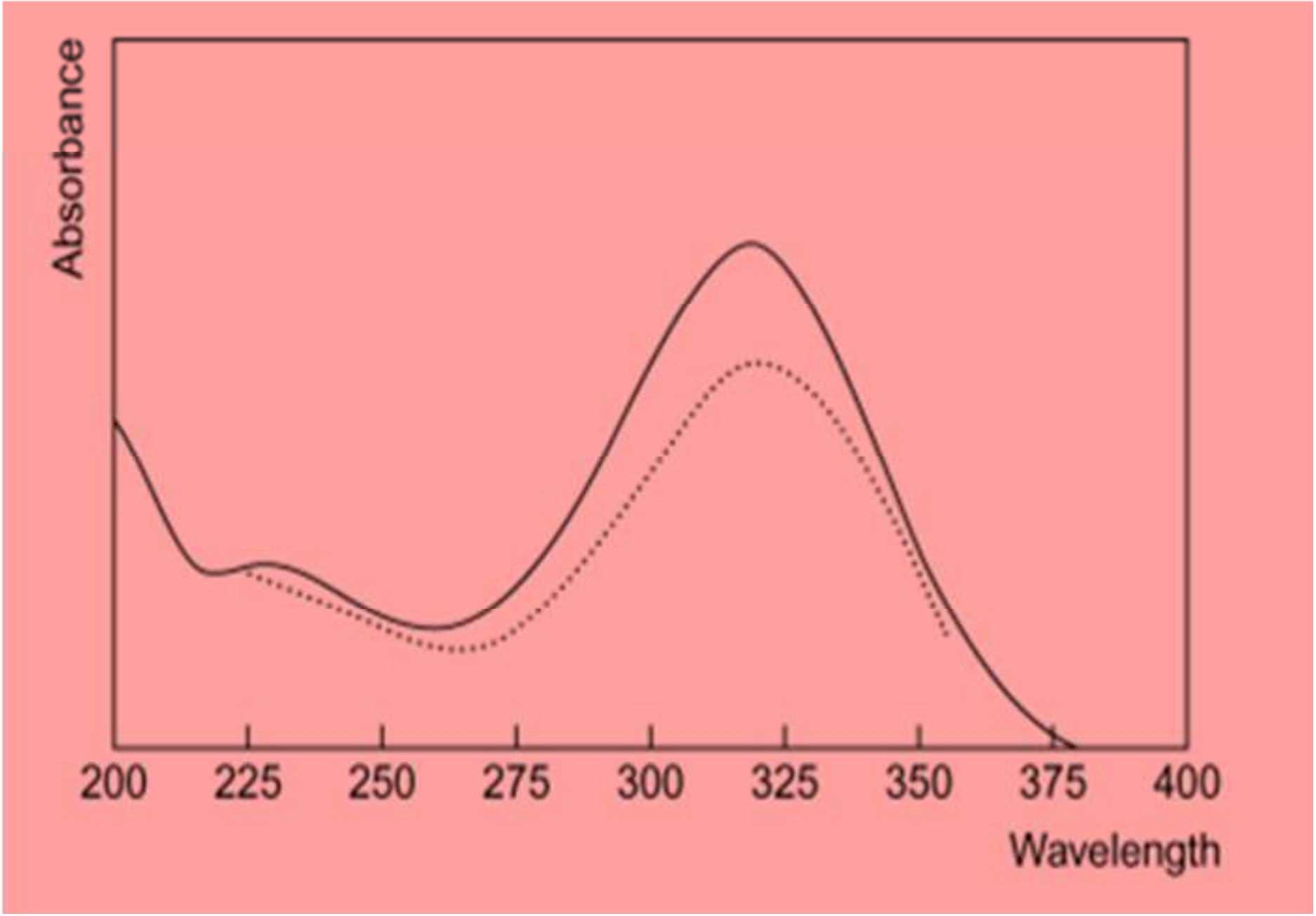


Example 2: Ultraviolet Spectrum Of Metronidazole:

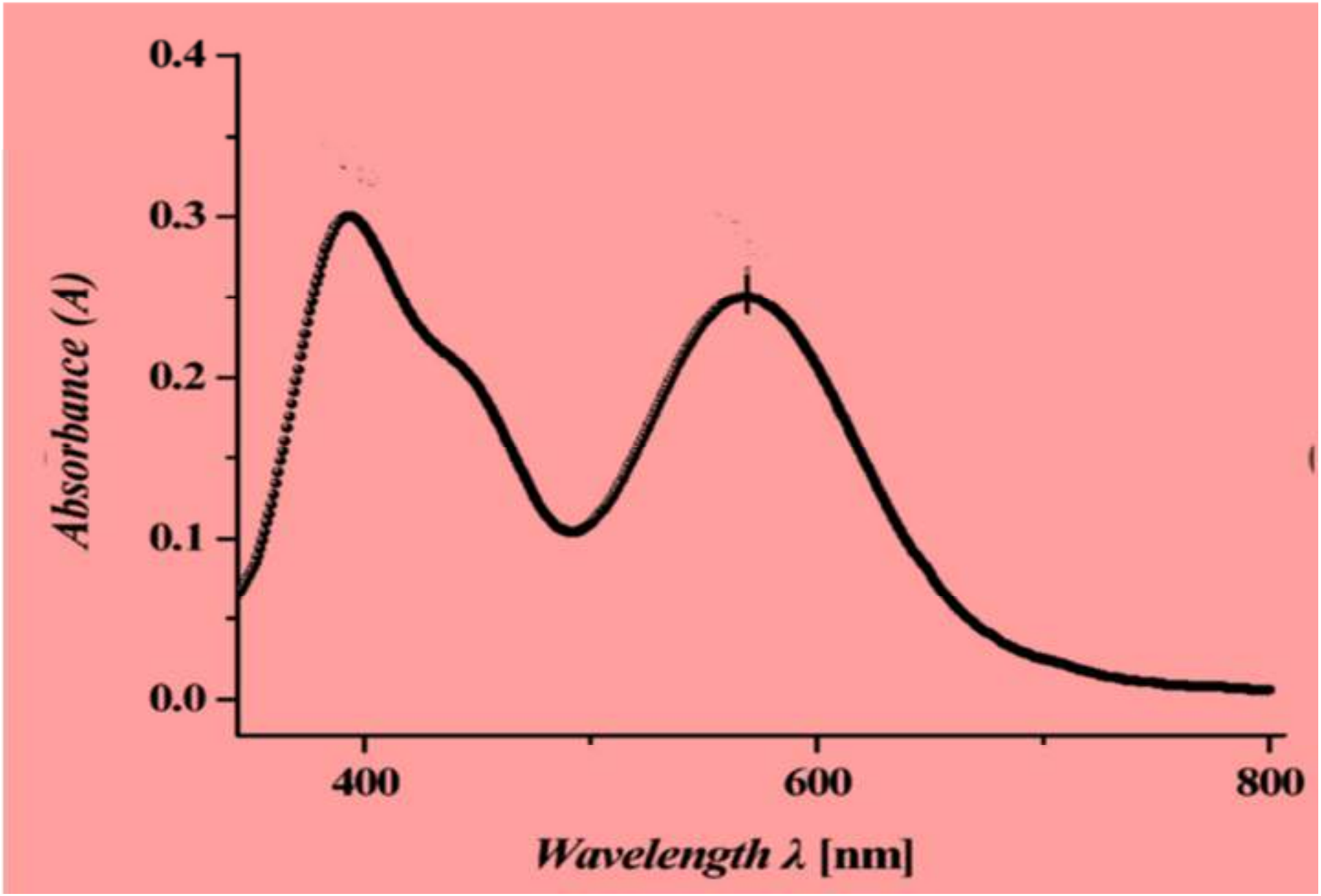
Aqueous acid: λ max 277 nm



Aqueous alkali: λ max 319 nm



Example 3 : Visible Spectrum Of Chromic Nitrate: (Why two λ max ?)



To identify the active ingredient in the pharmaceutical product by scanning in UV-Visible Spectrophotometer :

1. Determine a range of wavelengths to be scanned (depend on compound)
2. Zero the blank
3. Put the standard in the cuvette (the standard is prepared by dissolving specific weight of the standard in the blank)
4. Press Scan
5. Put the test (sample) in the cuvette (the test is prepared by dissolving the pharmaceutical product in the blank)
6. Press Scan
7. Compare the absorption spectrum and λ max of the test (sample) with the absorption spectrum of the standard.

- If similar ⟶ + Ve
- If not similar ⟶ - Ve

Quantitative analysis (% Assay or content):

UV- Visible Spectrophotometry can be used to determine the percent quantity of the active ingredient in the Pharmaceutical Products. This method is used for the compounds that can absorb UV or Visible Light. Otherwise there is no peaks (A) will appear.

% Assay is done by comparing the (A) of the test (sample) with the (A) of the standard at specific λ max by making a suitable standard solution and sample solution in a solvent (which is the bank)

$$\% \text{ Assay} = \frac{\text{(A) of the test}}{\text{(A) of the standard}} \times 100$$

$$F = \frac{\text{Standard Concentration}}{\text{Test Concentration}}$$

To determine % Assay of the active ingredient in Pharmaceutical Products by using UV-Visible Spectrophotometer :

1. Determine a specific λ max
2. Zero the blank
3. Put the standard in the cuvette (the standard is prepared by dissolving specific weight of the standard in the blank at suitable concentration)
4. Read (A) of the standard
5. Put the test (sample) in the cuvette (the test is prepared by dissolving the pharmaceutical product in the blank at same concentration of the standard or calculate factor)
6. Read (A) of the at suitable concentration test
7. Calculate **% Assay**

Practical Work: (Two Weeks)

I. Identification & Assay Of $Cr(NO3)_3$:
at Visible Region (colored compound)

II. Identification & Assay Of Metronidazole :
at UV Region

III. Unknown : % Assay Of $Cr(NO3)_3$ & Metronidazole