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COMPARATIVE ANALYSIS OF COMPLEXATION OF LABETALOL & CHLORTHALIDONE WITH Cu (ll) ION - A SPECTROPHOTOMETRIC STUDY

Dr. Namita Bhardwaj[1]* and Jaishri Kaushik[2]

[1]Department of Chemistry, Dr. C.V. Raman University, Kota, Bilaspur, C.G., INDIA.
[2]Department of Chemistry, C.M.D. College, Bilaspur, C.G., INDIA.

***Corresponding Author: Dr. Namita Bhardwaj**

Department of Chemistry, Dr. C.V. Raman University, Kota, Bilaspur, C.G., INDIA.

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ABSTRACT

UV- Visible spectrophotometric is a selective method for determination of the complexation of drugs with Cu(ll) Metal ion. The proposed method is based on the reaction of selected drugs with Cu(ll) ion. The formed complex were absorbed maximally at 350nm & 250 nm. The different experimental parameter affecting the development of the colour were carefully studied and optimized Here the selected drug labetalol is β-blocker having amino group so the chealation with cu ion is easy and stable and clorothalidone is diuretics thiazide (sulphur containing group) so the chealation is maximum with cu metal ion.

KEYWORDS: complexation, spectrophotometric, absorbance, labetalol, chlorthalidone, stability constant.

INTRODUCTION

The intraction between Copper (II) and the antihypertensive drug labetalol and chlorthalidone leads to formation of the binuclear complexes. It were characterize by spectroscopic (UV-Visible) double beam spectrophotometer[1] Chlorthalidon and labetalol drugs have been well studied for their bioactivity as antibiotics and tumor metastasis inhibitors[2] these drugs are used to treat hypertention.[3] labetalol is chemically 2-hydroxy-5-[1-hydroxy-2 [methylphenylpropyl) aminoethyl] monohydrochloride.

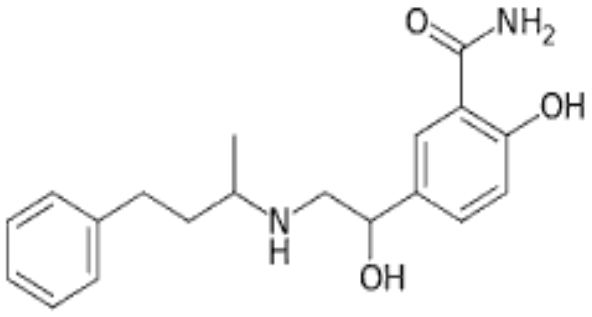

Figure 1: Structure of Labetalol.

Chlorthalidone is a benzenesulfonamide-phthalimidine that tautomerizes to a benzophenones form. It is considered a thiazide-like diuretic.2- chloro-5-(1-hydroxy-3-oxo-2H-isoindol-yl) benzenesulfonam.

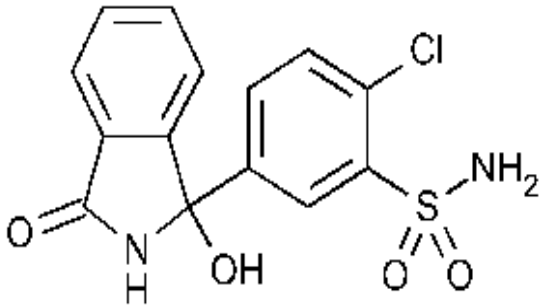

Figure 2: Structure of Chlorthalidone.

One of the most spectacular effects of complex formation is the change of spectral properties.[5] The reasons for light absorption by the complexes are, the excitation of the owing to interaction of the central metal ion and the ligand, a charge transfer from the ligand to metal ion may occur on irradiation; this phenomenon is the reason for the so called charge transfer spectra in the visible and near ultraviolet region. The electrons of transition metal ions are easily excited and consequently absorbed in the visible region i.e. these ions give coloured compounds.[6] In this paper, the interaction of Labetalol and Chlorthalidone with Cu ions is an attempt to examine the mode of coordination of both drugs and the determination of stability constant of the resulting complexes.

MATERIAL AND METHOD

A Systronic UV/Vis spectrophotometer with 1 cm quartz cells was used to measure the absorbance. The pH measurements were made with systronic pH meter model 371 All measurements were performed at room temperature (35 ±0.01°C). labetalol & chlorthalidone were obtained from sigma as hydrochloride form and their stock solution(1 x 10^{-2} M) was prepared by dissolving the accurately weighed amount in glacial acetic acid and the volume was completed to the mark with distilled water. Metal stock solution (0.1M) was prepared by dissolving the appropriate amount of copper acetate with distilled water. A series of solutions containing up to 4.0 ml of buffer solution, 1 ml (0.1 M) of the metal ions and 0.2-2.6 ml (1 x 10-2 M) of drugs were mixed in 10 ml measuring flask and then diluted up to the mark with water. The mixture was allowed to stand for 10 min. The absorbance was measured at the maximum wavelength (λmax) against a blank solution prepared in the same manner but not contains metal ions. The calibration graphswas prepared by using the same procedure (at least seven concentration points) and were linear passing through the origin.

Stoichiometry of labetalol complexes formed in the solution was determined spectrophotometrically applying the continuous variation[7] and mole ratio methods.[8] The obtained results revealed the formation of 1:1 (M:L) labetalol & chlorthalidone complexes with Cu (II) metal ions. The logarithmic constants (log βn) and the free energy changes (ΔG) of the formed complexes was calculated from the data of continuous variation and mole ratio methods applying equations 1 and 2.[9]

$$ß_n = A/A_m / 1- [A/A_m]^{n+1} C_1^n n^2 \text{ ..... (1)}$$

$$\Delta G = -2.303 \text{ RT log } ß_n \text{ ..... (2)}$$

where βn is the stability constant of the metal chelate, A is the absorbance at ligand concentration CL, Am is the absorbance at full color developed, n is the order of the complex formed, T is the absolute temperature and R is the gas constant.

TABLE: Spectrophotometric characteristic of labetalol & chlorthalidone complex with cu (ll) ion.

Drug name	Metal ion	λ_{max}	M/L Ratio	$ß_n$	- ΔG (KJ mol^{-1})
Labetalol	Cu (ll)	350 nm	1:1	4.6	3.91
Chlorthalidone	Cu (ll)	250 nm	1 : 1	3.5	1.50

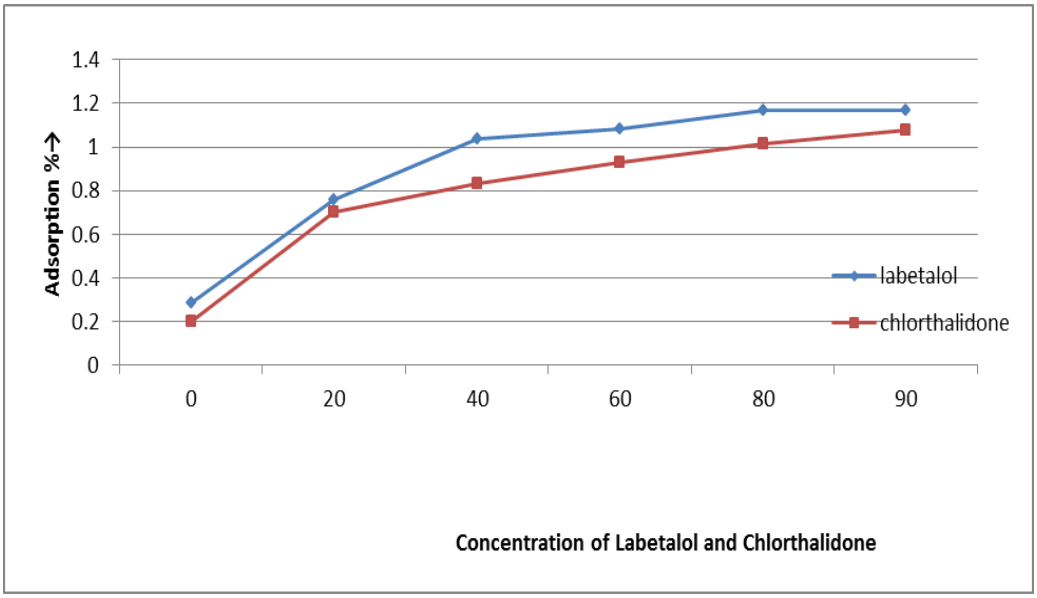

Figure 3: Absorbance vs Concentration plot for Cu (ll) -labetalol and Cu (ll) -chlorthalidone complexs.

RESULT AND DISCUSSION

The stability constant value for complexation of labetalol and chlorthalidone with Cu (ll) ion by spectrophotometric method have been presented in table 1 Labetalol and chlorthalidone complexes exhibits maximum absorption in the UV-Visible region at 350 nm & 250 nm for Labetalol and Chlorthalidone Cu (ll) complex, respectivaly. On plotting the absorbance as a function of concentration, straight lines were obtained up 79.9.00 and 90.10, with Cu(II), for Labetalol and Chlorthalidone respectively, in presence of borate buffer. The complexes of this antibiotic with all the metal ions indicate the formation of 1:1 complexes. The stability constant for metal labetalol and metal chlorthalidone have been found to be in order labetalol > chlorthalidone. The negative value of ΔG indicates that complex formation is spontaneous.

CONCLUSION

The present research work has demonstrated that the use of UV-Visible spectroscopy is feasible in complexation reaction for determine the stability constant. The determination process is based on the ability of

antihypertensive drug (ligand) to form stable complex with Cu (ll) metal ion.

REFERENCE

1. Zayan SE, Issa RM, Magrabi JY, El-Dessoukey MA. Spectrophotometric study on the copper(II) – dinitroresorcinol reaction. Egypt. J. Chem, 1973; 17: 459.
2. Dhaneshwar, S., Tewari, K., Joshi, S., Godbole, D., & Ghosh, P. Diglyceride prods rug strategy for enhancing the bioavailability of norfloxacin. Chemistry and Physics of Lipids, 2001; 164: 307-313.
3. Issa I.M. , Issa R.M. ,Ahmad Y.Z. ,The Th(ll),co(ll), and U(ll) chilate with hydroxy anthraaquem, 1975; 18: 427.
4. Kassem H, Rabih M, Chalhoub M, Elsayegh D. Unusual Presentation of Pneumocystis Pneumonia in an Immuno competent Patient Diagnosed by Open Lung Biopsy. Heart, Lung Circula, 2012; 21(4): 221-224.
5. H. M. Irving and R.J.P. Williams, Ibid, 162, 746 (1948).Stability constants, Part –II Inorganic ligands, The Chemical Society, London. 1958.
6. Bharadwaj N., et. al. Complexation of Norfloxacin with Some Transition Metal Ions - A Spectrophotometric Study, j. Chem and chem. Sci, 2016; 6(9): 821-825.
7. Bjerrum J., Metal Ammine formation in Aqueous Solution, P. Haase and Son, Copenhagen, 1941.
8. Vogel I. Textbook of Quantitative Inorganic Analysis Including Elementary Instrumental Analysis, 4th ed. John Wiley, London, 1986.
9. Britton HT. Hydrogen Ions, Vol. L, 2nd ed. Longman, London. Through personal communication of Egyptian International Pharmaceutical Industries Co, 1952; 16294/1989.