

Spectrophotometric Determination of Antibiotic drug Penicillin via its Quantitative Conversion to Pencillamine and its Complexation with OS (VIII): Characterization of Complex by FTIR, NMIR, ESR, TGA, DTA. Proposed Structure of the Complex

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Abstract—Micro determination of the well established antibiotic drug penicillin has been developed by its quantitative conversion to pencillamine. It involves stepwise complexation with Os(VIII) forming 1:1 complex, with $\lambda_{\max} = 238\text{nm}$. $E = 6.70 \times 10^2 \text{ L mol}^{-1} \text{ cm}^{-1}$, Beer's law range $1.2600 \times 10^{-1} \text{ mg}$ to 3.192mg . % error is less than 1.0%, standard deviation 1.012×10^{-4} and coefficient of variance 0.0080. Effect of foreign metal ion shows that 1 ppm of complex could tolerate 0.000056 ppm of Fe(II), 0.0372 ppm of Fe(III), 0.002 ppm of Cu(II), 0.0056 ppm of Co(II), 0.0005 ppm of Ni(II), where as Palladium(II) and Ru(III) cause severe interference. Characterization of the complex was done by elemental analysis (CHN), which confirms 1:1 ratio between metal and ligand. FTIR spectrum of the complex also confirms the binding of -SH and NH₂ Group to Os(VIII) by disappearance of -SH stretch art (2519 cm^{-1}) and C-N stretch (at 1354 cm^{-1}) in the Os(VIII) complex. Since no ESR signals were obtained by complex hence it shows diamagnetic nature as well as square bipyramidal geometry which is confirmed ¹H NMR spectrum of the complex exhibits down field shift (-0.26) for -SH proton and NH₂ protons (10 fold decrease) showing the bonding between Os(VIII) and 'S' atom of -SH group and N of NH₂ group. DTA and TGA of this complex have very significantly confirm the proposed structure and presence of water molecules.

Keywords: FTIR, NMR, ESR, DSC, TGA & DTA.