

## STUDY OF PARTICLE SIZE AND EFFICACY OF TRANSITION METAL COMPLEXES OF MIXED LIGANDS, TOLUBUTAMIDE AND GLICLAZIDE, THE ORAL ANTIDIABETIC DRUGS

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### ABSTRACT

The present study describes the particle size determination of mixed ligand complexes of tolbutamide (TBM), N-[(Butyl amino) carbonyl] – 4 methyl benzene sulfonamide (trade name, Rastinon) and gliclazide (GCZ) 1-(3-Azabicyclo [3,3,0] oct-3yl) – 3- (p-tolyl-sulfonyl) urea (trade name Diamicon) are oral hypoglycemics which were synthesized with copper, zinc, mercury, iron and cobalt and suitably isolated in pure powdered form. Yields are substantial. Stoichiometry suggests 1:1:1 (L<sub>1</sub>L<sub>2</sub>M) ratio between drugs and metal ion, (ternary complexes). Analytical data of these complexes agrees with the compositions C<sub>12</sub>H<sub>17</sub>N<sub>2</sub>O<sub>3</sub>S-Cu-C<sub>15</sub>H<sub>20</sub>N<sub>3</sub>O<sub>3</sub>S, C<sub>12</sub>H<sub>17</sub>N<sub>2</sub>O<sub>3</sub>S-Zn-C<sub>15</sub>H<sub>20</sub>N<sub>3</sub>O<sub>3</sub>S, C<sub>12</sub>H<sub>17</sub>N<sub>2</sub>O<sub>3</sub>S-Hg-C<sub>15</sub>H<sub>20</sub>N<sub>3</sub>O<sub>3</sub>S, C<sub>12</sub>H<sub>17</sub>N<sub>2</sub>O<sub>3</sub>S-Fe-G<sub>5</sub>H<sub>20</sub>N<sub>3</sub>O<sub>3</sub>S.2H<sub>2</sub>O, C<sub>12</sub>H<sub>17</sub>N<sub>2</sub>O<sub>3</sub>S-Co-C<sub>15</sub>H<sub>20</sub>N<sub>3</sub>O<sub>3</sub>S.2H<sub>2</sub>O.

**Keywords:** Particle size, analysis, antidiabetic drugs and metal complexes.

### INTRODUCTION

Now a days the particle size of drug is gaining much more importance both in the field of medicine<sup>1-2</sup> and industry<sup>3</sup> in order to find out the maximum efficiency of a particular drug<sup>4-6</sup>. Particle size measurements are made in conjugation with separation of the powder into fraction on the basis of size. The particle size is the single most important consideration for suspension in formulation. The literature survey indicates that the finer the particle size, the better is the absorption<sup>7</sup>. Keeping in the view the usefulness and importance of particle size study it, was therefore considered proper to study the comparative particle size of the transition metal complexes of mixed drugs as ligands TBM and GCZ as compared to the drugs alone.

### MATERIAL AND METHODS

#### Microscope Method

Microscopical measurement may be made either by means of a stage micrometer and an eye piece micrometer (ocular) or by means of a stage micrometer and *Camera lucida*. To measure the particle size of the compounds, the micrometer method has been found suitable.

Microscope is prepared by unscrewing the upper lens of the eye piece, placing the eye piece micrometer on the ridge inside, and the lens is replaced by the stage micrometer which is fitted on to the stage of the microscope and focused in the usual way. The eye piece micrometer scale is calibrated with the stage micrometer. A very small quantity of the sample, under investigation is spread on the microscope slide and covered with the cover slip. The diameter of about ten random particle is measured and the average results is finally recorded.

For this purpose mixed ligand complexes of TBM-GCZ with Cu, Zn, Hg, Fe and Co were taken and the particle size of the TBM, GCZ and their metal complexes were determined by microscope having eye piece 10x objectives 10/0.30 and stage micrometer 0.01m (Erma, Japan).

The eye piece was calibrated against stage micrometer so that one division the eye piece micrometer was found equal to 15 microns, the samples were suitably spread on the microscope slide and covered with cover slip. The diameter of 10 random particles of each sample was measured and the average sizes were recorded in Table 1.

**Table - 1: Particle size of Mixed Ligands TBM and GCZ and their metal complexes**

S.No.	Drug/ Complex	Particle Size (microns)	Appearance
1.	Tolbutamide (TBM)	25:12	White Tetrahedral
2.	Gliclazide (GCZ)	5:4	White
3.	TBM-Cu-GCZ	5:3	Lightgreen, round shaped
4.	TBM-Zn-GCZ	6:4	White, Round Shaped
5.	TBM-Hg-GCZ	5:4	White, irregular
6.	TBM-Fe-GCZ.H <sub>2</sub> O	8:3	Dark brown, Irregular
7.	TBM-Co-GCZ.H <sub>2</sub> O	7:5	Light pink, Irregular

### RESULTS AND DISCUSSION

The Cu, Zn, Hg, Fe and Co complexes with mixed ligands TBM and GCZ were synthesized and purified and after drying the particle size was measured by microscope method. It was observed in general that the particle size of drugs or organic molecules, reduces on complexation. Complexes would be absorbed more readily than their parent drugs and it also shows quick absorption in the blood stream. Thus it is observed that the particle

size of metal complexes of mixed ligand TBM-GCZ reduces on complexation which shows that complexes are biologically active due to easy absorption and swift action.

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