

COMPLEXES OF *Cu*(II), *Ni*(II) and *Co*(II)  
WITH SULPHADIAZINES SALICYLALDIMINES (SUDSSA)

PRABUDDHA JAIN & KAMAL K. CHATURVEDI

Holkar Science College, Indore

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Complexes of sulphasomidine salicylaldimine (SUSMSA), sulphamethazine salicylaldimine (SUMTSA) and sulphamerazine salicylaldimine (SUMRSA) with *Cu*(II), *Ni*(II) and *Co*(II) when studied by conductometric titrations and Job's method of continuous variation showed 2 : 1 complexation. Their stability constants and free energy changes ( $-\Delta F$ ) at 25°C are evaluated spectrophotometric studies have been carried out on complexes of sulphadiazine salicylaldimine (SUDSA), SUMRSA and SUMTSA with *Ni*(II). SUDSSA as well as its metal chelates are found to be bacteriostatic agents against *E. Coli* and *S. aureus*.

Condensation products of sulphonamides with salicylaldehyde are not only good complexing agents<sup>1-4</sup> but are also good bacteriostatic agents<sup>5-7</sup>. Herein we describe the conductometric and spectrophotometric studies of complexes of SUDSSA with bivalent metals.

EXPERIMENTAL

All chemicals employed were of Analar grade. Sulphadiazines salicylaldimines (SUDSSA) were prepared by the methods described earlier<sup>7</sup>.

Conductivity measurements were carried out with 10 ml, 0.005M SUDSSA dissolved and diluted to 100 ml in 50% acetone and titrated against 0.005M metal salt solutions. The results after applying volume correction were plotted, these indicate 2 : 1 complexation.

Job's method of continuous variation<sup>8</sup> was applied to determine the ligand-metal ratio using  $2 \times 10^{-3}$ M solutions and conductivity as index property. The stability constants were calculated by extrapolation of Job's curves as suggested by Raghavrao<sup>9</sup> using the expression

$$K_s = \frac{1-\alpha}{4\alpha^3 C^2}$$

where  $\alpha$  is the degree of dissociation and  $C$  the concentration. The results are recorded in Table 1.

TABLE 1  
STABILITY CONSTANTS

Complex	$\alpha$	Stability constants (log $K$ )	$\Delta F$ $K$ cal/mole
<i>Cu</i> -SUMTSA	0.0645	8.34	-11.26
<i>Ni</i> -SUMTSA	0.1621	7.11	-9.53
<i>Co</i> -SUMTSA	0.2045	6.80	-9.11
<i>Cu</i> -SUMRSA	0.0856	8.07	-10.81
<i>Ni</i> -SUMRSA	0.1777	6.94	-9.30
<i>Co</i> -SUMRSA	0.2156	6.71	-8.99
<i>Cu</i> -SUSMSA	0.1025	8.70	-11.88
<i>Ni</i> -SUSMSA	0.1500	8.15	-11.15
<i>Co</i> -SUSMSA	0.2000	7.75	-10.59

A Beckmann model Du2 spectrophotometer was used for absorption measurements. The studies were carried out in acetone/alcohol mixture. Stability constants were calculated by applying Job's method of continuous variation using  $3 \times 10^{-4}$ M solutions and optical density as index property. The absorption maxima of Ni-SUDSA is 290 n.m., that of Ni-SUMRSA is 305 n.m. and of Ni-SUMTSA, is 325 n.m. at pH 7.0; these were quite different from that of nickel acetate. At these wave lengths the absorption of nickel is nil. These wave lengths were chosen for studying the stoichiometry of the complexes and also for determining stability constants. The validity of Beer's law was observed and the absorption measurements were carried out after 24 hr of equilibration. The colour did not fade even after a week. The pH of the resulting solution was adjusted at the required level by using different buffer solutions. The values of the stability constants and free energy changes are recorded in Table 2.

TABLE 2

## STABILITY CONSTANTS

Complex	$\alpha$	Stability constants (log K)	$\Delta F$ K cal/mole
Cu—SUMTSA	0.1000	11.31	-15.19
Cu—SUMRSA	0.1250	11.03	-14.31
Cu—SUDSA	0.1364	10.99	-14.76

The bacteriostatic property of the complexes was compared against the parent compound by the method described earlier<sup>10</sup>. In all cases the antibacterial activity was found to be nearly equal against *Escherichia coli* and *Staphyl lococcus aureus*. Indirectly weight for weight the complexes appeared to be more potent than the parent compound.

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