
CHAPTER - VII

SUMMARY

New methods are being developed for the determination of elements under specific conditions which are also useful for the applications of analytical reagents. Therefore, development in methodology and techniques of analysis is important. Though several methods already exist for the analysis of each element, the search for new methods which are more specific, selective and sensitive continues. Therefore, it is necessary to develop new simple methods of analysis of elements. We have investigated new analytical reagent 2-benzoyl pyridine guanylhydrazone (BPG) and studied their applications.

BPG forms complexes with metal ions. The first chapter deals with the synthesis and characterisation of the reagent. It also deals with the literature survey of the reagent. It also deals with the literature survey of the reagent. Chapters two, three, four and five deal with the methods of determinations of gold(III), palladium(II), ruthenium(III) and osmium(VIII) respectively.

The spectral characteristics of these metals are summarised in table 7.1. The applications of the reagent are given in table 7.2. The interferences and tolerance limits of foreign ions are discussed for each element separately.

The method for simultaneous spectrophotometric determinations of Ru(III) and Os(VIII) is described in the sixth chapter.

Table 7.1 : Spectral characteristics of metal-BPG complexes

Spectral characteristics	Metal-BPG complex			
	Au(III)	Pd(II)	Ru(III)	Os(VIII)
Colour	Yellow	Yellow	Reddish-violet	Yellowish orange
λ , max, nm	395	415	520	435
Molar extinction coefficient, ϵ , l mole ⁻¹ cm ⁻¹	0.2859x10 ⁴	0.6609x10 ⁴	0.2650x10 ⁴	0.2986x10 ⁴
pH	10.5	8.5	4.0	3.0
Beer's law validity, ppm	40.0	6.0	33.0	22.0
M : L ratio	1:1	1:1	1:2	1:1
Sandell's sensitivity, S, $\mu\text{g}/\text{cm}^2$	0.1525	0.704	0.2844	0.2020
Degree of dissociation, α	0.1766	0.0892	0.0943	0.0818
Instability constant, K	7.519x10 ⁻⁶	7.56x10 ⁻⁷	3.33x10 ⁻¹⁰	7.288x10 ⁻⁷

Table 7.2 : Applications of the reagent (BPG)

Metal ion	Analysis of alloy	Certified value,	Experimental value,
Au(III)	Gold-copper-silver alloy	43.4%	43.1%
Pd(II)	Palladium(II)	5.0%	4.94%
	carbon catalyst	3.0%	2.89%
Ru(III)	Synthetic mixture	30.5 μg	30.27 μg
Os(VIII)	Synthetic mixture	100.0 μg	99.1 μg
		200.0 μg	198.9 μg

Thus, as compared with other reagents, BPG forms complexes instantaneously and thus shortens the time required for estimation. BPG is stable in air. There is no action of light on the reagent. So no special care is required to protect it from light. Sensitivity and selectivity of the reagent is fairly good.

Finally, it can be concluded that BPG is fairly good photometric reagent for the determinations of metals reported in this dissertation.
