



P-ISSN: 2349-8528  
 E-ISSN: 2321-4902  
[www.chemijournal.com](http://www.chemijournal.com)  
 IJCS 2025; 13(1): 01-02  
 © 2025 IJCS  
 Received: 05-10-2024  
 Accepted: 11-11-2024

**Rajesh S Mony**  
 Head Product Portfolio  
 Diversification, Vaidyaratnam  
 Oushadhasala Pvt. Ltd.,  
 Vaidyaratnam Road,  
 Thaikkattussery P.O, Ollur,  
 Thrissur, Kerala, India

**Corresponding Author:**  
**Rajesh S Mony**  
 Head Product Portfolio  
 Diversification, Vaidyaratnam  
 Oushadhasala Pvt. Ltd.,  
 Vaidyaratnam Road,  
 Thaikkattussery P.O, Ollur,  
 Thrissur, Kerala, India

## International Journal of *Chemical Studies*

# Quantitative gravimetric estimation of elemental gold in classical ayurvedic formulation - *Saraswatarishtam*

**Rajesh S Mony**

### Abstract

*Saraswatarishtam* is a Self-fermented Ayurvedic product under *Arishtasava* category referred in the Ayurvedic text "*Bhaishajyaratnavali*". Apart from various herbs in the form of herbal decoction and herbal powders, Gold is an integral component of this medicament. Along with statutory QC specifications mentioned by Ayurvedic Pharmacopeia of India, Gold estimation in the product is a sensitive aspect QC analysis.

**Keywords:** *Saraswatarishtam*, gold estimation, hydroquinone, aqua regia

### 1. Introduction

*Saraswatarishtam* is a Classical self-fermented formulation of *Arishtasava* category among Ayurvedic medicaments holding a high degree of commercial importance due to the presence of Gold as one ingredient in the formula. The main focus of this work is for developing an accurate rapid and fast laboratory method for the quantitative estimation Gold in this finished product as a part Quality assurance activity.

Even though the Ayurvedic classical textual reference (*Bhaishajyaratnavali*) mentions gold incorporation in to the formulation as immersion gold leaves in specified quantity for a stipulated period at the in-process step of the whole procedure, many manufacturers are adding gold in the form of either chemical solubilization method (gold occurs as Auric chloride) or by way of adding incinerated gold as microfine *Swarna Bhasma* (gold occurs as Auric oxide).

The design of this analytical method and protocol necessitates the step-by-step evasion of interfering chemical components aiming to isolate and extract the elemental gold from the poly herbal mixture formulation, base on the basic principles of Chemistry.

### 2.1 Materials and Methods

*Saraswatarishtam* samples manufactured by two AYUSH GMP Certified companies were procured for the analysis.

#### Sample details

- Saraswatarishtam* with Gold, M/s Vaidyaratnam Oushadhasala, Thrissur
- Saraswatarishtam*, M/s Arya Vaidya Sala, Kottakkal

#### Quantities of Gold mentioned in the Product Label

- M/s Vaidyaratnam Oushadhasala, Thrissur - 0.004 gm in 10 ml *Arishtam*
- M/s Arya Vaidya Sala, Kottakkal - 0.002 gm in 10 ml *Arishtam*

#### Procedure

Each sample of 450 ml is taken after assuring uniformity by sufficient agitation. The entire measured quantity of the sample is transferred to 1000.00 ml borosilicate glass beaker and evaporated over a water bath to reduce the volume to 1/10 quantity.

The concentrated sample is completely transferred to 50 ml silica crucible and kept inside a preheated muffle furnace to 200 deg. C. for 20 min. Then the temperature of the furnace is raised 600 deg. C and continued incineration for another 30 min.

After this the furnace heating is turned off and the crucible taken out and kept inside the desiccator to bring down to room temperature. The entire crucible contents are transferred to a

100 ml borosilicate beaker, added 50 ml concentrated Sulfuric acid and heated to boil with occasional stirring with glass rod, over water bath kept inside a fume hood. After cooling and settling the supernatant is decanted and added 50 ml of DM water, boiled, and allowed to settle. This supernatant is again drained out. This step is repeated for another two times. This removes the organic components in the ash through charring.

Added 50 ml concentrated Nitric acid and heated to boil with occasional stirring with glass rod, over a water bath under a fume hood. After cooling and settling the beaker contents the supernatant is decanted and discarded. Then added 50 ml DM water, boiled, cooled and discarded then supernatant. This activity is repeated for two times. This removes any remaining organic contents by oxidation.

To the beaker contents remaining added 50 ml Aqua regia and kept inside a fume hood for 30 min. After the cessation vigorous reaction, the supernatant aqua regia is decanted in another 100 ml beaker. Added 20 ml DM water to the content remaining in the beaker washed out the acid traces and decanted to the same beaker bearing the Aqua regia supernatant collected earlier.

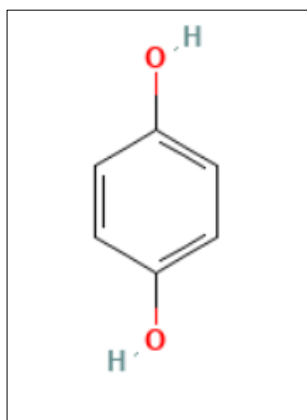
This supernatant is evaporated to dryness in a 500 ml borosilicate glass beaker, cooled and mixed with 100 ml DM water.

To this solution added 30 ml of 50 percent Hydroquinone (C<sub>6</sub>H<sub>4</sub>(OH)<sub>2</sub>) solution and heated to boil for 20 minutes.

After cooling filtered the precipitate obtained using Whatman 40 filter paper. After several washings of the filter paper with DM water, the filter paper comprising the precipitate is transferred to a pre weighed silica crucible and incinerated at 600 deg C for 30 minutes. After cooling the crucible in a desiccator, the precipitated Gold (100% pure) is retrieved carefully and weighed to calculate the percentage of the sample taken for analysis.

**Chemical reactions involved the whole exercise**  
**When Gold reacts with Aqua regia it produces Chloroauric acid (HAuCl<sub>4</sub>) and Nitrosil chloride (NOCl)**  
 $2\text{Au} + 3\text{HNO}_3 + 11\text{HCl} \rightarrow 2\text{HAuCl}_4 + 3\text{NOCl} + 6\text{H}_2\text{O}$

**Hydroquinone precipitate gold from aqua regia. The reaction reduces gold (III) to gold metal**  
**Structure of Hydroquinone**



### 3. Results and Observation

D.1 The average gold content range in Sample A - 0.036 - 0.038% w/v

D.2. The average gold content range in Sample B - 0.018- 0.019% w/v

### 3. Conclusion

Since *Saraswatarishtam* is a high valued versatile and time tested Classical Ayurvedic formulation practiced throughout the country by Ayurvedic Physicians for various Neurological conditions, for improving cognitive skills and treating dementia conditions, it is an immense obligation from the manufacturer to ascertain the quality in all aspects including the Gold content quantitatively batch to batch.

This works proved the application of the standard analytical techniques towards the assessment of gold present in the formulation accurately.

### 4. Acknowledgement

The authors are thankful to Dr. E T Neelakantan Mooss Managing Director, Vaidyaratnam Oushadhasala for providing all the necessary facilities and finance for this work.

### Conflict of Interests

The author has declared no conflict of interest.

### 5. References

1. Latinsier WM, Hildebrand JH. Reference book of inorganic chemistry. New York: The Macmillan Company; 1940. p. 206.
2. Balaram V, Gnanaswara Rao T, Anjaiah KV, Ramesh SL. Proc. Nat. Workshop on Exploration and Exploitation of Gold Resources of India. Hyderabad: N.G.R.I.; 1996. p. 231.
3. Text book of Quantitative Chemical Analysis. Burnt Mill, Harlow Essex: Longman House; [date unknown]. Co-published with John Wiley and Sons Inc., 605 Third Avenue, New York, NY 10158, USA.
4. Beamish FE, Russell JJ, Seath J. The determination of gold. Ind Eng Chem Anal Ed. 1937;9:174. doi: 10.1021/ac50108a011.
5. Nouri M, Nasehi B, Samavati V, Mehdizadeh SA. Optimizing the effects of Persian gum and carrot pomace powder for development of low-fat donut with high fibre content. Bioactive carbohydrates and dietary fibre. 2017 Jan 1;9:39-45.