

Analysys of Fe, Mn, Cu, Zn and Mg from Arogyavardhinivatiby A.A.S. technique**Dr.K.H.Kapadnis**

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Abstract:

For the maintance of health and to cure many of the janaralillness Arogyavardhinivatiis an important and widely used medicine in India since ancient time. It contains many trace elements such as Fe, Mn, Cu, Zn and Mg.The present study is based on Qualitative and quantitative analysis of these elements present in AurvedicVatibyAtomic Absorption Spectroscopy Technique.Amount offe, Mn, Cu, Zn and Mg is determined by graphically and results are interpreted in tabular form.

Key words:

AAS, Arogyavardhinivati, qualitativeanalysis ,Iron,Manganese, Copper,Zinc and Magnesium.

Introduction:

Arogyavardhinivatiis popular ayurvedic medicine in india for all age group peoples as it is used for maintain the health,for any teraphy branch medicine, There are two main issues of drug therapy viz. safety and efficacy of medicines. There is wide awareness among the scientific community regarding the quality control of herbal drugs and formulations in the last decades. The factors associated with herbal drugs are the use of fresh plants, temperature, light exposure, water availability, nutrients, period and time of collection, method of collection,drying, packing,storage,transportation of raw material,age and part of the plant collected etc. These factors greatly affect the quality and therapeutic value of herbal medicines.

The human body requires a number of trace elements like Ca, Mg, Al etc. in order to maintain good health. These trace elements essential for human nutrition are accumulated in different parts of plants transferred from the environmental conditions during their normal growth pattern. In human beings, these elements are mostly required in amounts less than 100 milligrams per day and are present in specific tissues and fluids of body. They maintain the certain physico-chemical processes, structural components of tissues and constituents of enzymes in many metabolic pathways.On other side, several scientific reports have indicated that herbal medicines also contain the toxic heavy metals which can cause various toxic effects like cancer, liver dysfunction, lung disease, cerebral haemorrhage, alopecia etc. One of the major reasons of incorporation of toxic metals in medicinal plants is due to the increase in contamination of the general environment. According to the WHO (World Health Organization, 1991), metal should be present in permissible limit. Various different types of herbal preparations are prepared from medicinal plants in which

the most frequently used type of herbal preparation is *Vati*. *Vatisare* preparations comprising of fine powders of medicinal plants and may be single or in combination. Several attempts have been made regarding the estimation of toxic heavy metals and trace elements in medicinal plants and formulations however no attempt has been made so far in *Vati* preparation despite of being the maximum probability of adulteration. Therefore, it is imperative to screen the present state of herbal *tablet* preparations popular in Indian market in terms of heavy metals (Pb, Cd, As, Hg) and trace elements (Fe, Mg, Mn, Zn, Cu and Al).

Materials and Methods :

Arogyavati sample, Sulphuric acid, Hydrogen peroxide, Hydrochloric acid Pb, Cd, As, Hg.

Qualitative study of Arogyavati sample

1 gm of sample + 1 test tube of distilled water + 1 test tube of Conc. HCl = O.S.

TEST	RESULT
Fe²⁺ : two drops of sample solution + K ₃ [Fe(CN) ₆]	Blue colour.
Zn²⁺ : acidify the solution by few drops of acetic acid + add 4 drops of K ₃ [Fe(CN) ₆] solution and few drops of diphenyl amine	Green ppt.
Cu²⁺ : sample solution + dil. acetic acid till acidic than few drops of potassium ferrocyanide	Chocolate-red ppt.
Mg²⁺ : sample solution + dil. H ₂ SO ₄ + 2 drops of titan yellow solution + 4 drops of dil. NaOH solution	Red colour.

Sample preparation:

Sample was digested by wet digestion method. Briefly, 10 ml of nitric acid was added to 2 g of accurately weighed dried sample in a 100 ml beaker and was heated on a hot plate at 95 degree Celsius for 15 min. The digest was cooled and 5 ml of concentrated nitric acid was added and heated for additional 30 min at 95 degree Celsius. The last step was repeated and the solution was reduced to about 5 ml without boiling. The sample was cooled again and 2 ml of deionised water and 3 ml of 30% hydrogen peroxide was added.

With the beaker covered, the sample was heated gently to start the peroxide reaction. If effervescence become excessively vigorous, sample was removed from the hot plate and 30% hydrogen peroxide was added in 1ml increment, followed by gentle heating until the effervescence was subsided. 5ml of hydrochloric acid and 10ml of deionised water added and sample was heated for additional 15 min without boiling. The sample was cooled and filtered through a Whatman No.42 filter paper and diluted to 50 ml with deionised water.

Instrumental condition for the analysis of metals.

Element	Wavelength nm	Types of flame	Light source
Fe	271.90	AA	HCL
Mn	279.5	AA	HCL
Cu	324.7	AA	HCL
Zn	213.9	AA	HCL
Mg	285.2	AA	HCL

Determination of Iron:-

Operating Parameters

Wavelength

271.90 nm

Light source

Hollow cathode Lampe

Flame type

air acetylene flame

Observation table for standard Fe solution and sample

Std/Sample	Absorbance	concentration ppm	concentration In sample (%)
Std 1	0.249	4.00	-
Std 2	0.331	6.00	-
Std 3	0.396	8.00	-
Sample	0.153	2.19	0.02

Determination of Manganese

Operating Parameters

Instrument

Wavelength

279.5 nm

Light source

Hollow cathode Lampe

Flame type

air acetylene flame

Observation table for standard Mn solution and sample

Std/Sample	absorbance	concentration ppm	concentration In sample (%)
Std 1	0.117	1.000	-
Std 2	0.213	2.000	-
Std 3	0.295	3.000	-
Std 4	0.396	4.000	-
Std 5	0.531	5.000	-
Sample	0.019	0.166	0.002

Determination of Copper:-

Operating Parameters

Instrument

Wavelength :-324.7 nm

Light source :-Hallee Cathode Lamp

Flame type :- Air acetylene flame

Observation table for standard Cu solution and sample

Std/Sample	absorbance	concentration ppm	concentration In sample (%)
Std 1	0.098	1.00	-
Std 2	0.261	3.00	-
Std 3	0.414	5.00	-
Sample	0.015	0.141	0.001

Determination of Zn

Operating Parameters

Instrument

Wavelength :- 231.9 nm

Light source :- Hollow cathode Lamp

Flame type :-Air acetylene flame

Observation table for standard Zn solution and sample

Std/Sample	absorbance	concentration ppm	concentration In sample (%)
Std 1	0.105	0.200	-
Std 2	0.158	0.400	-
Std 3	0.227	0.600	-
Std 4	0.288	0.800	-
Std 5	0.331	1.000	-
Sample	0.188	0.492	0.005

Determination of Mg

Operating Parameters

Instrument

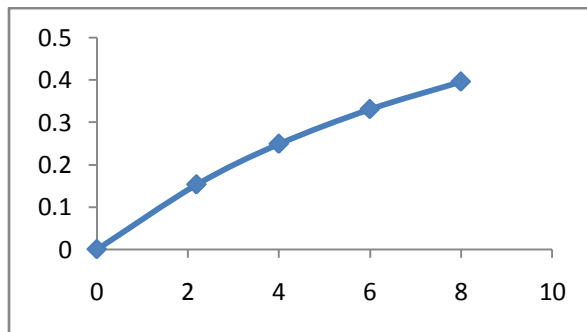
Wavelength :-285.2 nm

Light source :-Hollow cathode Lampe

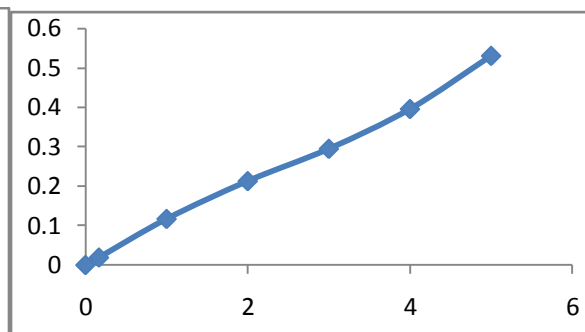
Flame type :- Air acetylene flame

Observation table for standard Mg solution and sample

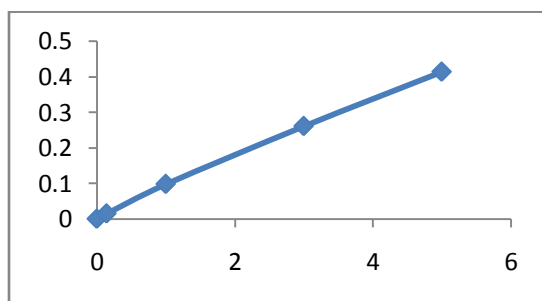
Std/Sample	absorbance	concentration ppm	concentration In sample (%)
Std 1	0.165	0.200	-
Std 2	0.247	0.400	-
Std 3	0.335	0.600	-
Std 4	0.444	0.800	-
Std 5	0.747	1.000	-
Sample	0.188	0.959	0.005

Graphs:- 1] Iron

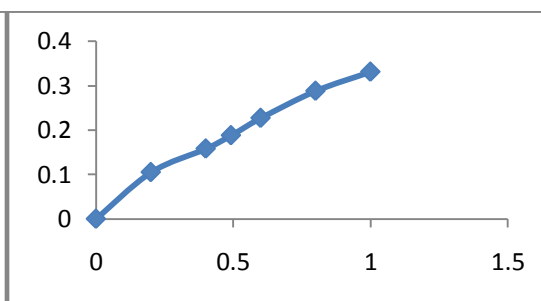
Absorbance vs. concentration

Graph:-2] Manganese

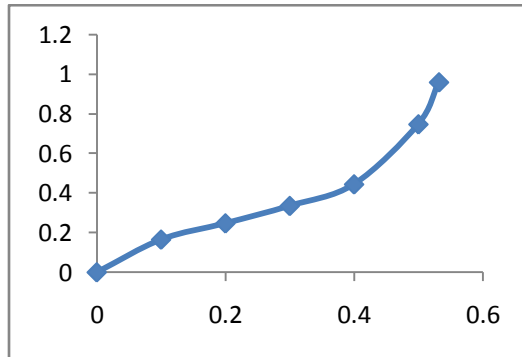
Absorbance vs. concentration

Graph: - 3] Copper

Absorbance vs Concentration

b**Graph:- 4] Zinc**

Absorbance vs. concentration

Graph:-5] Magnesium

Absorbance vs. concentration

Result Table:-

Sr. No.	METALS	CONCENTRATION (ppm)
1	Iron	0.022
2	Manganese	0.005
3	Copper	0.005
4	Zinc	0.002
5	Magnesium	0.001

Conclusion :-

From the study carried out on Arogyavardhinivati the following conclusions can be made: Arogyavardhinivati sold in Indian market contain wide range of trace elements which are helpful in the prevention and control of several ailments as well for the good biochemical reactions happen in human body. These metals are not present above the WHO permissible limits and hence they do not cause any disorders.

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