ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 9, Issue, 02, pp.47191-47193, February, 2017

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

PHYTOCHEMICAL SCREENING AND METAL ANALYSIS OF HYDRO ALCOHOLIC EXTRACT OF *CARICA PAPAYA* BY USING INDUCTIVE COPLED PLASMA-OPTICAL EMISSION SPECTROSCOPY (ICP-OES)

Sri Lakshmi, K., *Siva Sai Kiran, B., Dr. Chandra Sekhar, K. B. and Shaik Muneer

Department of Pharmaceutical Analysis, JNTUA- Oil Technological and Pharmaceutical Research Institute, Ananthapuramu, India

ARTICLE INFO

Article History:
Received 23rd November, 2016
Received in revised form
18th December, 2016
Accepted 26th January, 2017
Published online 28th February, 2017

Key words:

Carica papaya, Heavy Metals,
ICPOES, Phytochemical screening.

ABSTRACT

In view of importance of herbal drug standardisation, it was contemplated to carry out the heavy metal determination in papaya fruits which were procured from gandi maisamma fruit market, Hyderabad, Telangana. The extract were subjected to general phytochemical screening and estimated for metals like copper, iron, magnesium, nickel, sodium and zinc in the hydro alcoholic extracts by using ICPOES. It's an alarming bell for human kind if the heavy metal content is more than permitted level cause lethal effects.

Citation: Sri Lakshmi, K., Siva Sai Kiran, B., Dr. Chandra Sekhar, K. B. and Shaik Muneer, 2017. "Phytochemical screening and metal analysis of hydro alcoholic extract of *Carica papaya* by using inductive Copled plasma-optical emission spectroscopy (ICP-OES)", *International Journal of Current Research*, 9, (02), 47191-47193.

INTRODUCTION

Spectroscopy is the chief experimental technique of atomic and molecular physics and involves determining the energy states of atoms or molecules by looking at the light absorbed or emitted when they change states. Measuring the frequency of light absorbed or emitted which is determined by the energy difference between the two states, can provide a sensitive probe of interactions which pertain to that energy states. Determination of heavy metals up to trace level concentrations with high accuracy and precision is one of the most important concerns of the analytical methodology in the present era. ICP-OES is one of the most widely using techniques for determination of multi-elements in various environmental matrices in single aspiration. From the Literature Review it is found that ICPOES is extensively used for the determination of various Heavy metals and Trace elements in various samples like escitalopram oxalate bulk drug (3), vinegar (4), environmental samples (soil & drinking water) (5-11), potato chips (12), honey (13) and eliphos tablets (14) were reported. On the other hand there is no technique developed for *Carica Papaya* fruit for determination of heavy metals. So the Aim of the present work is to use ICPOES for the determination of metal traces even if they are present in PPM or PPB present in *Carica Papaya* fruit sample.

****Corresponding author:*** **Siva Sai Kiran, B.**
Department of Pharmaceutical Analysis, JNTUA- Oil Technological and Pharmaceutical Research Institute, Ananthapuramu, India

MATERIALS AND METHODS

Collection and Authentication of Plant Material

The plant material *Carica Papaya* was collected in the month of April 2015 from local market in Gandimaisamma, Hyderabad. The Authentication of plant material was given by Prof.Madhusudhan Chetty from the Department of Botany, Sri Venkateswara University, Tirupathi.

Chemicals Required

Ethanol, Milli Q water, Standard Reagent Bottles 1000ppm, Conc Nitric Acid.

Instruments Required

ICPOES, Heating Mantles, Hot plate.

Preparation of *Carica Papaya* Powder

The fruit of *Carica Papaya* was shade dried and then powdered with a mechanical grinder to form a coarse powder.

The powder was passed through sieve no 40 and was stored in an air tight container until further use. The powder was used for the extraction process.

Preparation of Hydro-Alcoholic Extract

The hydro alcoholic extract of the fruit was prepared by using Maceration process. The coarse powder of 250 ml and was Macerated for 72hrs. During the Maceration occasional stirring was carried of fruit (50g) was taken in a beaker with the water (70%) and ethanol (30%) quantity out. After 72 hrs, the suspension was filtered through a fine muslin cloth. The solvent was removed by heating until residues was obtained and then calculate the percentage yield.

Calibrated Standard Preparation

The Calibrated Standard1, 2 and 3 was prepared by 1, 2 and 3 PPM standard stock solution. 1, 2 and 3 PPM standard stock solution was prepared by adding 1, 2 and 3 ppm of certified standard reference material procured from National Institute of Standards and Technology to 5 ml of Concentrated Nitric Acid in a 100 ml Volumetric Flask. The remaining Volume is raised with Mill Q water.

Preparation of sample

1g of the fruit extract was weighed and transfer into 50 ml of beaker. Then add 5ml of conc. HNO_3 and placed it on hot plate until the organic fumes were completely stopped. Then add 25 ml of water for acid digestion on hot plate. Digestion to be taken until 50% of the sample was too evaporated and remaining sample was filtered and makeup to 25 ml, and gone for furthered dilutions.

RESULTS AND DISCUSSION

Percentage Yield of the Extract

The Percentage Yield of the Hydroalcholic Extract of the shade dried and powdered plant material of *Carica Papaya* was found to be 3.6%.

Phytochemical Screening

Alkaloids, Carbohydrates, Glycoisdes, Tannins, phytosterols are present in the given fruit extract. Flavonoids, Proteins and Mucilage is absent in the given sample.

Replicate Data: TR01

Repl#	Analyte	Net Intensity	Corrected Intensity	Calib. Conc.	Calib. Units	Sample Conc.	Sample Units	Analysis Time
1	Cd 228.802	-235.3	959.6	0.001	mg/L	0.001	mg/L	17:55:32
1	Pb 220.353	2363.4	486.2	-0.016	mg/L	-0.016	mg/L	17:56:08
1	As 193.696	-433.5	-139.7	-0.010	mg/L	-0.010	mg/L	17:56:44
1	Zn 206.200	42560.6	41984.9	0.866	mg/L	0.866	mg/L	17:57:22
1	Ni 231.604	1249.6	544.9	0.004	mg/L	0.004	mg/L	17:57:46
1	Cr 267.716	3067.0	1644.9	0.002	mg/L	0.002	mg/L	17:58:23
1	Cu 327.393	224932.1	225865.0	0.305	mg/L	0.305	mg/L	17:58:59
1	Fe 238.204	125691.3	123817.9	0.170	mg/L	0.170	mg/L	17:59:18
1	Mg 285.213	10722769.5	10534028.6	15.92	mg/L	15.92	mg/L	17:59:41
1	Mn 257.610	106266.3	95919.0	0.030	mg/L	0.030	mg/L	17:59:53
2	Cd 228.802	-222.6	972.3	0.001	mg/L	0.001	mg/L	17:55:44
2	Pb 220.353	2358.8	481.6	-0.016	mg/L	-0.016	mg/L	17:56:20
2	As 193.696	-458.0	-164.1	-0.016	mg/L	-0.016	mg/L	17:56:57
2	Zn 206.200	42866.1	42290.4	0.873	mg/L	0.873	mg/L	17:57:29
2	Ni 231.604	1232.3	527.7	0.004	mg/L	0.004	mg/L	17:57:59
2	Cr 267.716	3061.9	1639.8	0.002	mg/L	0.002	mg/L	17:58:35
2	Cu 327.393	224692.8	225625.7	0.305	mg/L	0.305	mg/L	17:59:05
2	Fe 238.204	125477.0	123603.6	0.170	mg/L	0.170	mg/L	17:59:26
2	Mg 285.213	10553303.6	10364562.7	15.65	mg/L	15.65	mg/L	17:59:46
2	Mn 257.610	105816.2	95468.9	0.030	mg/L	0.030	mg/L	17:59:59
3	Cd 228.802	-191.9	1003.0	0.001	mg/L	0.001	mg/L	17:55:55
3	Pb 220.353	2317.0	439.8	-0.019	mg/L	-0.019	mg/L	17:56:31
3	As 193.696	-439.0	-145.2	-0.011	mg/L	-0.011	mg/L	17:57:08
3	Zn 206.200	42699.3	42123.7	0.869	mg/L	0.869	mg/L	17:57:37
3	Ni 231.604	1220.6	516.0	0.004	mg/L	0.004	mg/L	17:58:10
3	Cr 267.716	3031.8	1609.6	0.002	mg/L	0.002	mg/L	17:58:46
3	Cu 327.393	222892.8	223825.7	0.302	mg/L	0.302	mg/L	17:59:11
3	Fe 238.204	125675.8	123802.3	0.170	mg/L	0.170	mg/L	17:59:32
3	Mg 285.213	10547346.1	10358605.2	15.64	mg/L	15.64	mg/L	17:59:48
3	Mn 257.610	105305.1	94957.8	0.030	mg/L	0.030	mg/L	18:00:06

Fig.1. Triplicate aspiration of sample in ICP-OES

Mean Data: TR01

Analyte	Mean Corrected Intensity	Calib. Conc.	Calib. Units	Std.Dev.	Sample Conc.	Sample Units	Std.Dev.	RSD
Cd 228.802	978.3	0.001	mg/L	0.0001	0.001	mg/L	0.0001	7.10%
Pb 220.353	469.2	-0.017	mg/L	0.0020	-0.017	mg/L	0.0020	11.52%
As 193.696	-149.7	-0.012	mg/L	0.0032	-0.012	mg/L	0.0032	25.99%
Zn 206.200	42133.0	0.869	mg/L	0.0034	0.869	mg/L	0.0034	0.39%
Ni 231.604	529.5	0.004	mg/L	0.0002	0.004	mg/L	0.0002	4.28%
Cr 267.716	1631.4	0.002	mg/L	0.0001	0.002	mg/L	0.0001	3.97%
Cu 327.393	225105.4	0.304	mg/L	0.0016	0.304	mg/L	0.0016	0.51%
Fe 238.204	123741.3	0.170	mg/L	0.0004	0.170	mg/L	0.0004	0.22%
Mg 285.213	10419065.5	15.74	mg/L	0.160	15.74	mg/L	0.160	1.02%
Mn 257.610	95448.6	0.030	mg/L	0.0002	0.030	mg/L	0.0002	0.66%

Fig.2. Mean data of Triplicate Aspiration of sample in ICP-OES

Selection of Wavelength

The Wavelength for the selected metals is taken as a default by the ICPOES instrument. The Wavelengths which are used in their determination of metals is given in the Table-1:

Table 1. Wavelength of Metals

S. No	Name of the metals	Wave length(nm)
1	Cadmium	228
2	Lead	220
3	Arsenic	193
4	Zinc	206
5	Nickel	231
6	Chromium	267
7	Copper	327
8	Iron	238
9	Magnesium	285
10	Manganese	257

Table 2. Metal Concentration present in the given sample

S.No.	Elements	*Carica Papaya* (PPM)
1	Cadmium	0.04
2	Lead	--
3	Arsenic	--
4	Zinc	43.363
5	Nickel	0.199
6	Chromium	0.099
7	Copper	15.169
8	Iron	8.483
9	Magnesium	785.429
10	Manganese	1.497

The prepared sample was aspirated in the Perkin Elmer ICPOES Instrument. The sample was aspirated for 3 times and the intensities at which each metal and the concentration of the particular metal present in the *Carica Papaya* fruit extract in triplicate was mentioned in the above Fig.1. The Concentration of each and every metal present in the Sample was mentioned in the above Table-2.

Conclusion

In conclusion, it is clear that herbal industry has to make great strides in India, with the cooperation between drug regulatory authorities, scientists and industry. Standardization of methods, quality control data on safety and efficacy are need for proper understanding for the use of herbal medicines. Due to pollution the entire plants are contaminated with heavy metals with leads to toxic. We have estimated the metals like Zinc, Copper, Nickel, Chromium, Lead, Arsenic, manganese, Magnesium, cadmium, and Iron in the extracts of *Carica papaya.* Among the above estimated metals heavy metals like Lead and Arsenic are not found. Whereas the other trace elements were determined with their respective concentrations found in the fruit. The Concentration found was in the permissible levels therefore the fruits grown in this area are suitable for human consumption.

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