Qualitative Elemental Analysis of some selected Indian Medicinal Plants Using Micro focus X-Ray fluorescence using Synchrotron Radiation

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Abstract: Micro focus X-ray fluorescence using synchrotron radiation is used to estimate major and trace elements present in 10 different medicinal plants often used in Indian Ayurvedic system. Qualitative elemental analysis was carried out in medicinal plant samples collect from different parts of Andhra Pradesh, India using micro focus X-ray fluorescence at Indus-2 Synchrotron radiation facility.

The trace element deficiencies effects in the reduced activity of the concerned enzymes. However, since each trace element is related to so many enzymes, deficiency of a single trace element is often not related with any specific medical manifestations, but rather manifests as a combination of many symptoms.

The present work is done at Indus 2 Synchrotron radiation source - BL16 beam line at Raja Ramanna center for Advanced Technology (RRCAT), Indore. The microprobe XRF beam line (BL-16) has been designed to work in the photon energy range 4–20 keV and has an acceptance of 1 mrad (H) ×0.2 mrad and include a fixed-exit double-crystal Monochromator (DCM) with a pair of symmetric and asymmetric Si (111) crystals (mounted side-by-side) and a Kirkpatrick–Baez (KB) focusing system with a pair of elliptical mirrors.

In the present study, significant concentrations of Iron, Zinc, Manganese, Calcium, Copper, and Nickel are found in almost all the plant samples. Graphs plotted between X-ray energies and detector counts gives the different peaks at different energies which shows the presence of different elements in the studied samples. Attempts have made to identify different elements present in some medicinal plants generally used in herbal medicine formulation by using synchrotron radiation micro focus x-ray fluorescence. Presence of the elements identified in different medicinal plants are having immense importance in herbal medicine formulation. Elemental data present in present study may be useful to set new standards for prescribing the dosage and duration of administration of these herbal medicine to the diseased patient.

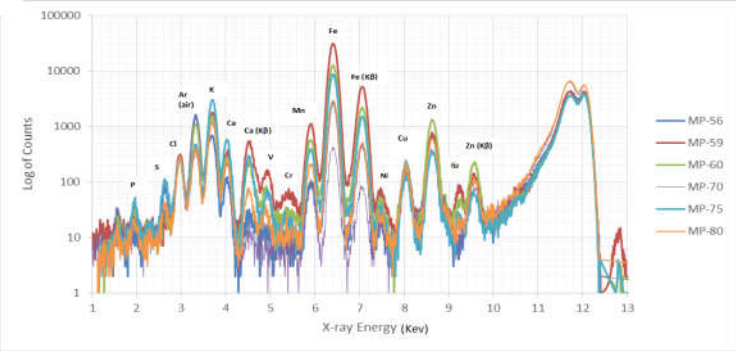

Figure 1: Comparative plots of X-ray energies with log of counts

s.no	Sample Code	Name of Sample
1	MP-56	*Acorus calamus*
2	MP-59	*Nardostachys jatamansi*
3	MP-60	*Clerodendrum infortunatum*
4	MP-70	*Psidium guajava*
5	MP-75	*Anisomeles malabarica*
6	MP-80	*Hemidesmus indicus*

Table 2: Studied Samples