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SARAWUT LUNVONGSA: DETERMINATION OF MINERAL CONTENTS IN THAI HERBS USING INDUCTIVELY COUPLED PLASMA MASS SPECTROMETRY. THESIS ADVISOR : JUWADEE SHIOWATANA, Ph. D., DUANGJAI NACAPRICHA, Ph. D. 105 p. ISBN 974-664-238-3

The presence of minerals in food can have both good and bad consequences. Several minerals are known to be essential for human life while others are toxic. Determination of mineral contents of edible plants is therefore of considerable interest. This work attempted to determine 24 metals in 17 common Thai herbs and 5 herb capsules using a multielemental analytical technique, Inductively Coupled Plasma Mass Spectrometry (ICP-MS). The performance of ICP-MS has been investigated as a function of a number of parameters associated with sample uptake rate and plasma operation. 1.1 mL/min sample uptake rate, 1300 watts RF power and 0.95 L/min nebulizer gas flow rate were the optimum conditions obtained. Indium was used as the internal standard in order to compensate for the difference in analyte signals resulting from sample preparation error and nebulization changing efficiency. The isobaric elemental interferences were corrected by selecting suitable isotopes and applying the appropriate correction equations.

The microwave digestion of the plant samples in a mixture of HNO_3 and H_2O_2 was explored. This digestion procedure is simple and quick and gives low reagent blank, also minimizing interference effect.

The accuracy of the method was assessed by analysis of a certified reference material, SRM 1515: Apple leaves. The analytical results showed that, twelve elements (Al, B, Ba, Co, Cu, Mg, Mn, Na, P, Pb, Sr and V) could be determined with good accuracy. The results of Mo, Ni, Sb and Zn were lower than the certified values probably due to incomplete digestion. As, Cr, Fe and Se gave higher values than certified values possibly owing to positive polyatomic interferences. The isotope ratios after mass bias correction of $^{53}Cr/^{52}Cr$, $^{54}Fe/^{57}Fe$ and $^{82}Se/^{77}Se$ were found to be -60.6, -63.4 and -63.9 % their natural ratios, respectively, indicating the interference problem of Cr, Fe and Se measurement. Separation by anion exchange resin was successfully used to eliminate (Cr and Fe) and reduce (As and Se) interferences from the existing anions. Upon treatment, acceptable recoveries were obtained for Cr and Fe but As and Se could not be determined with good accuracy although the results were improved. Ca and K could not be determined with good accuracy because of inconsistency in blank intensities, and were therefore determined using Flame Atomic Absorption Spectrometry (FAAS).

The method developed was applied to the analysis of 17 selected common Thai herbs, collected from three locations (Kabin buri, Pinklao and Kingpetch), 5 selected herb capsules.