CERTIFICATE

This is to certify that the dissertation entitled

"DETERMINATION OF LEAD (Pb) IN LOCAL COSMETIC PRODUCTS BY ATOMIC ABSORPTION SPECTROSCOPY"

is the bonafide record of research work done by

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during the period December 2010 to May 2011

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'In the name of Allah, most gracious, most merciful'

'Over the knowledgeable, Allah the most knowledgeable.'

All praises and gratitude is due to Allah, the lord to whom every single creature in the heaven and the earth belongs to. Thank you Allah for giving me the strength and patient during this trying times. May peace and blessings be on the leader of all creation, the prophet Muhammad S.A.W, his family and companion.

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LIST OF ABBREVIATIONS

%	Percentage
°C	Degree Celsius
µg	microgram
µg/day	microgram per day
µg/g	microgram per gram
µL	micro liter
µmol/L	micromol per liter
AAS	Atomic Absorption Spectroscopy
As	Arsenic
ASEAN	The Association of Southeast Asian Nation
bar	unit of pressure equals to 100 kilopascals (kPa)
CARB	California Air Research Board
Cd	Cadmium
Cu	Copper
dm	decimeter
EPA	Environment Protection Agency
etc	et cetera; and other things, so on
FAAS	Flame Atomic Absorption Spectroscopy
FDA	Food and Drug Association
FD&C	Federal Food, Drug and Cosmetic
g	gram
GF-AAS	Graphite Furnace Atomic Absorption Spectroscopy
Hg	Mercury
Hg_2Cl_2	Calomel
i.e.	That is; in the other words

IARC	International Agency for Research of Cancer
ICD	Irritant contact dermatitis
ICP	Inductively Coupled Plasma
IUPAC	International Union of Pure and Applied Chemistry
kg	kilogram
LOD	Limit of detection
$Mg(NO_3)_2.6H_2O$	Magnesium nitrate
min	minute
mL	milliliter
MSD	Material Safety Data
$NH_4H_2PO_4$	Ammonium phosphate
nm	nanometer
no.	number
NPCB	National Pharmaceutical Control Bureau
NRC	National Research Council
Pb	Lead
ppb	parts per billion
ppm	parts per million
PVC	Polyvinylchloride
QC	Quality Control
SD	Standard deviation
US FDA	United States Food and Drug Association
V	Volts
v/v	volume per volume
W	Watts
w/v	weight per volume
WHO	World Health Organization
Zn	Zinc

ABSTRACT

Cosmetic products have been extensively used for the purpose of personal hygiene, to improve self-esteem, prevent aging and help people to enjoy a full and rewarding life. However, these products can be harmful to human as it may contain heavy metals which have been included during the manufacturing process. Many are unaware about the effects of heavy metals in cosmetic products, especially when the cosmetic brands are only well-known among locals. Lead, for instance is believed to be used as color additive in cosmetic products. The aim of this study is to determine the concentration of lead (Pb) in cosmetic products available locally. Ten different brands of local cosmetic creams were selected and digested by using microwave digestion system for sample pre-treatment. The samples were analyzed by Graphite Furnace Atomic Absorption Spectroscopy (GF-AAS) for estimation of lead concentration in each. The feasibility of microwave digestion was determined by spike recovery method. The mean recoveries for spiked levels ranged between 90 to 96%. Results showed that the local cosmetic creams which have a strong vibrant color are indicative of higher lead concentration. Results also demonstrated that the concentrations of lead in tested creams are in the range of 0.62 to 67.5 µg/g. Of ten samples analyzed, none has contained concentration of lead higher than that of permitted in food by United States Food and Drug Association (US FDA) and The Malaysia Cosmetic Guidelines and ASEAN Cosmetic Directive.