APPENDICES

APPENDIX A

CALIBRATION CURVE BY FAAS DETECTION

Table A-1 Calibration equation and R^2 used for study on ultrasonic acid digestion of Cr from FAAS

Parameters	Calibration equation	(R^2)
1. Solvent systems $HNO_3 : H_2O_2$	y = 0.0214x + 0.0016	0.9914
2. Presonication time	y = 0.0228x + 0.0020	0.9971
3. Sonication time	y = 0.0228x + 0.0004	0.9988
4. Temperature of ultrasonic bath	y = 0.0224x + 0.0020	0.9972

Table A-2 Calibration equation and R^2 used for study on cloud point extraction of Cr from FAAS

Parameters	Calibration equation	(R^2)
1. Conc. APDC	y = 0.0234x + 0.0016	0.9920
2. Conc. Triton X-114	y = 0.0239x + 0.0032	0.9947
3. pH of solution	y = 0.02220x + 0.0032	0.9933
4. Complexing time	y = 0.0247x + 0.0045	0.9965
5. Eqiliblium temperature	y = 0.0258x + 0.0064	0.9974

Table A-3 Calibration equation and R^2 used for study on ultrasonic acid digestion of Ni from FAAS

Parameters	**Calibration equation**	**(R^2)**
1. Solvent systems $HNO_3 : H_2O_2$	y = 0.0136x + 0.0040	0.9911
2. Presonication time	y = 0.0139x + 0.0049	0.9963
3. Sonication time	y = 0.0135x + 0.0033	0.9954
4. Temperature of ultrasonic bath	y = 0.0132x + 0.0030	0.9900

Table A-4 Calibration equation and R^2 used for study on cloud point extraction of Ni from FAAS

Parameters	**Calibration equation**	**(R^2)**
1. Conc. APDC	y = 0.0133x + 0.0032	0.9902
2. Conc. Triton X-114	y = 0.0127x + 0.0031	0.9902
3. pH of solution	y = 0.0127x + 0.0019	0.9901
4. Complexing time	y = 0.0127x + 0.0035	0.9988
5.Eqiliblium temperature	y = 0.0128x + 0.0029	0.9930

Table A-5 Calibration equation and R^2 used for study on ultrasonic acid digestion of Pb from FAAS

Parameters	**Calibration equation**	**(R^2)**
1. Solvent systems HNO_3 : H_2O_2	y = 0.0092x + 0.0001	0.9997
2. Presonication time	y = 0.0094x + 0.0014	0.9975
3. Sonication time	y = 0.0094x + 0.0014	0.9975
4. Temperature of ultrasonic bath	y = 0.0096x + 0.0037	0.9971

Table A-6 Calibration equation and R^2 used for study on cloud point extraction Of Pb from FAAS

Parameters	**Calibration equation**	**(R^2)**
1. Conc. APDC	y = 0.0098x + 0.0048	0.9953
2. Conc. Triton X-114	y = 0.0098x + 0.0044	0.9941
3. pH of solution	y = 0.0096x + 0.0021	0.9955
4. Complexing time	y = 0.0100x + 0.0046	0.9961
5.Eqiliblium temperature	y = 0.0099x + 0.0054	0.9957

APPENDIX B

DETERMINATION OF CHROMIUM NICKEL AND LEAD IN HUMAN HAIR SAMPLES BY FAAS

B-1 Determination of chromium, nickel and lead in human hair samples by FAAS

A 0.20 g of human hair samples was digested by ultrasonic acid digestion and the sample solution was adjusting to 25.00 ml in volumetric flask. A 5.00 ml of sample solution was preconcentrated by cloud point extraction and determination the amount of Cr, Ni and Pb by FAAS. The results are shown in **Table B-1** - **Table B-4**.

Table B-1 The concentration of Cr in human hair samples

Sample	Cr			Average	SD
	Replications	Abs.	Conc. (μg ml^{-1})		
A	1	0.001	-0.028	ND	-
	2	0.001	-0.028		
B	1	0.002	0.019	0.019	0.00
	2	0.002	0.019		
C-1	1	0.003	0.065	0.042	0.03
	2	0.002	0.019		
C-2	1	0.002	0.019	0.019	0.00
	2	0.002	0.019		
D-1	1	0.001	-0.028	ND	-
	2	0.001	-0.028		
D-2	1	0.000	-0.075	ND	-
	2	0.000	-0.075		
E-1	1	0.002	0.019	0.042	0.03
	2	0.003	0.065		
E-2	1	0.004	0.112	0.112	0.00
	2	0.004	0.112		
E-3	1	0.002	0.019	0.019	0.00
	2	0.002	0.019		

Calibration curve: $y = 0.0214x + 0.0016$

$R^2 = 0.9914$

Table B-2 The concentration of Ni in human hair samples

Sample	Ni			Average	SD
	Replications	Abs.	Conc. (μg ml^{-1})		Replications
A	1	-0.001	-0.016	ND	-
	2	-0.001	-0.016		
B	1	-0.001	-0.016	ND	-
	2	-0.002	-0.093		
C-1	1	0.001	0.140	0.101	0.06
	2	0.000	0.062		
C-2	1	0.003	0.295	0.218	0.11
	2	0.001	0.140		
D-1	1	-0.001	-0.016	ND	0.00
	2	-0.001	-0.016		
D-2	1	-0.001	-0.016	ND	0.00
	2	-0.001	-0.016		
E-1	1	-0.002	-0.093	ND	-
	2	-0.001	-0.016		
E-2	1	0.002	0.217	0.140	0.11
	2	0.000	0.062		
E-3	1	0.003	0.295	0.295	0.00
	2	0.003	0.295		

Calibration curve: $y = 0.0129x - 0.0008$

$R^2 = 0.9826$

Table B-3 The concentration of Pb in human hair samples

Sample	Pb			Average	SD
	Replications	Abs.	Conc. (μg ml^{-1})		
A	1	0.002	-0.165	ND	-
	2	0.002	-0.165		
B	1	0.003	-0.062	ND	-
	2	0.003	-0.062		
C-1	1	0.003	-0.062	ND	-
	2	0.002	-0.165		
C-2	1	0.004	0.041	0.093	0.07
	2	0.005	0.144		
D-1	1	0.004	0.041	0.041	0.00
	2	0.004	0.041		
D-2	1	0.004	0.041	0.041	0.00
	2	0.004	0.041		
E-1	1	0.002	-0.165	ND	-
	2	0.003	-0.062		
E-2	1	0.004	0.041	0.041	0.00
	2	0.004	0.041		
E-3	1	0.006	0.247	0.196	0.07
	2	0.005	0.144		

Calibration curve: $y = 0.0097x + 0.0036$

$R^2 = 0.9998$

B-2 The amount of chromium, nickel and lead in human hair samples

Table B-4 The amount of Cr, Ni and Pb in human hair samples

Samples	Cr content (μg/g) *	Ni content (μg/g)*	Pb content (μg/g) *
A	ND	ND	ND
B	2.34 ± 0.00**	ND	ND
C-1	ND	ND	ND
C-2	2.34 ± 0.00**	27.13 ± 17.75	ND
D-1	ND	ND	5.15 ± 0.00**
D-2	ND	ND	5.15 ± 0.00**
E-1	ND	ND	ND
E-2	14.02 ± 0.00	ND	5.15 ± 0.00**
E-3	2.34 ± 0.00**	36.82 ± 0.00	ND

*Mean ± SD (N=3) ** Detectable but below LOD ND = Not detectable

CURRICULUM VITAE

Name	Miss Supaporn Pengping
Date of birth	7 October 1983
Education background	2002-2005 B.Sc. (Chemistry), Chiang Mai University, Chiang Mai, Thailand
Scholarship	The Institute for the Promotion of Teaching Science and Technology: Promotion of talented teachers in science and mathematics (PSMT.)
National presentation	Supaporn Pengping and Sukjit Kungwankunakorn, Determination of Some Heavy Metals in Human Hair by Ultrasonic Acid Digestion and Atomic Absorption Spectrophotometry, Pure and Applied Chemistry International Conference (PACCON 2012) 11-13 January 2012, Chiang mai, Thailand.