

# **The qualitative and quantitative analysis of metals in the non-homogeneity soil sample**

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## 1 Introduction

The qualitative and quantitative determination of metal components in soil sample is obligated of environmental guideline. The determination of metal components is facilitated by commercial laboratory that highly requires accuracy and quick responses. In general, the determination of certain metal components is carried out multivariate analytical techniques. One of powerful technique is Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES) that is based on determining certain metal emission spectrum, which characteristic emission participates of qualitative and quantitative analysis. Some analytical science students in Macquarie University luckily had chance to join the ENBIROLAB to gain a great experience. This report was written of two days of external levorotary work done by students.

AIM: To examine qualitative and quantitative determination of metal concentration As, Cd, Cr, Cu, Pb, Ni and Zn, in soil sample using ICP-OES.

## 2 Experimental

### 2.1 Standard

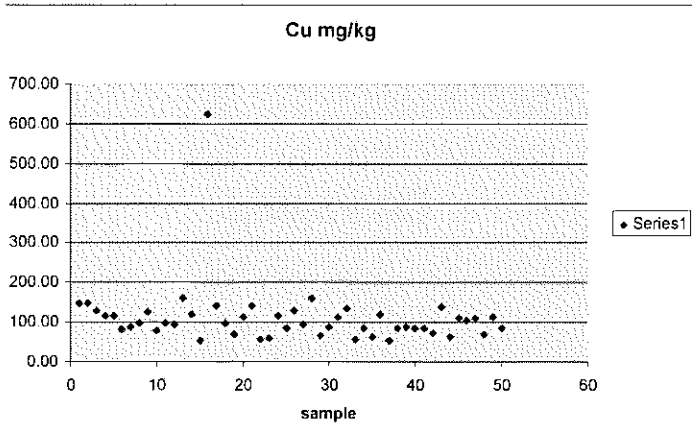
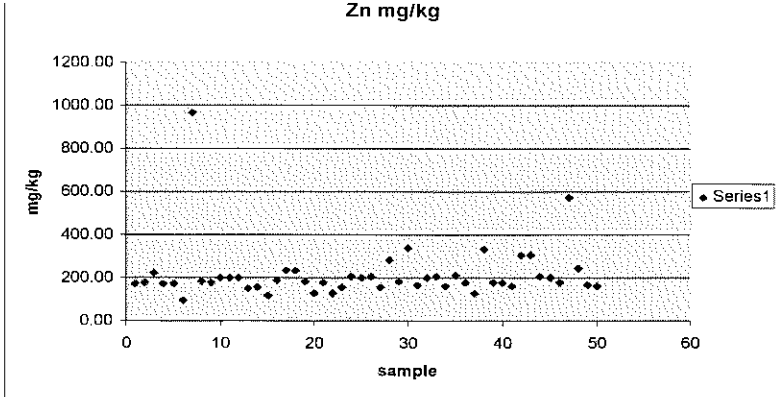
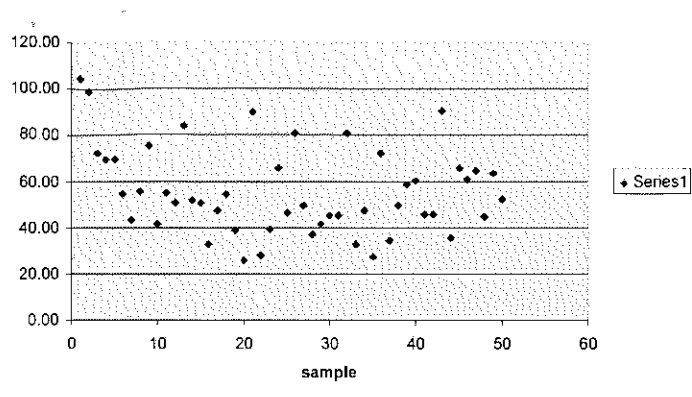
It was already set up.

### 2.2 Sample

The soil sample was homogenised and weighted into 50 mL tube with concentrated HCl ( 3 ml) and concentrated HNO<sub>3</sub> ( 3 ml) was diluted by distilled water. The soil was digested by mixture of strong acid at 95 °C for 60 minuets. The 50 sample solutions were determined of metal components using with ICP-OES.

### 2.3 Quality control

The Blank solution, and laboratory control solution (LCS) was examined at each 10 samples determination. The LCS was prepared with 0.5 g of sample was digested.



Graph 1: The concentrations of each metal

As		Cd		Cr		Cu	
Bin (mg/kg)	Frequency	Bin (mg/kg)	Frequency	Bin (mg/kg)	Frequency	Bin (mg/kg)	Frequency
7.97561	1	3.463415	1	61.16505	1	53.8835	1
11.39869	5	5.000784	2	86.51966	5	135.2875	41
14.82177	28	6.538153	21	111.8743	9	216.6915	7
18.24485	12	8.075523	21	137.2289	10	298.0954	0
21.66793	3	9.612892	2	162.5835	12	379.4994	0
25.09101	0	11.15026	2	187.9381	6	460.9034	0
28.51409	0	12.68763	0	213.2927	5	542.3074	0
More	1	More	1	More	2	More	1
Ni		Pb		Zn			
Bin (mg/kg)	Frequency	Bin (mg/kg)	Frequency	Bin (mg/kg)	Frequency		
25.72115	1	77.07317	1	96.09756	1		
36.95834	6	499.4885	46	220.3649	38		
48.19552	14	921.9039	1	344.6321	9		
59.43271	11	1344.319	1	468.8994	0		
70.66989	8	1766.735	0	593.1667	1		
81.90707	5	2189.15	0	717.434	0		
93.14426	3	2611.565	0	841.7013	0		
More	2	More	1	More	1		

Table 3: The frequency of each metal concentration

#### 4 Discussion

The concentration of each metals were varied, due to the soil sample was not homogeneity that contained lot of materials such as fragment of paint, piece of metal etc. The RPD was less than 50 % thus; the concentration viridity was acceptable range. The viridity of metal concentration was observed some characteristics in each metal. The concentration metal was observed high frequency of As, Cu, Pb, and Zn, 135.28 mg/kg, 499.49 mg/kg and 220.36 mg/kg respectively. On the other hands, the concentration of metals was observed low frequency, in other words, viridity, of Cd Cr and Ni, 6.53 mg/kg and 8.07 mg/kg and 48.20 mg/kg respectively. The place, where sampled soil came from, may be concluded that the soil contains some metal contamination that are Cd, Cr, Ni because, variety of concentrations were found, those metals might be transferred from somewhere somehow.