ASSESSMENT OF WATER POLLUTION IN TAUNGTHAMAN LAKE

Dr Aye Myat Mon

Lecturer

Department of Physics, Yadanarbon University

14 March, 2017

Outline

1. Abstract

2. Introduction

3. Materials and Methods

4. Results and Discussion
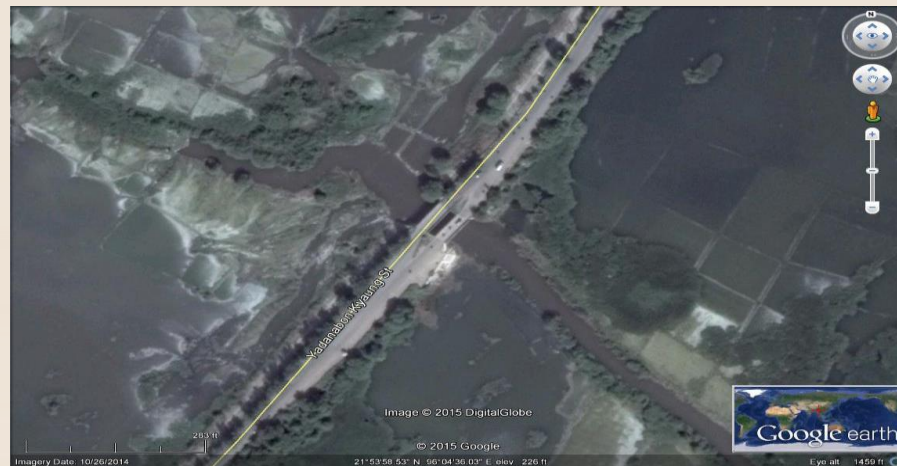
5. Conclusion

Abstract

- **Two sediment samples**
  - **within water pollution (Sept 2014)**
  - **after water pollution (Nov 2014)**

- **SPECTRO XEPOS - heavy metal pollution of the sediments**

- **Concentration of heavy metals except Cr**

- **sediment after water pollution > within water pollution**

- **NaI (TI) gamma ray spectrometer -the existence of Gamma-Vision 32 Software   radionuclides**

- **^{234}Th, ^{212}Pb, ^{214}Pb, ^{208}TI, ^{228}Ac and ^{40}K**

Introduction

- Pollutants ⟹ chemicals, garbage, and waste water
- Air and water pollution

- Pollution levels

- heavy metal pollution ❯ by the EDXRF method

- radionuclides ❯ by the Gamma Spectroscopy.

- ENP Laboratory Physics Department,MU

- Sediment during waste water flooding and sinking at a fixed location under U Shwe Tun bridge in Taungthaman near Yadanabon University

- sample location is seemed to be an entrance of the waste water from the factories.

Materials and Methods

Sample Location (Sampling Site)

Lat 21º 53´ 59.25´´ (N), Long 96º 04´ 34.67´´ (E)

Sample Collection

Sediment → a 2-inches in diameter and 2 feet length pipe from the ground and taking 1 feet length sediment from the depth

S1 →

Sediments within Water Pollution Collected on Sept 2014

S 2 →

Sediments after sinking Water Pollution Collected on Nov 2014

Sample Preparation

Drying

Grinding & Homogenization

Packing
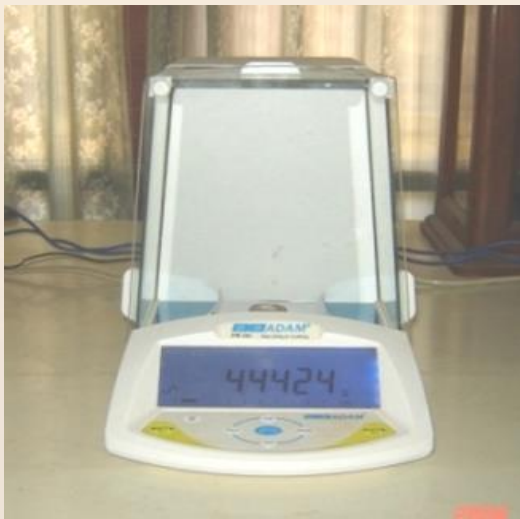
At room temperature avoiding loss of Volatile Element

mesh

Plastic container of 600g and Pellet sample of 5g

Materials and Methods

Photograph of Experimental Arrangement for XEPOS Spectrometer Detection System
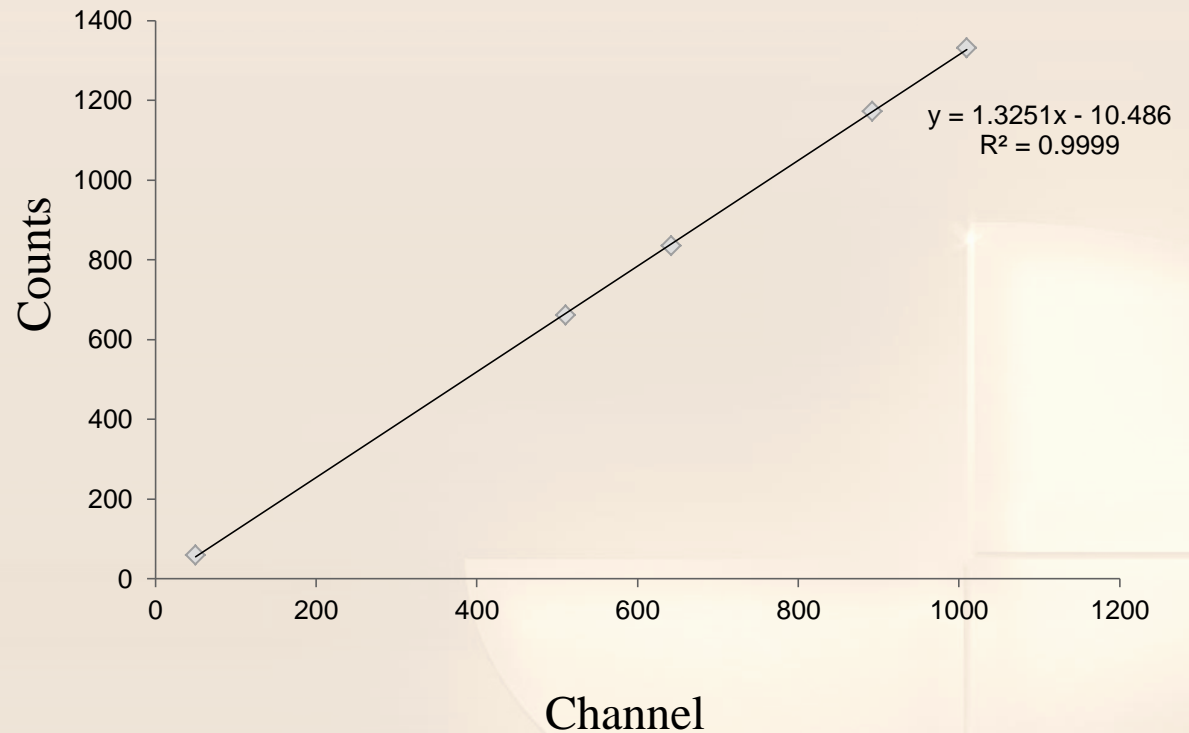
Materials and Methods

Calibratin for Gamma spectroscopy

Element	Channel	Energy(keV)
Am	50	60
Cs	511	662
Mn	642	835
Co	892	1173
Co	1010	1332

Calibration Curve

$y = 1.3251x - 10.486$
$R^2 = 0.9999$

Counts (y-axis)

Channel (x-axis)

Experimental Procedure in Gamma Transmission Measurement for Sediment Samples

1. Two Sediment Samples

2. Four standard gamma sources(^{241}Am, ^{60}Co , ^{25}Mn and ^{137}Cs → **energy calibration**

   300s   60 keV   1173keV   835keV   662keV

                            1332keV

3. Model 296 NaI (Tl) detector

4. Model 671 Spectroscopy Amplifier

Fig (1)Experimental Arrangement for Detecting System

5. Gamma Vision-32 Software installed

in PC with MCA Card

Operating Voltage=1000 V

Conversion gain=2048

Coarse gain=20,Fine gain= 8.7

Shaping time=1μs

Real time-15000 s,Live time=7200 s

9

Materials and Methods

BG counting time

2 hour

Sample counting time

Fig(1) Top view for sediment sample in the lead shield

Fig(2)sediment sample in the lead shield

after water pollution $>$ within water pollution

EDXRF Analysis

- Mn, Fe, Ni, Cu, Zn, As and Pb except Cr
- Fe is extremely higher than other heavy metals
- K and Tl

Gamma Analysis

- ^{234}Th, ^{212}Pb, ^{214}Pb, ^{208}Tl, ^{228}Ac and ^{40}K
- Net count rates
- ^{208}Tl and ^{228}Ac are daughter nuclei in ^{232}Th decay series
- ^{214}Pb and ^{234}Th daughter nuclei in the ^{238}U decay series

Results and Discussions

Table (1) Concentration of heavy metals in sediment sample within water pollution

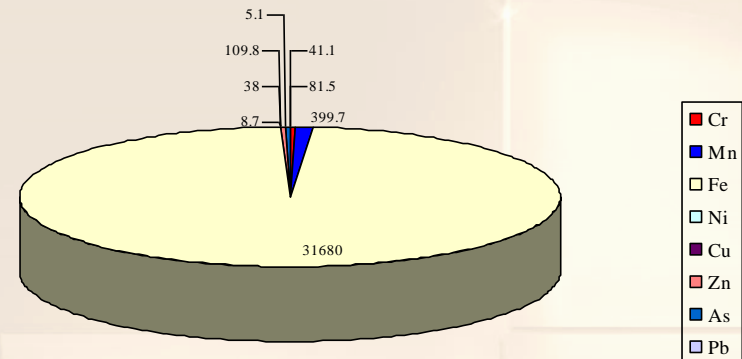| Sr. No	Heavy Metals	Concentration	
		S1 (%)	S1 (ppm)
1	Cr	0.00815	81.5
2	Mn	0.03997	399.7
3	Fe	3.168	31680
4	Ni	0.00087	8.7
5	Cu	0.00380	38
6	Zn	0.01098	109.8
7	As	0.00051	5.1
8	Pb	0.00411	41.1

Figure (1) The Comperison of heavy metals in sediment sample within water pollution

12

Results and Discussions

Table (2) Concentration of heavy metals in sediment sample after water pollution

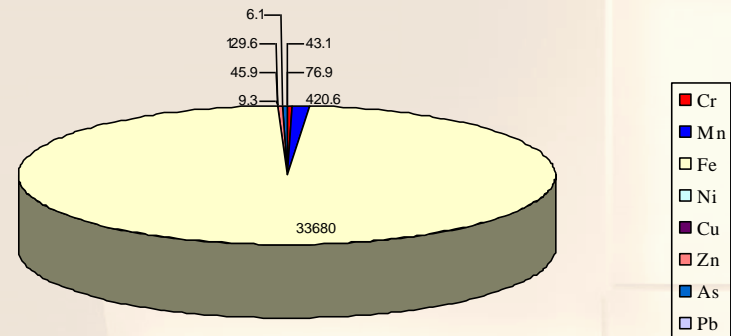| Sr. No	Heavy Metals	Concentration	
		S1 (%)	S1 (ppm)
1	Cr	0.00769	76.9
2	Mn	0.04206	420.6
3	Fe	3.368	33680
4	Ni	0.00093	9.3
5	Cu	0.00459	45.9
6	Zn	0.01296	129.6
7	As	0.00061	6.1
8	Pb	0.00431	43.1

Figure (2) The Comperison of heavy metals in sediment sample after water pollution

Results and Discussions

Table (3)The analyzed data for sediment within water pollution

Radionuclide	Energy (keV)	Gross Area Counts	Net Area Conts
^{234}Th	69.92	60342	5656 ± 280
^{212}Pb	238.89	33509	1849 ± 275
^{212}Pb	300.08	22654	1019 ± 283
^{214}Pb	352.28	8946	382 ± 181
^{208}Tl	582.99	22412	3735 ± 432
^{228}Ac	911.51	17430	2926 ± 509
^{40}K	1464.93	13785	7053 ± 391

Table (4) The analysed data for sediment after water pollution

Radionuclide	Energy (keV)	Gross Area Counts	Net Area Conts
^{234}Th	69.92	65493	6243 ± 308
^{212}Pb	238.89	35577	2100 ± 283
^{212}Pb	300.08	23396	1351 ± 286
^{214}Pb	352.28	9156	404 ± 163
^{208}Tl	582.99	23321	4298 ± 437
^{228}Ac	911.51	18779	3622 ± 520
^{40}K	1464.93	14559	8507 ± 373

Conclusions

- **Heavy metals except Cr**

- **Fe> Mn > Zn > Cr > Pb > Cu > Ni > As to EDXRF technique**

- **Radionuclides found in the measured samples were the products of ^{238}U and ^{232}Th natural radioactive series.**

- **Identification of radionuclides can be clearly analyzed by using good resolution detector.**

- **Further studies will be undertaken for several years to detect the status of these elements in sediment.**