

INTERNSHIP AT NAST

RATO BANGALA SCHOOL

INTERNSHIP AT NEPAL ACADEMY
OF SCIENCE AND TECHNOLOGY

Khumaltar, Lalitpur, Nepal

ANUBHAV SHARMA

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1/23/2017

INTRODUCTION

Nepal Academy of Science and Technology (NAST) is a body that was established in 1982 to promote science and technology in Nepal. It consists of different laboratories like Physical Science, Natural Product Chemistry, Molecular Biotechnology and Environment Research Laboratory. Some objectives of NAST are:

- Advancement of science and technology
- Preservation and modernization of indigenous technologies.
- Promotion of research in science and technology.
- Identification and facilitation of technology transfer.



The three-week internship program at Nepal Academy of Science and Technology was very interesting with fruitful experiences. I got to be well known to brilliant minds and grasp handful of knowledge from them. In addition to being able to run Thermo luminescent Dosimeter to read and anneal cards, I became familiar with working and purpose of different other scientific equipment such as Atomic Absorption Spectrometer. By the collaborative work and effective presentation of researchers, I got to enhance my knowledge in science. I want to express my heartfelt gratitude to Dr. Jiba Raj Pokharel (Vice-Chancellor) and Dr. Buddha Ram Shah (Radiation Researcher). Also, thank you very much Mr. Bipin Rijal, Mr. Pravash Acharya, Mr. Sujhan Dhungana and all other researchers who have helped me a lot to work in the labs. I am very obliged to NAST and its team for enriching me with better experiences and inspiring me to research and achieve maximum.



Nepal Academy of Science and Technology Building

BACKGROUND

Introduction to radiation

Radiation is the emission or transmission of energy in the form of waves or particles through space or material medium. Radiation may be electromagnetic, particle, acoustic or gravitational. Radiation can be broadly categorized into two types:

1. Ionizing radiation

Ionizing radiation is the radiation that carries enough energy to ionize atoms. They can knock electrons off and create ions. Ionizing radiation contains photons and particles with energy of 10 electron volt (eV) or more. Some ionizing radiations are: UV-rays, X-rays, α -rays, β -rays.

2. Non-ionizing radiation

Non-ionizing radiation refers to any type of radiation that does not carry enough energy to ionize atoms or molecules.

Despite of numerous advantages, radiation has negative effects on health and environment. Though short term exposure of fewer doses (1-10 rems) is considered safe, it has been found that long exposure of 100 rems can cause cancer and 1000 rems can cause death. It is because of radiation affecting the cell and its activity like the cell division; making the cell divide continuously and be prone to cancer. Other than cancer different other abnormalities like hair loss to heart failure can take place.

Occupational Radiation Exposure

The exposure of ionizing radiation received by the person at work where assigned duties involve exposure of harmful radiation and radioactive materials is occupational radiation exposure. Different government and research institutes have set limits for occupational radiation exposure. For example, US limit for occupational radiation exposure is 5 rem/year for workers while 100 mrem/year for minors and public. Similarly, Canadian Nuclear Safety Commission also limits workers by 5 rem/year. In order to measure radiation absorbed dose of radiation workers in Hospitals and other Labs, NAST has a device Thermo luminescence dosimeter.

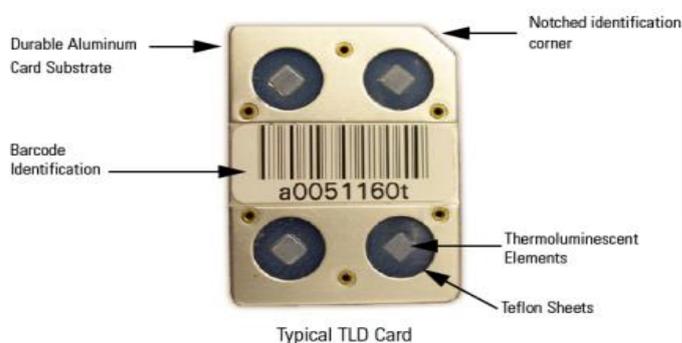
DAY-WISE ACTIVITIES

S no.	Date	Day	Work
1.	26/12/2016	Monday	-Submission of letter and understanding basic work. -Being Familiar with NAST environment and lab.
2.	27/12/2016	Tuesday	-Basic research about radiation, its types and characteristics.
3.	28/12/2016	Wednesday	-Attended presentation on Paracetamol tablets comparison by Mr. Ganesh Man Thakuri. -Exploration on occupational radiation exposure and radiation measurement techniques.
4.	29/12/2016	Thursday	-Understanding the working and purpose of machine (Thermo Luminescent Dosimeter) -Observation of working of TLD. -Reading of the Device's Operators Manual.
5.	01/01/2017	Sunday	-Use of WinRems software to create new workspace and manage Time Temperature Profile and Acquisition Setup of TLD.
6.	02/01/2017	Monday	-Visit of different labs at NAST and exploration of prime purpose of labs along with different devices.
7.	03/01/2017	Tuesday	-Practice of using software to manage Time Temperature Profile and Acquisition Setup-TLD
8.	04/01/2017	Wednesday	-Participated in measuring occupational radiation exposure of 23 radiation workers of Vayodha Hospital Pvt. Ltd.
9.	05/01/2017	Thursday	-Being familiar with the Chemistry Lab. -Understanding the names and purpose of different devices in lab.
10.	06/01/2017	Friday	-Basic knowledge about Atomic Absorption Spectrometer.
11.	08/01/2017	Sunday	-Assisted in working with AAS.
12.	09/01/2017	Monday	-Assisted in working with AAS.
13.	10/01/2017	Tuesday	-Observation of presentation on Genetic Research Banks by Prof. Manabu Onuba. -Involved in the basic principle of Column Chromatography.
14.	11/01/2017	Wednesday	-Weighing of different samples and absorbing moisture of the samples. -Preparation of 1N solution of NaOH.
15.	12/01/2017	Thursday	-Weighing of 9 mushroom samples and 4 woollen samples. -Mixing of 70% Sulphuric acid to the woollen samples. -Understood the working of Soxhlet to find the percent of fat in sample.
16.	13/01/2017	Friday	-Use of Rotatory pump/suction to filter the solution of Sulphuric acid and sample
17.	15/01/2017	Sunday	- Use of Rotatory pump/suction to filter the solution of Sulphuric acid and sample
18.	16/01/2017	Monday	-Assisted in titration of EDTA solution to know the present of concentration of Calcium in sample. -Preparation of 0.01 mole of EDTA solution.
19.	17/01/2017	Tuesday	-Preparation of Ammonium solution (8:92). -Observation of working of Condenser and Magnetic Stirrer.
20.	18/01/2017	Wednesday	-Participated in a presentation by Faculty of Science on utilization and Conservation of Yarsagumba.

DEVICES

THERMO LUMINESCENT DOSIMETER

Thermo luminescent dosimeter is an instrument that measures ionizing radiation exposure by measuring intensity of visible light emitted from a crystal in the detector when the crystal is heated. The intensity of light emitted is dependent upon the radiation exposure. The device used was Thermo Scientific Harshaw TLD 6600 Plus. The model 6600 Automated TLD Card Reader is fully automated used for extremity, environmental and whole body measurement. It uses LiF as the crystal. It has capacity to read 200 TLD cards at a time. It requires Nitrogen supply for heating. The suitable temperature of device must be around 9 degree Celsius after starting the machine. The device requires WinREMS Application software installed on the computer to give commands to the machine.



Thermo luminescence dosimetry lab

ATOMIC ABSORPTION SPECTROMETER

Atomic absorption spectrometer (AAS) is a spectro-analytical device for the quantitative determination of chemical elements using the absorption of optical radiation (light) by free atoms in the gaseous state. In NAST, 240FS model of Agilent Technology was used. In the lab, Atomic Absorption Spectrometer was used to find concentration of metals such as Iron, Manganese, Copper and Lead of 60 plant extract samples and 18 tap water samples from around the valley. This device also requires software installed in the computer to give instructions and collect results effectively. According to WHO, 5mg/Liter is the limit for iron concentration in the drinking water. But none of our sample contained iron more that the limit and thus the tap water was considered safe for health. Similar comparison was made for other metals as well.

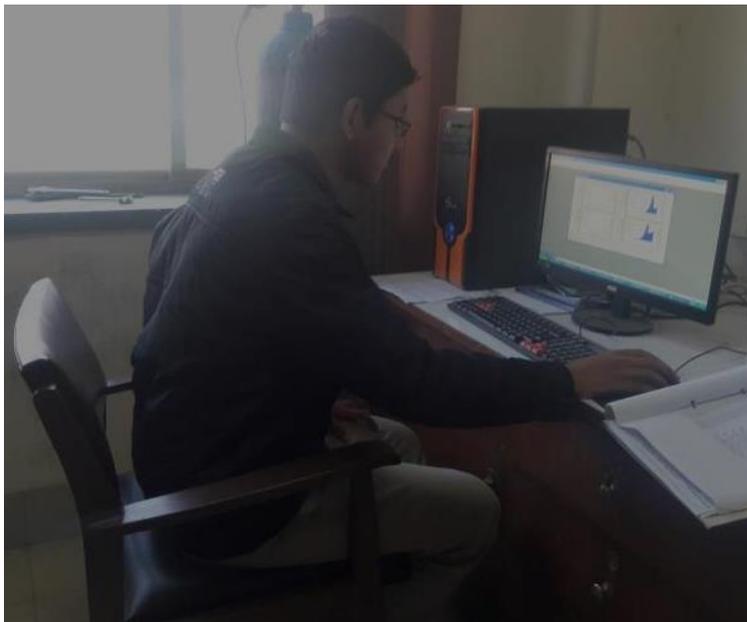


Atomic Absorption Spectrometer

USING MACHINE

Thermo luminescent Dosimeter

First, the Nitrogen Supply must be turned on. The TLD can be turned on but must be waited until it cools itself to 8-9 degree Celsius. The WinREMS software must be opened in the computer and New Workspace must be defined. After the workspace has been created, Time Temperature Profile and Acquisition Setup must be managed. Depending upon the requirement, we click on the GO dialog button and work accordingly. After completion of the work, then report must be made. For the report, RSP button can be clicked and we can choose to view reports in glow curves or standard format. While I was in NAST, I prepared the report of absorbed radiation dose of radiation workers in Vayodha Hospital Pvt. Ltd.



Working at Radiation Laboratory

OTHER ACTIVITIES

- Observation of presentation on Genetic Research Banks by Prof. Manabu Onuba.
- Understood the basic principle of Column Chromatography.
- Weighing of different samples and absorbing moisture of the samples.
- Preparation of 1 N solution of NaOH.
- Weighing of 9 mushroom samples and 4 woollen samples.
- Mixing of 70% Sulphuric acid to the woollen samples.
- Understood the working of Soxhlet to find the percent of fat in sample.
- Use of Rotatory pump/suction to filter the solution of Sulphuric acid and sample
- Observation of presentation on Paracetamol tablets comparison by Mr Ganesh Man Thakuri.
- Visit to different laboratories.



Natural Product Chemistry Lab



Environment and Climate Change Lab

THE END