

University of Salahaddin-Erbil
College of Science

Department of Physics
Nuclear laboratory



Experiments in Nuclear Physics
For 2nd Stage (Environmental Science)

(2nd Semester)

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Contents

| Exp. No. | Name of Experiment | Page |
|-----------------|---|--------------|
| 1 | Verification of Inverse Square Law for Gamma-Ray | 1-4 |
| 2 | Deflection of Beta Particles in a Magnetic Field | 5-6 |
| 3 | Absorption Coefficient for γ - Rays | 7-9 |
| 4 | Foundation of Material Height in Closed Containers | 10-11 |
| 5 | Determination of Dead Time (Resolving Time) of G.M. counters by two –Source Method | 12-14 |
| 6 | Operating Plateau for the Geiger Tube | 15-18 |

Introduction to Laboratory Safety

Radiation Safety:

Radiation like anything else can be dangerous. The sources used for this experiment are exempt sources, which mean that they give off very little radiation compared to dangerous sources. Exempt sources, as long as they are not in quantities of hundreds, require no special shielding, storage, or disposal. We suggest that they be securely stored so that students or non-authorized personal do not take them. (These could be storing them out of sight in your desk.) We also suggest that common sense be used when handling these sources. Basic laboratory safety procedures should be followed. Treating a source in the same manner as a chemical is a good idea. Not eating and not inhaling the source or any part of it will eliminate the two worst ways to have radiation exposure. Also, no special disposal is required. However, government regulations do require that you deface or remove the label before disposing of them in normal trash containers.

General Nuclear Substances Safety Precautions:

Every worker shall comply with the measures established to protect the environment, the health and safety of persons, maintain security, control the levels and doses of radiation, and control releases of nuclear substances into the environment. A poster listing some of these precautions is posted in every laboratory designated as a radioactive work area.

1. Only persons properly trained to work with nuclear substances and informed of the hazards involved are permitted to work with nuclear substances or operate devices containing nuclear substances.
2. Keep external radiation exposure as low as reasonably achievable.
3. Minimize internal radiation exposure by limiting removable contamination and preventing personal contamination.
5. Do not eat, drink, store food or smoke in laboratories.
6. Do not pipette radioactive solutions by mouth.
7. No nuclear substances shall be used in or on human beings.
8. Wear a dosimeter at all times while in a radioactive work area, if recommended by the Permit. Dosimeters shall be stored away from sources of radiation exposure.

9. In case of a radioactive spill, follow emergency procedures and notify the Radiation Safety Manager.
10. Never leave nuclear substances unattended, unless in a locked room or enclosure.
11. Store radioactive waste in a secure area.
12. All containers used to contain nuclear substances shall be labeled with the radiation warning symbol, radioisotope, activity and date. This does not apply to containers that are:
 - used to hold nuclear substances for current or immediate use and are under the continuous direct observation;
 - used to hold nuclear substances in quantities less than 10 kBq (270 nCi);
 - used exclusively for transporting nuclear substances and labelled in accordance with the Packaging and Transport of Nuclear Substances Regulations.
13. Clearly identify and mark working surfaces used for handling nuclear substances.
14. All equipment and other items used during a procedure with nuclear substances shall be labeled with the appropriate radiation warning labels.
15. Workers shall ensure the meter used to monitor for radiation contamination is working properly and function tested every 12 months.
16. Monitor the laboratory for removable contamination immediately following radioactive work or at least weekly. Decontaminate any surface where contamination was found as soon as possible. Keep a record of all monitoring and decontamination results.
17. Monitor equipment used for radioactive work to ensure that it is not contaminated prior to being used for non-radioactive work.
18. No worker shall transfer any nuclear substances to any person without the approval of the Radiation Safety Manager.
19. Maintain up-to-date inventory, usage and disposal records of all nuclear substances.
20. In the use of nuclear substances for teaching or research, consideration must be given to other physical, chemical and biological hazards, which may arise during the procedure.