Ni-63 ELECTRON CAPTURE DETECTOR SAFETY GUIDELINES

Read below for information about safely working with Ni-63 electron capture detector (ECD) used in gas chromatographs.

BACKGROUND

Chromatography is a form of chemical analysis used to separate mixtures into their individual components.

Gas chromatographs (GC) are used for separating and analyzing compounds that can be vaporized without decomposition. They can measure the purity of a sample or separate the different components, determining individual composition.

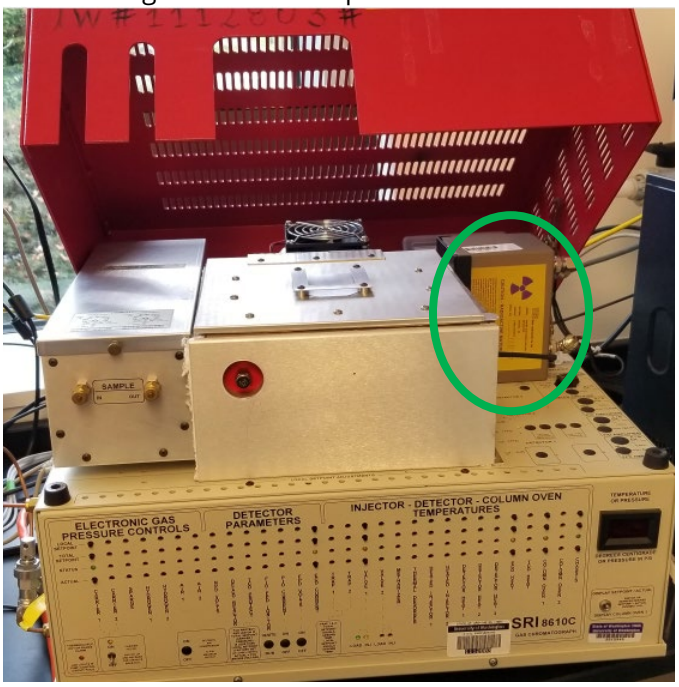

Figure 1 picture of a GC containing a Ni-63 ECD

An **electron capture detector (ECD)** is a device used in a GC to detect trace amounts of chemical compounds by detecting the amount of electron-absorption in a sample.

Ni-63, a radioactive beta emitter, ionizes the gas used in a GC. A sample absorbs the negative electron ions which causes changes in the current being measured by an ECD. The current fluctuation is used to reveal the presence of the sample components.

QUICK FACTS

> Ni-63 has a low energy beta spectrum emission and about a 96 year half-life, making it useful as an alternative for H-3.

> ECDs are best used in analysis of halogenated compounds.

> The precision of ECDs allow them to detect pesticides and chlorofluorocarbons at levels of one part per trillion.

Radiation Use Authorizations (RUA)

Radiation Use Authorizations (RUA) are issued to Principal Investigators who use radioactive materials. This includes users of radioactive ECDs. RUA Holders and researchers who work with radioactive material must be properly trained.

RUA FACTS

> The RUA lists the conditions, the ECD inventory, storage location, security, and the ECD users.

> Contact Radiation Safety before selling or relocating an ECD.

> All documents relating to the purchase, transfer, or disposal of an ECD must be retained by the RUA Holder for as long as the RUA is active.

LEAK TESTS AND INSPECTIONS

ECDs are required to be leak tested every six months and this testing is conducted by Radiation Safety personnel in April and October each year. The leak tests are performed in accordance with the manufacturer's instructions by wiping the gas intake and outlet surfaces using a standard laboratory wipe or cotton swab.

Inspections and Leak Tests of ECDs are completed by trained Radiation Safety personnel.

Warnings

> An ECD can produce contamination from rubbing or scratching the source's active surface, from overheating the source, or from cleaning the source with caustic solutions.

> Do not conduct your own leak test nor attempt to clean an ECD.

> If an ECD is malfunctioning and there is concern over the safety of the instrument, contact Radiation Safety with a detailed account of the problem.

ECD ORDERS AND RETURNS

Before purchasing an ECD, Radiation Safety must review and approve the information on the purchase order. An ECD may also be transferred to another RUA Holder by contacting Radiation Safety prior to the transfer to ensure the transfer is completed in accordance with regulatory requirements.

Contact Radiation Safety to have an ECD removed from a GC. Removal of an ECD must only be conducted by Radiation Safety staff.

Caution

Immediately report to Radiation Safety any of the following:

> Loss of ECD integrity

> Loss or theft of an ECD

> Physical damage to the ECD

> Temperature control failure

GENERAL SAFETY AND PERCAUTIONS

- Ni-63 presents no external dose hazard. Therefore, personnel dosimetry is not necessary when working with or around an ECD. *This does not mean that personnel dosimetry is unnecessary if working with other radioactive compounds.*
- Do not modify an ECD in any manner (e.g., cutting, drilling), including removing its sheet metal cover.
- The "Caution – Radioactive Materials" label must be attached to the detector. The label must identify the type of radioactive material the ECD contains, the activity, and a reference date.
- Never use a damaged ECD – notify Radiation Safety immediately upon discovery.
- Cap the inlet and outlet fittings when an ECD is not in use.
- Solvents (including water) or corrosive chemicals in contact with an ECD may compromise its integrity.
- Interfering with the overheat circuitry could result in the release of radioactive material from an ECD.
- Best practice is to vent ECD effluent exhaust to a filter or a fume hood – not ambient room air. Wear disposable gloves when removing or attaching vent lines.

Contact EH&S Radiation Safety at 206.543.0463 or radsaf@uw.edu for more information.