Personal Safety with the Spectrometer

While the Nicolet™ Summit™ Spectrometer is designed to be a safe instrument, you should take a few precautions to protect yourself from potential hazards that can arise during normal use and maintenance.

CAUTION This guide is an introduction to potential dangers that you should be aware of, but it is not a comprehensive guide. Before using the instrument, see the Site and Safety Information for a full description of these potential hazards.

Potential Hazards during Normal Use

During normal use, most hazards are due to following sources:

- Potentially hazardous samples and solvents
- Parts of the spectrometer that are hot or emit heat
- The instrument's laser

You can avoid possibly harming yourself or damaging the instrument by understanding potential hazards and by taking a few precautions.

Hazardous Samples and Solvents

Take special precautions if you are using or plan to measure potentially hazardous samples or solvents, such as pressurized gases or corrosive or flammable solvents.

Use Proper Ventilation

There are no special ventilation requirements for your spectrometer, but you may need additional ventilation during certain types of analysis. Ensure that you have proper ventilation if you will be analyzing highly toxic samples, dissolving your samples in solvents that may interact with the infrared source, or sampling flammable gases.

The pyrolysis of solvents containing halogenated hydrocarbons may produce hydrochloric acid (HCl), hydroflouric acic (HF), or phosgene ($COCl_2$).

WARNING Avoid toxic inhalation. Hydrochloric acid, hydrofluoric acid, and phosgene are highly toxic. If you are using solvents containing halogenated hydrocarbons, ensure your work area is properly ventilated.

Volatile and Flammable Solvents

The infrared source inside the spectrometer can ignite flammable and volatile samples and solvents. Take the following actions when working with samples and solvents that are flammable:

- Work with the sample compartment windows installed.
- Ensure that the workspace is properly ventilated with an active venting system that is free of spark or other sources of ignition and that prevents flammable vapors from collecting in the atmosphere surrounding the instrument.
- Do not leave flammable solvents or samples near the instrument.
- Do not leave flammable solvents or samples in the sample compartment for longer than necessary.
- Purge the spectrometer with clean, dry air or nitrogen.

Corrosive Solvents

Solvents that produce HCl or HF vapors in the sample compartment may severely damage the system. If you are using halogenated solvents, purge the instrument with clean, dry air or nitrogen.

NOTICE Your warranty does not cover equipment damage that is due to a failure to purge the instrument.

HCl and HF vapors may also compromise the coating of KBr sample compartment windows. If you are planning to work with corrosive solvents regularly, consider installing ZnSe sample compartment windows, instead.

Biohazard or Radioactive Materials and Infectious Agents

Biological samples, such as tissues, body fluids, infectious agents, and blood, have the potential to transmit infectious diseases. Follow your organization's Biosafety Program protocols for working with potentially infectious materials.

Sources of Heat

Parts of the spectrometer can become quite hot during normal use. Be careful around the spectrometer's infrared source and the vents.

Figure 1. Take care around the instrument's infrared source and the vents

The outward facing surface of the infrared source is located on the bottom of the instrument and can become quite hot. Do not touch the underside of the instrument during operation or shortly after use.

The spectrometer's vent is located on the left side of the instrument. During normal use, the spectrometer dissipates hot air from internal components to the area outside the spectrometer through these vents. Leave enough space around the instrument vents for hot air to dissipate.

Laser and Optical Safety

You will never be exposed to unsafe levels of laser radiation during normal use of the spectrometer. If the cover is removed during a service procedure, you may need to take special precautions, such as using protective eyewear. Your service person will notify you if this is necessary.

WARNING Avoid personal injury. Never stare into the laser beam or at its reflection. Never tamper with the laser, even if you are replacing a defective laser, or you could be exposed to laser light or to high voltage.

Potential Hazards during Maintenance

You may be exposed to different hazards while performing maintenance on the instrument than you would encounter during normal use. During maintenance, the primary hazards involve purging the instrument and working with the instrument's internal components.

Purging the Instrument

In especially humid environments, we recommend installing a source of clean, dry air or nitrogen to purge the spectrometer. Purging the instrument can help protect internal optical components from damage caused by a moist environment or corrosive solvents, and it can ensure more accurate results.

See "Install and Maintain a Purge Kit" for details on purchasing and installing a purge kit for your spectrometer.

DANGER Avoid fire and explosion hazard.

- Use only dried air or nitrogen to purge your spectrometer.
- Never use a flammable, combustible, or toxic gas to purge this instrument. The purge gas must be free of oil and other reactive materials. Heat from the source or from laser absorption may ignite flammable gases or reactive materials in the purge gas.

Working with Internal Components

Typically, there should be no reason for you to remove the instrument cover or attempt to replace internal components. However, if you need to remove the cover for maintenance, be aware that you risk being shocked, burned, and exposed to laser light.

CAUTION Avoid shock hazard.

Even after this instrument has been disconnected from all voltage sources, capacitors may remain charged for up to 30 seconds and can cause an electrical shock.

CAUTION Avoid burn hazard.

Internal components, especially the infrared source, can become extremely hot during normal operation. Turn off the instrument and wait at least 10 minutes before replacing any components.

WARNING Avoid personal injury.

- Never stare into the laser beam or at its reflection. Never tamper with the laser. You could be exposed to laser light or high voltage.
- If you adjust the laser or perform procedures that are not described in the user guides and manuals, you could be exposed to hazardous radiation.

Replacing the desiccant

When you open the desiccant compartment, you must prevent flammable liquids or gases from entering the compartment. For instructions on changing the desiccant, see "Replace the Desiccant."

DANGER Avoid explosion hazard.

Before you open the desiccant compartment, turn off the instrument power, unplug the power cord and remove all accessories and samples from the system. Entry of flammable liquids or gases into the desiccant compartment could cause an explosion. If such entry occurs, contact us immediately and do not apply power to the instrument until the condition has been corrected.

Replacing the IR Source

The IR source becomes extremely hot during use. If you need to replace the IR source, avoid burn and explosion hazards.

CAUTION Avoid burn hazard.

The source becomes extremely hot during normal use. Always allow the source to cool for at least 10 minutes after the spectrometer is turned off before you work with the source.

DANGER Avoid explosion hazard.

Before you remove the source from the spectrometer, turn off the instrument power, unplug the power cord, disconnect any purge lines, and remove all accessories and samples from the system. Entry of flammable liquids or gases into the source compartment could cause an explosion. If such entry occurs, contact us immediately and do not apply power to the instrument until the condition has been corrected.

Summary

The Nicolet Summit spectrometer is a safe and rugged instrument, but you can be exposed to hazards during use and maintenance. During normal operation, use caution when handling potentially hazardous samples and solvents and avoid parts of the spectrometer that are hot or emit heat. During maintenance, take precautions to avoid harm or damage that could occur when purging the instrument, handling internal components, or changing the desiccant.

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