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## Operating Instructions

According to the Betriebssicherheitsverordnung

UNIVERSITÄT  
DUISBURG  
ESSEN

Offen im Denken

Faculty of Chemistry

Institute: AAC

Work place: AAC Labs

Activity: Laboratory work

### EQUIPMENT

#### Schimadzu GC 2010-Plus

### DANGERS FOR HUMANS AND ENVIRONMENT



- High temperatures in the oven chamber and the flame ionization detector port pose a hazard if touched.
- Risk of injury due to breakable capillaries.
- Sharp and fast moving needle in autosampler operation.

### PROTECTIVE MEASURES AND RULES OF CONDUCT



- Unplug the power cord before opening the lid as there are open high voltages inside the unit. Only qualified personnel (trained electrician) may remove the cover on the back or the side covers as there is a risk of electric shock.
- If possible, do not connect the device to the mains via a multiple socket. Make sure that a protective conductor is present. Never place heavy objects on the power cables.
- Install the device on a plane an smooth, vibration-free surface.
- The device should not be operated near strong electric and magnetic fields. The power supply should not make any noise (except fan noise).
- Do not expose the device to extreme temperature fluctuations and avoid direct sunlight.
- The device requires 30cm of space on the back and 10 on the left side to the next wall. Make sure there is enough space for inspections and maintenance.
- The GC (without MS) weighs 30 kg and must not be moved alone, but only with at least two people. Mechanical loads, e.g. by shaking or deforming should be avoided.
- During transport and the associated temperature fluctuations, humidity can condense on the device. Allow the unit to dry and reach the room temperature of the new location before using it.

- After operation, wait for the injection port to cool down before loosening nuts and bolts.
- Hold the septum nut while removing the glass inlet nut, otherwise the septum nut may break the inlet while it is being withdrawn.
- Do not touch the injector, the detector or the lid because of possibly high temperatures. Also, never touch connections and internal surfaces of the oven when heating.
- Keep temperature-sensitive material away from the back of the GC as this is the outlet for hot gas. Never place flammable materials there.
- In case of unusual incidents during the analysis, turn off the power switch of the GC and surrounding units, close the main valves of all gases (air, hydrogen ...) and unplug the unit.
- To prevent cremations, always keep the column oven door closed when the oven has reached high temperatures. Leave the Inject Protection in place when injecting manually.
- Do not use the device with corrosive gas or expose it with excessive dust.
- To prevent eye injuries, wear safety goggles when working on the capillary column. Never install or remove the column at temperatures above 50° C.
- Wear gloves and goggles if you inject manually with a syringe. The syringe plunger could be pushed back with great force during the injection during the injection process by the pressure inside the injection inlet. Then sample material could escape and may contact your eyes. Holding the plunger with your finger allows you an easy injection of the sample and the plunger remains in the syringe.
- Never increase the oven temperature when air is mixed with the carrier gas.
- Gas cylinders are under high pressure. In order to avoid accidents, the safety precautions and instructions of the gas supplier must be observed.
- If possible, do not store gas cylinders in the laboratory, ideally place them outside in a gas storage area, or in gas cylinder cabinets inside the building. From there, the gas is routed via gas pipes to the pressure reducers in the lab. If it is unavoidable to operate a gas cylinder in the area of the laboratory, it must be securely fastened and should not be exposed to direct sunlight. The ambient temperature of the gas cylinder must not be higher than 40° C. When using flammable gases, flammable objects must not be brought closer than 2 meters to the gas cylinder.

- If using high pressure gas, check for leaks daily. If you use flammable gases, such as hydrogen, never smoke within a five meter radius of the gas cylinder (in the area of a gas storage outside the lab area) and avoid open flames. Fire extinguishers must be located nearby.
- Always secure cylinders with cylinder clamps or chains so that they can not fall over. Use only oil-free pressure gas cocks. Do not use pipes that had contact with oil. When you have finished the analysis, close the main valve of the gas cylinder immediately.
- The pressure regulator will be damaged if pressure above the manufacturer's instructions is used. Set the inlet pressure of the inlet gas to the maximum permitted pressure of the regulator.
- Make sure that the working pressure for the flow controller does not exceed 500 kPa. Large amounts of effluent hydrogen can cause the FID flame to expand out of the detector housing.
- If multiple devices are connected to the gas line, check all instrument specifications to ensure adequate gas supply pressure for all devices.
- Do not use leak-detecting liquid or soapy water for the connections above the carrier and detector gas controllers for leak detection.
- Use gloves when working with samples. Use lab coat and goggles when cleaning the glass inlet with organic solvents or acids. If you get chemicals in your eye or onto the skin, wash/rinse with large amounts of water and consult a physician.
- Pay attention to correct connections between gas pipes. Do not connect the hydrogen line to the air inlet as otherwise larger amounts of hydrogen may escape.
- When using hydrogen, special caution is required in general as hydrogen forms explosive mixtures with air in a wide range. Due to its small molecules, hydrogen is easily able to penetrate porous pipes, which is why hydrogen is always to be connected by means of metal gas tubes. In addition, hydrogen is colorless and odorless, so that an organoleptic detection is not possible.

## RESPONSE TO MALFUNCTIONS



Shut down device immediately, faults must be reported to:

- Maria Madani, if not present O. Schmitz, M. Sulkowski, F.Uteschil, S. Meckelmann.

## BEHAVIOR IN CASE OF ACCIDENT / FIRST AID



- Keep calm.
- Call first responders.
- Emergency call: 0112
- Report accident.

## MAINTENANCE / DISPOSAL

- Maintenance only by authorized, competent persons.
- Switch off the device and disconnect it from the mains.
- Regular inspection of wearing parts.