

lechyd a Diogelwch – Health and Safety

LABORATORY SAFETY – SAFE HANDLING AND USE OF COMPRESSED GAS CYLINDERS

(excludes liquefied gases and gases used solely for the purpose of Diving)

This Information Sheet provides guidance on eliminating or reducing the risks associated with gas cylinders. It is aimed at anyone who purchases, transports or uses compressed gases in laboratories.

General Information

Compressed gas cylinders are a convenient way to transport and store gases under pressure. A variety of gases are used in laboratories across the University for a range of scientific purposes. But remember, hazards are not just from the gas itself but also as a result of how the gas is stored -under pressure.

Compressed gas cylinders may pose a particular hazard during a fire, and the Emergency Services often require information as to the location of gas cylinders in order to protect themselves and others.

General Hazards

- Impact from falling cylinders.
- Impact as a result of a gas cylinder explosion.
- Impact as a result of a rapid release of compressed gas.
- Injection of gas under high pressure.
- Asphyxiation.
- Manual handling.
- Fire / explosion due to the escape of flammable gas.

Main causes of Accidents

- Inadequate training, poor handling and storage.
- Faulty equipment.
- Inadequate ventilation of workplaces.



Effects of exploding gas cylinder on the hull of a lifeboat

Before Handling and Using Gas Cylinders

You should always have training before handling / using cylinders as detailed below:

LOCAL TRAINING BY A COMPETENT PERSON	RECOGNISED EXTERNAL TRAINING SCHEME OR SIMILAR
<ul style="list-style-type: none">• Move cylinders around the workplace EXCEPT acetylene• Changing the regulator from an empty gas cylinder to a full cylinder of the same gas type	<ul style="list-style-type: none">• Moving acetylene cylinders• Selection of suitable regulators• Connecting pipework or equipment to gas cylinders / regulators <p><i>NOTE: Contact Health and Safety Services or your College Health and Safety Officer for information on training</i></p>



You must always consult with the person in charge of the laboratory before:

- Introducing a new type of compressed gas to a laboratory for the first time.
- Increasing the total amount of compressed gas used in the laboratory.

This will ensure essential information about increased hazards is passed on to the appropriate person(s) and that:

- If necessary alarm systems to warn of leaking gases are installed.
- The cylinders are placed on the appropriate database.

Transporting Compressed Gas Cylinders in Vehicles



- **NEVER** transport acetylene, hydrogen, oxygen or any other explosive or flammable gas in a vehicle without a proper risk assessment and approval.
- **ALWAYS** consult with your College Safety Officer before transporting any other compressed gases in vehicles and ensure a risk assessment is undertaken.
- **ALWAYS** transport compressed gases capable of causing asphyxiation eg nitrogen, carbon dioxide, helium etc in a part of the vehicle that is completely separate from vehicle occupants eg on a flatbed truck but never in the boot of a car.



Results of a gas cylinder explosion in a car

HANDLING AND USING GAS CYLINDERS

a) Moving Gas Cylinders

- Visually check the cylinder to ensure there is no damage eg dents, cracks, scorch marks or corrosion.
- Ensure two people are present when moving large cylinders eg above 75kg or when acetylene cylinders are being moved.
- Wear safety shoes.
- Disconnect regulators and fit protective valve caps when possible.
- Use an appropriate trolley.
- Ensure the chain / restraining device is in place.
- Use a stair climbing trolley if no lift is available.



Safety chain not in place,
regulator still connected



Both safety chains in place,
regulator removed



b) Positioning Cylinders

- Ensure the cylinder is vertical (unless designed to be used otherwise).
- Ensure the cylinder is stored away from sources of ignition.
- Restrain the cylinder to stop it falling (see below).



c) Connecting Regulators

- Check the gas cylinder is the correct type for the intended use.
- Check the regulator is suitable for the type of gas and the pressure of the cylinder.
- Check the regulator has been tested in the last 5 years.



This shows the regulator is capable of producing an outlet pressure of between 0 – 3.5 bar

This shows the regulator is suitable for Air and Nitrogen

This shows the regulator is suitable for a maximum cylinder pressure of 250bar

- Check the associated pipe work is suitable for the gas and pressure and that a flashback arrestor is fitted when using flammable or explosive gases eg hydrogen, oxygen, acetylene.



Flashback arrestor fitted to acetylene cylinder

d) Good Cylinder Management

- Store full cylinders vertically in the designated external gas store until needed.
- Remove empty cylinders from the laboratory immediately and store in the external gas store.
- Ensure all cylinders are properly secured with the chain across.



- Never smoke when handling gas cylinders.



- A list of emergency contact details must always be displayed wherever gas cylinders are stored / used.

EMERGENCY PROCEDURES (excluding acetylene)

If you drop a cylinder take the following action:

IF YOU CAN HEAR GAS ESCAPING		
TYPE OF CYLINDER	INDOORS	OUTDOORS
Nitrogen Carbon Dioxide Air Helium Argon Other inert gases	<ul style="list-style-type: none"> • Evacuate the area • Ventilate if possible, but do not put yourself at risk • Contact Security on 01248 382795 / 333 and request Fire Service 	<ul style="list-style-type: none"> • Keep people clear • Contact Security on 01248 382795 / 333 and request Fire Service
Oxygen Hydrogen Other flammable gases <u>EXCLUDING</u> acetylene	<ul style="list-style-type: none"> • Extinguish all ignition sources • Evacuate the area • Ventilate if possible, but do not put yourself at risk • Sound the fire alarm if the gas ignites • Contact Security on 01248 382795 / 333 and request Fire Service 	<ul style="list-style-type: none"> • Keep people clear • Ensure no smoking or use of naked flames • Contact Security on 01248 382795 / 333 and request Fire Service

IF YOU CANNOT HEAR GAS ESCAPING		
TYPE OF CYLINDER	INDOORS	OUTDOORS
All cylinders <u>EXCLUDING</u> acetylene	<ul style="list-style-type: none"> • Check cylinder and valves for signs of damage • If there is damage contact appropriate person • If there is no damage and enough space attempt to upright the cylinder using a minimum of two people 	<ul style="list-style-type: none"> • Check cylinder and valves for signs of damage • If there is damage contact appropriate person • If there is no damage and enough space attempt to upright the cylinder using a minimum of two people

EMERGENCY PROCEDURES - ACETYLENE

If you drop a cylinder take the following action:

IF YOU CAN HEAR GAS ESCAPING	
INDOORS	OUTDOORS
<ul style="list-style-type: none">• Extinguish all sources of ignition• Ventilate the area but do not put yourself at risk• Evacuate all buildings within 150m of the gas escape and activate the fire alarm• Contact Security on 01248 382795 / 333 and request Fire Service	<ul style="list-style-type: none">• Keep people clear at least 150m• Evacuate all buildings within 150m of the gas escape and activate the fire alarm• Ensure nobody smokes in the area• Contact Security on 01248 382795 / 333 and request Fire Service

IF YOU CANNOT HEAR GAS ESCAPING	
INDOORS	OUTDOORS
<ul style="list-style-type: none">• Carefully examine the cylinder using the back of your hand to check if there are any signs of heating• If the cylinder shows signs of heating evacuate immediately. Activate the fire alarm and contact Security on 01248 382795 / 333 and request Fire Service• If the cylinder shows no signs of heating check cylinder and valves for signs of damage• If there is damage contact BOC immediately for advice: 0800 111333• If there is no damage and enough space attempt to upright the cylinder using a minimum of two people• Do not use the cylinder, contact BOC on 0800 111333 to arrange for a replacement and in the interim monitor regularly for signs of heating	<ul style="list-style-type: none">• Carefully examine the cylinder using the back of your hand to check if there are any signs of heating• If the cylinder is heating up clear the area immediately• Ensure nobody smokes in the area• If the cylinder shows signs of heating evacuate immediately. Contact Security on 01248 382795 / 333 and request Fire Service• If the cylinder shows no signs of heating check cylinder and valves for signs of damage• If there is damage contact BOC immediately for advice: 0800 111333• If there is no damage and enough space attempt to upright the cylinder using a minimum of two people• Do not use the cylinder, contact BOC on 0800 111333 to arrange for a replacement and in the interim monitor regularly for signs of heating