

This Information Sheet provides guidance on eliminating or reducing the risks associated with gas cylinders. The guidance is for anyone who purchases, transports or uses compressed gases in laboratories, workshops etc.

The guidance does not apply to liquefied gases and gases used solely for diving.

## **General Information**

Compressed gas cylinders are a convenient way to transport and store gases under pressure.

A number of different gases are used in laboratories across the University for a variety of scientific purposes. However, remember, hazards are not just from the gas itself but also because 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 within a building in order to protect themselves and others.

## **General Hazards**

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

## **Main Accident Causation**

- 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 must have received the following training before handling / using cylinders as detailed:

Local Training by a Competent Person eg Technician	Recognised External Training Scheme or Similar
<ul style="list-style-type: none"><li>• Move cylinders around the workplace <b><u>EXCEPT</u></b> acetylene</li><li>• Changing the regulator from an empty gas cylinder to a full cylinder of the same gas type</li></ul>	<ul style="list-style-type: none"><li>• Moving acetylene cylinders</li><li>• Selection of suitable regulators</li><li>• Connecting pipework or equipment to gas cylinders / regulators</li></ul> <p><b>NOTE:</b> Contact HSS or your College Health and Safety Officer for information on training</p>

Always consult with the person in charge of the laboratory before:

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



Essential information about increased hazards can then be passed on as appropriate and:

- Alarm systems to warn of leaking gases can be installed (if required).
- The cylinder's details are recorded as required (eg asset 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. **A Risk Assessment is required.**
- **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.
- **NEVER** carry cylinders 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 inspect the cylinder to check for damage eg dents, cracks, scorch marks, corrosion.
- Ensure two people are present when moving large cylinders eg above 75kg, or if moving acetylene cylinders.
- Wear safety shoes to protect feet.
- Disconnect regulators and fit protective valve caps (when possible).
- Use an appropriate trolley (with a chain to hold the cylinder).
- 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

- The cylinder should be vertical (unless designed otherwise).
- Store the cylinder away from all ignition sources.
- Restrain the cylinder to the bench with a strap to stop it falling.



### 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 is not past its expiry date and is in test date eg last 5 years.

Shows the regulator can produce an outlet pressure of between 0 – 3.5 bar



Regulator is suitable for a max. cylinder pressure of 250bar

Regulator is suitable for Air and Nitrogen

- Check the associated pipe work is suitable for the gas and pressure.
- **ALWAYS** fit flashback arrestors if using flammable or explosive gases eg hydrogen, oxygen, acetylene.



Flashback arrestor fitted to acetylene cylinder

### d) Good Cylinder Management

- Store full cylinders upright, in the designated external gas store until needed.
- Remove empty cylinders from the lab immediately and store in the external gas store.
- Secure all cylinders properly with the chain across.
- Never smoke when handling gas cylinders.
- Display a list of Emergency Contacts wherever gas cylinders are stored / used.



## EMERGENCY PROCEDURES (excludes acetylene)

Take the following action if a cylinder is dropped:

<b>IF YOU CAN HEAR GAS ESCAPING</b>		
<b>CYLINDER TYPE</b>	<b>INDOORS</b>	<b>OUTDOORS</b>
Nitrogen Carbon Dioxide Air Helium Argon Other inert gases	<ul style="list-style-type: none"> <li>• Evacuate the area</li> <li>• Ventilate if possible</li> <li>• Never put yourself at risk</li> <li>• <b>Call Security on 333 / 01248 38 2795 - request Fire Service</b></li> </ul>	<ul style="list-style-type: none"> <li>• Keep people clear</li> <li>• <b>Call Security on 333 / 01248 38 2795 - request Fire Service</b></li> </ul>
Oxygen Hydrogen Other flammable gases <b><u>EXCLUDING</u></b> acetylene	<ul style="list-style-type: none"> <li>• Extinguish ignition sources</li> <li>• Evacuate the area</li> <li>• Ventilate if possible</li> <li>• Never put yourself at risk</li> <li>• Sound the fire alarm if the gas ignites</li> <li>• <b>Call Security on 333 / 01248 38 2795 - request Fire Service</b></li> </ul>	<ul style="list-style-type: none"> <li>• Keep people clear</li> <li>• Ensure no smoking or use of naked flames</li> <li>• <b>Call Security on 333 / 01248 38 2795 - request Fire Service</b></li> </ul>

<b>IF YOU CANNOT HEAR GAS ESCAPING</b>		
<b>CYLINDER TYPE</b>	<b>INDOORS</b>	<b>OUTDOORS</b>
Other cylinders <b><u>EXCLUDING</u></b> acetylene	<ul style="list-style-type: none"> <li>• Check cylinder and valves for damage</li> <li>• If there is <b>damage</b> contact appropriate person</li> <li>• If <b>no damage</b> and enough space, upright cylinder (use minimum of 2 people)</li> </ul>	<ul style="list-style-type: none"> <li>• Check cylinder and valves for damage</li> <li>• If there is <b>damage</b> contact appropriate person</li> <li>• If <b>no damage</b> and enough space, upright cylinder (use minimum of 2 people)</li> </ul>

## EMERGENCY PROCEDURES - ACETYLENE

Take the following action if an acetylene cylinder is dropped:

<b>IF YOU CAN HEAR GAS ESCAPING</b>	
<b>INDOORS</b>	<b>OUTDOORS</b>
<ul style="list-style-type: none"> <li>• Extinguish all sources of ignition</li> <li>• Ventilate area. <b>DO NOT</b> put yourself at risk</li> <li>• Evacuate all buildings within 150m of the gas escape</li> <li>• Sound the fire alarm</li> <li>• <b>Call Security (away from the leak) on 333 / 01248 38 2795 - request Fire Service</b></li> </ul>	<ul style="list-style-type: none"> <li>• Keep people clear – at least 150m</li> <li>• Evacuate all buildings within 150m of the gas escape</li> <li>• Sound the fire alarm</li> <li>• <b>Call Security (away from the leak) on 333 / 01248 38 2795 - request Fire Service</b></li> </ul>

<b>IF YOU CANNOT HEAR GAS ESCAPING</b>	
<b>INDOORS</b>	<b>OUTDOORS</b>
<ul style="list-style-type: none"> <li>• Carefully examine the cylinder</li> <li>• Use the back of your hand to check for signs of heating</li> <li>• If the cylinder <b>shows signs of heating</b> evacuate immediately</li> <li>• Sound the fire alarm</li> <li>• <b>Call Security on 333 / 01248 38 2795 - request Fire Service</b></li> <li>• If the cylinder shows <b>no signs of heating</b>. Check cylinder and valves for damage</li> <li>• If <b>damaged</b> contact BOC for advice: <b>0800 111 333</b></li> <li>• If there is <b>no damage</b> and enough space, upright the cylinder (minimum of 2 people)</li> <li>• <b>Do not use the cylinder</b>, contact BOC on 0800 111 333 to arrange a replacement</li> <li>• In interim monitor for signs of heating</li> </ul>	<ul style="list-style-type: none"> <li>• Carefully examine the cylinder</li> <li>• Use the back of your hand to check for signs of heating</li> <li>• If the cylinder <b>shows signs of heating</b> clear the area immediately</li> <li>• Ensure no one smokes in the area</li> <li>• <b>Call Security on 333 / 01248 38 2795 - request Fire Service</b></li> <li>• If the cylinder shows <b>no signs of heating</b>. Check cylinder and valves for damage</li> <li>• If <b>damaged</b> contact BOC for advice: <b>0800 111 333</b></li> <li>• If there is <b>no damage</b> and enough space, upright the cylinder (minimum of 2 people)</li> <li>• <b>Do not use the cylinder</b>, contact BOC on 0800 111 333 to arrange a replacement</li> <li>• In interim monitor for signs of heating</li> </ul>