	<b>Department of Physics</b> <b>National University of Singapore</b>		<b>Ref. No</b> <i>SOP/001</i>
	<b>Standard Operation Procedure</b> <b>Title:</b> Gas cylinder		<b>Rev. No</b> <i>002</i>
			<b>Pages:</b> <i>3</i>
<b>Lab: Nanomaterials &amp; Devices Group</b>			
<b>Written by</b> Chen Mingjun	<b>Approved by</b> A/Prof Eda Goki	<b>Issue date</b> 25/12/2021	<b>Review date</b> 25/12/2024

## 1. Purpose

The objective of this SOP is to provide guidelines to all the laboratory personnel on operating gas cylinder.

## 2. Scope

The procedure is applicable to all research staff, research students and technical staff working in the laboratory.

## 3. Responsibility

It is the responsibility of the PI in conjunction with the laboratory I/C to ensure that all research and technical staff and students are advised, prepared and trained.


### 3.1. Principal Investigator

The principal investigator is responsible for the implementation of these guidelines and takes ownership of all research and technical staff, graduate and undergraduate students under his charge in ensuring that they will carry out their activities in a reasonably practicable manner. The PI has to ensure that all the personnel mentioned above are adequately advised, prepared and trained.

### 3.2. Staff / Students

All research and technical staff and graduate students are under the obligation to work and behave safely and are responsible for taking care of their own health and safety and not placing themselves or others at risk of injury

## 4. Personal protective equipment

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At a minimum, chemically resistant gloves, long-sleeve lab coat, chemical-spill-proof goggles with side shield and closed toed shoes should be worn. This is to be considered as minimum protection and must be upgraded if necessary.

## 5. Safety precautions

Inspect equipment to be used and ensure all are in proper working condition. Report any equipment deficiencies prior to use.


## 6. Procedure

### 6.1. Preparation & material placement

- Ensure adequate personal protective equipment is worn e.g. glove coat and shoe. (The type of PPE required would depend on the findings obtained from the risk assessment).

### 6.2. Operation

- Move the cylinder from the delivery point (workshop) to the gas storage cabinet.
  - i) Do not roll but use proper gas cylinder trolley.
  - ii) Ensure the floor is kept clear of obstacles for this task.
  - iii) Ensure the person involved has read appropriate Manual Handling Instructions.
  - iv) The persons moving the cylinders must be physically capable of carrying out this task.
  - v) Chain the cylinder to the wall after delivery.
- Connect the cylinder to the equipment.
  - i) Note the possibility of gas leaks and; possibility of abrasion from spanner use.
  - ii) Only gas-specific connections are used.
  - iii) Ensure the O-rings are checked before attachment.
  - iv) The person involved is familiar with the requirements for connecting regulators to cylinders.
- Use of the nitrogen, argon
  - i) Possible asphyxiation
  - ii) Ensure The room is very large and is well ventilated at all times.

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- iii) No-one works on a continual basis in this room
- Disconnecting the cylinder from the manifold.
- i) Possible high pressure gas release.
- ii) The cylinder is isolated from the system before disconnection.
- Moving the cylinder to the despatch area (Workshop)
- i) Manual handling of big size cylinders.
- ii) Hazard as above.

## 7. Precaution

- Asphyxiation. Condensed gas leakage can cause asphyxiation during using

## 8. Prevention measure

- Operating gas source in the fume hood, glovebox or open space with oxygen level detector

## 9. Operation control

### 7.1. Administrative control

- The key of gas cabinet is regulated by lab safety lead
- The authority of entering gas inventory is controlled by department staff
- SOPs of cylinder exchange
- Safety label is pasted inside gas cabinet

### 7.2. Engineering control

- Proper PPEs

## 10. Revision History

Date Revised	Revision No.	Author	Revision Summary
20.12.2018	001	Eris Linardy	Text
27.12.2021	002	Chen Mingjun	Procedures

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