

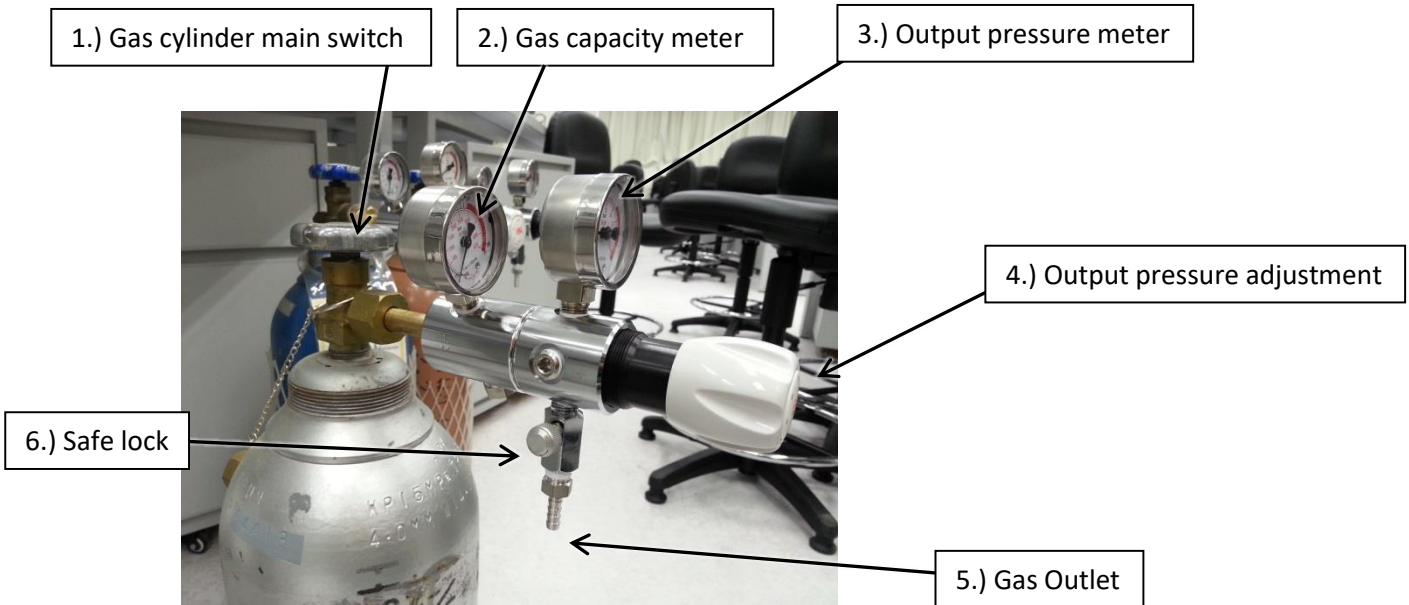
PHYS2261 Introductory Heat and Thermodynamics

Laboratory manual 2261-1:

Adiabatic gas law

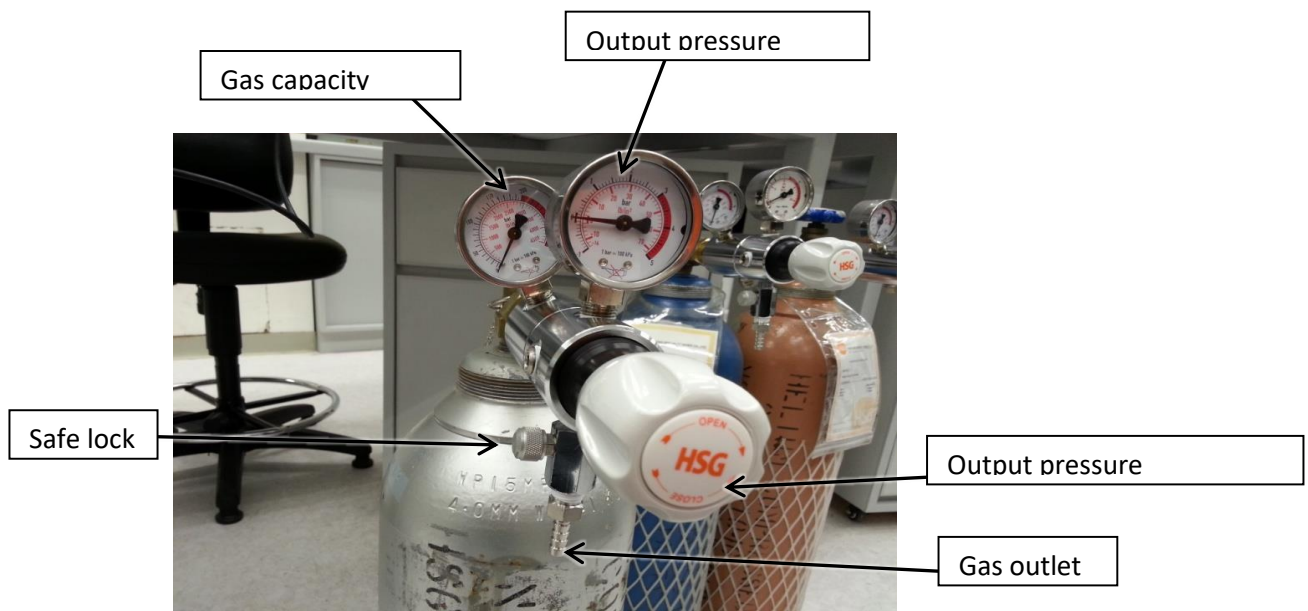
Appendix A. Gas Cylinder Operation

Gas Cylinder side view



- 1.) Gas cylinder main switch: turn clockwise to lock and anti-clockwise to open.
- 2.) Gas capacity meter: to show the existing gas capacity remained.
- 3.) Output pressure meter: please adjust the output pressure adjustment (4) to knob within 2 bar.
- 4.) Output pressure adjustment: clockwise to open and anti-clockwise to close.
- 5.) Gas outlet: for piping connection or your device.
- 6.) Safe lock: anti- clock wise to provide gas and clockwise to stop the gas output

Gas cylinder regulator and outlet front view



Appendix B. Connection between Gas Cylinder and Adiabatic Gas Law Apparatus







A brass gas cock with a short hose (like pig tail) is fixed on the Adiabatic Gas Law Apparatus. When the hose is free from connection, normal air is applied to the experiment.



Close state of the brass gas cock. The gas inlet and outlet are blocked. The handle is in 90 degrees with the hose.



Open state of the brass gas cock. The gas inlet and outlet are allowed. The handle is aligned with the hose.

	<p>A piece of easy connection adaptor in top view. An easy connection adaptor is usually used as hose connection in simple management. Both ends of the blue ring are the lock and unlock switches for mount and dismount of the hose.</p> <p>Students can apply this accessory to connect different gases to the Adiabatic Gas Law Apparatus.</p>
	<p>Side view of the easy connection adaptor.</p>
	<p>An easy connection adaptor connected to the hose with the tap on the apparatus.</p>
	<p>Students just need to insert the hose end into one end of the easy connection adaptor. The blue ring (as pointed by pencil) will lock and seal automatically, when well connected.</p>



About the easy connection adaptor:
The blue ring down the adaptor body shows that the lock to the hose has completed. To dismount the hose, push the blue ring down into the body and then pull out the hose.



A hose with easy connection adaptors on both sides. This hose is used for connection between the gas cylinder and the Adiabatic Gas Law Apparatus. (For example: carbon dioxide, helium and argon gas)

Steps and operation hints of filling special gas (Carbon dioxide, Helium and Argon) to the apparatus.

Please follow the below steps for special gas to fill up the cylinder of apparatus:-

- 1.) Student need to check the gas type and location as their needs. (Gas cylinder is labeled.)
- 2.) Turn safe lock on gas regulator in clock-wise direction for closure.
- 3.) Turn output pressure adjustment on gas regulator in anti-clockwise direction for closure. (Output pressure meter shows zero)
- 4.) Turn on (in anti-clockwise direction) Gas cylinder main switch as open for gas to be ready to supply.
- 5.) Adjust the output pressure adjustment by turning in clockwise direction and observe the pressure meter which reveals that the output reading is maintained within 1.5 – 2.0 bar.
- 6.) Turn both stopcock (A & B) open on the cylinder of apparatus (stopcock A & B addressed in the base of the cylinder; photos in Appendix B for reference), student can identify stopcock A and B by themselves. (Turn both stopcock A and B open, making the condition ready for gas to fill up.)
- 7.) Connect the hose with easy connection adaptor to the stopcock A. Then leave stopcock B for free and turn open.
- 8.) Student need to turn on the safe lock on gas regulator for around 20s, this is a simple management to allow gas flow via stopcock A in and out from stopcock B. This approach is needed to allow the special gas to flow in with high concentration and pressure to force the existing atmosphere air/gas molecules move out from the stopcock B. (Student can use your hand or skin to feel the air flow from this stopcock B outlet.)
- 9.) When student is ready to fill the gas for the cylinder, turn off the stopcock B. (Please pay attention that the special gas will flow into the cylinder and the handle may rise suddenly to cause injury!) So, a fine tune/gentle adjustment to the safe lock to control the gas flow into cylinder is the appropriate management to avoid some accident and damage to the apparatus.

Reminder: Strong adjustment on safe lock may cause the gas overflow/high flow rate with strong momentum! It may lead to instant upward movement of the apparatus and the cylinder with handle. As it is very dangerous for the handle and cylinder to rise under this unexpected condition, student and your group-mate may get injured!

Recommendation: When a student is applying the special gas to fill up the cylinder of the apparatus, other group-mates please stay away from the apparatus and pay attention to its handle and its sudden rise! About the operation, student may use the safe lock to fine tune the gas flow with gentle adjustment. This can help your group-mate to observe the slowed down movement of the handle to avoid injury and accident.

- 10.) After the gas fills up the cylinder of apparatus, student needs to take the measurement of the capacity reading over the cylinder (its height and diameter for volume calculation) and turn off the stopcock A as completion.
- 11.) Turn off/close the safe lock (in clockwise direction) on the gas cylinder regulator.
- 12.) Turn off / close the output pressure adjustment (in anti-clockwise direction) on the gas cylinder regulator. Please keep the output pressure meter at Zero reading!
- 13.) Turn off / close the gas cylinder main switch (in clockwise direction).