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[Home](#) > Gas Cylinders

Gas Cylinders

Posted by Anonymous on Fri, 2014-06-13 16:59

Storage of Gas Cylinders: We currently have three gas cylinders - Hydrogen - DG 2.1 (size E), Oxygen - DG 2.2 & 5.1 (size D) and Carbon Dioxide - DG 2.2 (size D) which are secured with chains on trolleys. They have always been stored in the science prep area together, but I have now separated them so that the Hydrogen Gas cylinder is at one end of the prep area and the the Oxygen and Carbon Dioxide are together at the other end of the prep area. The MSDS says (among various other conditions) that they need to be stored in a well ventilated area, away from sources of ignition. The Hydrogen cylinder is near a bench with power points and a gas tap as this is the most practical location available. Can you please advise me if this is an unsafe practice? Also, there has been a practice of leaving the tap which controls the opening and closing of the valve in the open position and just shifting the lever to the off position to turn off or on. Is this safe, or should both sources be turned off?

Voting:



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Laboratory Technicians:

Laboratory Technicians

Showing 1-1 of 1 Responses

Gas Cylinders

Submitted by sat on 25 July 2014

Answer reviewed 24 February 2023

Firstly, a site specific risk assessment should be conducted to determine appropriate storage

and transport arrangements for the compressed gases required by your laboratory. Gas cylinders are hazardous due to their physical size and chemical characteristics and, wherever possible, should be stored outside.

All users of the gas cylinders should receive training prior to use and be familiar with the specific gases being used and their safety data sheets. The hydrogen, oxygen and carbon dioxide gas cylinders that you are using are supplied as high-pressure cylinders. All cylinders should be stored upright, secured with a chain to a wall or a suitable trolley and be in a well-ventilated area, which you are doing.

These gases, as you have mentioned, have different dangerous goods classes assigned to them and must be segregated in accordance with Dangerous Goods legislation and Australian Standards.

Storage of hydrogen cylinder

The hydrogen gas cylinder has special considerations for storage due to its fire and explosion hazard. The explosive range is for mixtures with air between 4% and 75%, therefore it is essential that it is stored in a well-ventilated area. As hydrogen is much lighter than air it will collect at the highest point in any enclosed space unless it is ventilated at a high level. Your hydrogen cylinder is currently located close to two ignition sources and should be relocated away from these. (An electrical switch is considered a spark ignition source and therefore a significant hazard. Although the gas tap is currently not in use it is still a potential source of ignition as someone unknowingly could come and use that gas tap.) The preferred storage option is outside in a shaded locked mesh cage away from student traffic, which would be subject to a risk assessment to ensure that it is secure from theft or vandalism, away from all sources of heat and ignition and not under a structure such as an air intake for a building. You may need to seek further advice on this for your specific site. The supplier of your gas cylinders may be able to help direct you to a suitable consultant.

Storage of oxygen and carbon dioxide cylinders

Oxygen supports and accelerates combustion, therefore the oxygen cylinder must be a minimum of 3m away from any sources of ignition and flammable or combustible materials, which includes the very flammable hydrogen gas cylinder. Carbon dioxide is heavier than air and will collect at ground level, however due to the size of the carbon dioxide cylinder, which is similar to the size of a fire extinguisher, this should not present a problem in a large room. It can be stored adjacent to the cylinder of oxygen.

Valves and regulators

With regard to the practice of leaving the tap which controls the opening and closing of the valve in the open position and just shifting it to turn on or off, the guidance material recommends that both the cylinder valve and the regulator valve should always be closed when not in use or when the cylinder is empty. In addition, it is recommended that the valve should not be fully opened to the point of resistance, but given a half turn back to prevent it locking in an open position. It might be useful to create a laminated instruction guide to be

used in conjunction with the cylinders to remind users to turn off both the valve and the regulator.

BOC has produced an excellent document called Guidelines for gas cylinder safety. We recommend downloading the latest version from their website and printing it out for easy reference.¹

Further guidance is available in the Science ASSIST SOP.²

References

¹ BOC Limited, 2012, *Guidelines for Gas Cylinder Safety*, BOC Limited website, <https://www.boc.com.au/shop/en/au/gases>

² Science ASSIST, 2015, *SOP: Gas cylinders in school science areas*, Science ASSIST website: </resource/3191/sop-gas-cylinders-school-science-areas>

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