

NDMRB – University of Oxford **NDMRB-SOP-028 Issue 001 – July 2016 (JW)**

NDM Research Building Ammonia Gas

1.0 Introduction

Ammonia is required as a reagent in some chemical reactions. There are a number of risks associated with the use of ammonia which should be considered before use. This document aims to enable users to handle and operate an ammonia gas cylinder in a safe manner.

The main risks include:

- Release of toxic gas into the laboratory
- Fire resulting from the release of flammable gas

The main causes of accidents are:

- Faulty equipment (eg. Badly fitted regulators or valves)
- Incorrect storage
- Incorrect handling

2.0 Storage of ammonia gas cylinder

Ammonia is a toxic flammable gas; therefore it should be clearly labelled and stored in a fume hood away from combustible, flammable, or choro-based compounds. It should also be stored at a constant temperature, and not above 40 °C. To meet these criteria, the ammonia cylinder is stored in the fume hood located in room 664.30.23.

3.0 Fitting ammonia regulator

The ammonia cylinder needs to be fitted to an ammonia specific regulator before use. This is to ensure that the regulator can withstand the corrosive nature of ammonia.

Note** All valves on full cylinders will arrive fitted with a blanking nut. BOC blanking nuts have a small vent hole drilled into one of the flats. When the blanking nut is loosened, a gas path is created from the valve to the atmosphere, thus allowing a leak check to be performed on the valve without the full removal of the blanking nut.

To attach the regulator:

- Check the cylinder valve is in the closed position.

- Loosen the blanking nut cautiously, and leak check the valve utilising the vent hole. Should the valve appear to be leaking, immediately retighten the blanking nut to stop the leak. If no leak is detected it is safe to proceed.
- With the regulator valve closed, place the regulator in position and hand screw into the port. The regulator should screw cleanly and easily into the port, tighten with a cylinder key a quarter turn. (10 ins adjustable spanner.) Open the cylinder valve – if leakage occurs do not use PTFE pipe thread tape to affect a seal, instead close the valve, loosen the connector and reattempt. In the case of a poor connection the sealing washer may need to be replaced.
- Store with the cylinder valve closed, and with regulator valve pressure released and closed.

4.0 Handling of ammonia gas cylinder

Reactions using ammonia will be undertaken in fume hoods in room 664.30.18. Due to the small cylinder size (1 Kg gas capacity), the cylinder can be moved by hand to this location. The cylinder should be handled with care, and not carried by the valve or regulator. Full PPE should be worn throughout. Before moving, ensure that the cylinder and regulator valves are closed.

5.0 Operation of ammonia gas cylinder

Full PPE should be worn throughout. Before moving the cylinder to room 664.30.18, ensure that the receiving fume hood is free of naked flames, combustible materials, and incompatible materials.

To use the cylinder: with the regulator closed, open the cylinder valve fully, and then close it by one turn. This will avoid the valve seizing in the open position, and thus prevent subsequent users mistaking a seized open valve for a closed valve. Adjust the flow to the reaction using the regulator valve. After use be sure to fully close the valve and refit the blanking nut securely. It should be noted, however, that over-tightening the valve will damage the valve seal and could cause it to leak. Release pressure from regulator before moving from fume hood.

Note** Be aware that cold cylinders containing only a small residue may contain a sub atmospheric pressure. When the cylinder warms to ambient temperature the pressure in the container can rise to above atmospheric pressure. This can enable a previously undetected inward leak to become a detectable outward leak. Therefore, allow cylinder to warm to ambient temperature, and check for leaks, before moving back to storage location.

6.0 Emergency procedures

Ammonia has a pungent aroma. If you detect ammonia, alert other people present in the lab and evacuate the lab.

- If you detect ammonia in the lab whilst operating the gas cylinder turn off the flow at the cylinder valve (if possible), close fume hood sash, and evacuate the lab.

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- It may be the case that you are not operating the gas cylinder, but on entering the lab you detect ammonia gas. In these circumstances do not enter the lab to attempt to turn off the flow. Only re-enter lab once positive pressure breathing apparatus is worn.

NOTE: Ammonia is toxic. Leaks should only be approached when appropriate PPE and breathing apparatus are worn.

The storage location of the cylinder must be included on the building plans so that the location is known in the event of a fire.

7.0 Associated First aid

- Inhalation: Wearing self-contained breathing apparatus, remove victim to uncontaminated area. Ensure no obstruction to air way. If breathing weak or has stopped, apply artificial respiration. Keep victim warm and rested.
- Skin Contact: Irrigate affected skin or eyes with water for at least 15 minutes. Remove contaminated clothing

8.0 Risk assessment

The risk assessment associated with the document is NDMRB-RA-055.

3.0 References

- Safety documentation from the BOC website regarding ammonia

4.0 Review

This document should be reviewed by the relevant person every three years