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**Risk Assessment for an Activity involving Compressed Gases / Cryogenic Liquids**

as required under Regulation 3 of the

**Management of Health and Safety at Work Regulations 1999**

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| The *Management of Health and Safety at Work Regulations 1999* require every employer to make a suitable and sufficient risk assessment of the risks to health and safety of his employees to which they are exposed while at work. With regards to gases and cryogenics, other more specific regulations may also need to be considered, namely:*Control of Substances Hazardous to Health Regulations 1999**Pressure Systems Safety Regulations 2000**Personal Protective Equipment at Work Regulations 1992**Confined Space Regulations 1997* |

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| *Person responsible for this area* |  |  |
| Name: **Alan C Spivey** | Position: **Professor** | CID: **00386917** |
| Department: **Chemistry** | Division: **Synthesis Section** | Faculty: **Natural Sciences** |
| Campus: **White City Campus** | Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Date: **13/09/2021** |
| *Person conducting this assessment* |  |  |
| Name: **Joshua Linfoot** | Position: **PhD Student** | CID: **01595121** |
| Department: **Chemistry** | Signature: | Date: **13/09/2021** |
| *Where will this activity be conducted?* |  |  |
| Room(s): **502**  | Building: **Molecular Sciences Research Hub (MSRH)** | Campus: **White City Campus** |
| Department: **Chemistry** | Division: **Organic** | Faculty: **Natural Sciences** |

**Part 1. Identification of hazards**

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| 1. | Are non-flammable, non-toxic ‘industrial’ gases used in the activity? | [ ] Y | [x] N | List type and cylinder size:  |
| 2. | Are flammable gases used in the activity? | [x] Y | [ ] N | List type and cylinder size:Oxygen Size W |
| 3. | Are gases with any other hazardous property (e.g. toxic, corrosive etc.) used in the activity? | [x] Y | [ ] N | List type, cylinder size and hazardous properties:Oxygen Size W (oxidising) |
| 4. | Are medical gases used in the activity? | [ ] Y | [x] N | List type and cylinder size: |
| 5. | Are cryogenic liquids used in the activity? | [ ] Y | [x] N | Substance: |
| 6. | Does the activity involve mixing fuel gas with oxidising gas and the resulting mixture being burned? | [ ] Y | [x] N | Describe: |
| 7. | Are the gas cylinders / vessels located within the laboratory? | [x] Y | [ ] N | Our gas cylinders are isolated in a fireproof gas cylinder cabinet in 502. |
| 8. | Are the gas cylinders / vessels in a remote location and the gases / liquid piped to the point where they are used? | [x] Y | [ ] N | Describe: Pipes with relevant corrosion-resistant properties. |
| 9. | Is manual handling of gas cylinders / vessels into position a necessity? | [ ] Y | [x] N | Describe:  |
| 10. | Does the room where the gases / vessels are located benefit from forced ventilation? | [x] Y | [ ] N | Describe: Our laboratory section is part of the shard laboratory space (502), which is constantly ventilated and contains >30 fume hoods that also ventilate. |
| 11. | Is a lift used to transport cylinders / vessels between floors? | [ ] Y | [x] N | Describe: |

**Part 2. People at risk**

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|  | Identify those people who may be at risk from the activity. | **[x]** Worker(s) directly involved in the activity.[x]  Other laboratory workers in the vicinity.[ ]  Cleaners / ancillary workers.[ ]  Maintenance workers.[ ]  Others (specify). |

**Part 3. Existing control measures**

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|  | **Further Assessment** |  |  |  |
| 1. | If the answer to Part 1, Q3 is ‘Y’, then a separate assessment is required under *COSHH ’99*. Has this been carried out? | [ ] Y | [x] N | If yes, reference: |
| 2. | If the answer to Part 1, Q7 and Q9 is ‘Y’, then a separate assessment is required under the *Manual Handling Regulations 1992*. Has this been carried out? | [x] Y | [ ] N | If yes, reference: See manual handling risk assessment form |
|  | **Piped Systems** |  |  |  |
| 3. | If a piped system is in place, is it inspected and maintained in accordance with Regulations? | [x] Y | [ ] N | Details of contractor: Checked annually by BOC engineers |
| 4. | If a piped system is in place, is it subject to any user inspections? | [x] Y | [ ] N | Describe: Visual inspection |
|  | **Storage & Use** |  |  |  |
| 5. | Are cylinders stored upright and properly secured (e.g. by chains or straps)? | [x] Y | [ ] N |  |
| 6. | Are cylinders correctly segregated? | [x] Y | [ ] N | Describe: Only one cylinder in a fireproof gas cylinder cabinet in our group’s area of lab 502. |
| 7. | Are measures in place to minimise the number of cylinders located in the laboratory? | [x] Y | [ ] N |  |
| 8. | Is appropriate signage present in areas where cylinders are stored and used? | [x] Y | [ ] N |  |
| 9. | Is the area spacious enough, clean and adequately lit? | [x] Y | [ ] N |  |
| 10. | Is the room adequately ventilated? | [x] Y | [ ] N | Describe: Our laboratory section is part of the shared laboratory space (502), which is constantly ventilated and contains >30 fume hoods that also ventilate. |
| 11. | Is there a means of detecting oxygen deficiency (e.g. static monitor / alarm)? | [x] Y | [ ] N | Make, model and serial number: IGD (International Gas Detectors), Oxygen TOC-SO-O2, 1077602Static monitor at ankle height in LN2 storage area of 502, with audiovisual alarm system above lab exit. |
| 12. | Is the monitor subject to a suitable service / maintenance regime? | [x] Y | [ ] N | Details: Monitor is maintained by the Health & Safety team. |
| 13. | Are cylinders kept away from sources of ignition and other flammables. | [x] Y | [ ] N | Describe: Our gas cylinders are isolated in a fireproof gas cylinder cabinet in 502. Flammables are kept in separate 30 or 90 minute rated fireproof cabinets depending on their flash point.  |
| 14. | If cylinders are stored outside, are they protected from unauthorised tampering (e.g. caged)? | [ ] Y | [x] N | N/A |
| 15. | Are cylinders protected from extremes of temperature? | [x] Y | [ ] N | Describe: Our gas cylinders are isolated in a fireproof gas cylinder cabinet in 502. |
|  | **Regulators & Accessories** |  |  |  |
| 16. | Are regulators correct for the job and compatible with the gases in question? | [x] Y | [ ] N |  |
| 17. | Are regulators suitable for the inlet pressure generated? | [x] Y | [ ] N |  |
| 18. | Are regulators within their 5 year working life (2 years for those used with corrosive gases)? | [x] Y | [ ] N |  |
| 19. | Are regulators subject to annual maintenance checks? | [x] Y | [ ] N | Details: Regulator checked annually by BOC engineers |
| 20. | Are regulators subject to user checks? | [x] Y | [ ] N | Details: Visual inspection |
| 21. | Are the correct tools available for fitting regulators and accessories? | [x] Y | [ ] N |  |
| 22. | If the answer to Part 1 Q 6 is ‘Y’,have non-return valves and flashback arrestors been fitted? | [ ] Y | [ ] N |  |
|  | **Personal Protective Equipment (PPE)** |  |  |  |
| 23. | If necessary, is suitable PPE available for users (e.g. gloves, goggles, full face protection etc.)? | [x] Y | [ ] N | Type: Nitrile gloves, heatproof oven gloves, safety glasses and cotton lab coats available. |
| 24. | Is PPE adequately accommodated? | [x] Y | [ ] N | How and where?: 502 is stocked with nitrile gloves and oven gloves in each bay, and each person has their own safety glasses and labcoat that they must wear in the lab. |
| 25. | Is any special emergency equipment required (e.g. breathing apparatus)? | [x] Y | [ ] N |  |
| 26. | Is this equipment available and suitably maintained? | [ ] Y | [ ] N | N/A |
|  | **Emergency Procedures** |  |  |  |
| 27. | Are emergency procedures defined, and are all users familiar with what to do in an emergency? | [x] Y | [ ] N | Details: In event of leak, vacate area. In event of regulator blowing off, vacate area. In the event of fire or explosion, vacate area and sound fire alarm. |
|  | **Information, Instruction & Training** |  |  |  |
| 28. | Is a material safety data sheet available and are users familiar with the properties of the gas? | [x] Y | [ ] N |  |
| 29. | Have users received adequate instruction and training within the department? | [x] Y | [ ] N | Describe: Training by superuser, completion of any requisite safety courses. |
| 30. | Are formal training records kept within the department? | [x] Y | [ ] N | Details: Individual online training records. |
| 31. | Have users attended any formal gas / cryogenics training courses? | [x] Y | [ ] N | Details: Any requisite courses. |
| 32. | If applicable, have users been trained in the use of emergency equipment? | [ ] Y | [ ] N | N/A |

**Part 4. Recommended measures for risks identified but not adequately controlled**

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| **No.** | **Description** | **Remedial Action** | **Person Responsible** | **To be completed by (date)** | **Date actually completed** |
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