# **Standard Operating Procedure (SOP) Title: NMR Sample Preparation**

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| Assessor: | Joshua Linfoot | | | Location of work: | MSRH 502 |
| Principal Investigator: | | | Prof Alan Spivey | | |
| Date of approval: | | 13/09/2021 | | Date for review: | 13/09/2022 |

## **Justifying the hazards:**

Nuclear magnetic resonance (NMR) is used to determine the structure of a compound. Glass sample tube is used to deliver the sample to the NMR machine.

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| Identify hazards with specific risk assessments and a College or a departmental approval process | | | |
| [Ionising radiation sources](https://www.imperial.ac.uk/safety/safety-by-topic/laboratory-safety/) |  | [Biological sources](https://www.imperial.ac.uk/safety/safety-by-topic/laboratory-safety/) (microorganisms, human/animal tissues, plants) |  |
| [Class 3R, 3B or 4 Lasers](https://imperiallondon.sharepoint.com/sites/fons/faculty/safety/lasers/SitePages/laserhome.aspx) |  | [Offsite work](http://www.imperial.ac.uk/safety/safety-by-topic/off-site-working/) |  |
| Confirm if [Lone working](https://www.imperial.ac.uk/safety/safety-by-topic/lone-working/) is permitted with this SOP?  If it is permitted, describe the control measures for lone workers: | | | |

## **Preparing for the SOP:**

* **DON’T** use chipped NMR tubes.
* **DON’T** stick labels on the NMR tubes.
* **DON’T** leave work area dirty.
* **DO** prepare and inspect the required glassware.

## **Procedure:**

# **Before the procedure:**

1. Visually inspect NMR tube making sure clean un-damaged NMR tubes with caps are available.
2. Determine which deuterated solvent is appropriate.

# **During the process:**

1. Dissolve a few mg of sample in 0.7 mL of an appropriate deuterated solvent.
2. Transfer the solution into the NMR tube using a Pasteur pipette or syringe and **blunt** needle.
3. **Carefully** cap the NMR tube and label it at the top using a marker.

**After the procedure:**

1. Transport the NMR tube in a suitable secondary container that will contain any spills and prevent injuries to the individual transporting it.
2. Make sure you **leave the area clean**.
3. Wash glassware following SOP for Glassware.
4. Dry the cleaned NMR tubes under vacuum or in air.

## **Disposal:**

If any chemical waste is produced, ensure it is disposed of via the appropriate chemical waste stream. Dispose of Pasteur pipettes and syringes with needles in the yellow sharps waste container.

Wash and reuse NMR tubes and caps, or dispose of them as glass and lab waste correspondingly.

## **Personal Protective Equipment (PPE):**

Lab coat, appropriate gloves, safety glasses

## **Risk Analysis of SOP and emergency procedures:**

### (In addition to [Safe Lab Practice](https://imperiallondon.sharepoint.com/sites/fons/faculty/safety/SitePages/Basic%20Laboratory%20Rules%20for%20All%20Laboratories%20in%20FoNS.aspx))

### **Always remember to include fire associated risks and control measures where appropriate**

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| Hazard | Raw risks | Current control measures | Residual risk  (Low/Med/High) |
| Glassware and glass parts | Cuts and splinters from broken glass | Visually inspect glassware for cracks and other defects before and after use. If glassware is damaged, arrange for repair or dispose. | Low |
| Hazardous materials | Exposure to hazardous reagents via inhalation or skin contact | No working with hazardous reagents outside of the fume cupboard.  Always wear appropriate PPE.  Ensure the fume cupboard and sample preparation areas are cleaned after each use.  (Include hazards and controls of associated reagents in this or separate risk assessment) | Low |
| Organic solvents | Risks associated with specific solvent | Follow the control measures established in the COSHH assessment for the appropriate solvent. | Low |
| Sharp needles | Puncture, Injection of hazardous materials into body/blood stream | Use blunt needles if possible!  Use the needle so that the point faces away from the operator and others nearby.  Ensure needles are never re-sheathed with their plastic cap.  If a needle is dropped, it must be retrieved immediately. If it cannot be found, inform people of the danger, and search the area until it is found and disposed of.  Do not leave needles exposed on benches or work surfaces - store in a suitable container.  Do not remove needles from syringe barrel before disposing in a sharps bin, dispose of both at the same time. | Med |

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| **Additional control measures to minimise residual risks** | **Implementation date** |
| Especial care should be take when capping the NMR tubes to avoid the tube cracking and cutting the hand/fingers. |  |

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| **Who may be harmed** | |
| Staff / students | Cleaners / Engineers |
| Supporting staff | Others (specify): |

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| **Emergency procedures** – describe the response(s) required by the user and lab members |
| Clear up **broken glass** using dustpan and brush, tweezers or other suitable equipment to prevent exposure to the glass then place into the appropriate waste bin (clean or contaminated glassware).  If anyone is injured while using the equipment contact first aider.  If any **cuts or exposures** to hazardous substances, ensure affected area is held under running water for at least 15 mins and the wound is encouraged to bleed, ask for first aid assistance. If water is not available use alcohol free wipe from the First Aid Kit and dress the wound. Seek further medical attention if required.  **Chemical spills, risks specific to hazardous substances** - dependant on the nature of the chemical. Specific procedures will be outlined on an individual basis on the relevant COSHH form.  (Include emergency procedures associated with the use of hazardous substances if relevant) |

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| Recommended trainings and records: |
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| List of individuals competent to demonstrate safe work practice and train others (level 1 trainers): | Names of those that have been trained and can work unsupervised (level 2) and date training completed: |
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