

# NMR OHS Induction Form



\*Register on-line <https://acls.analytical.unsw.edu.au/>

\*First name: \_\_\_\_\_ Middle initial: \_\_\_\_\_ \*Surname: \_\_\_\_\_

\*zID Number: \_\_\_\_\_ \*E-mail: \_\_\_\_\_

\*Type of Research: (e.g.: Hons, PhD, Postdoc...): \_\_\_\_\_

\*Supervisor's Name: \_\_\_\_\_

Send NMR bill to (Name): \_\_\_\_\_ (if **not** your Supervisor)

\*All users must provide the following account information (please consult supervisor):

Fund:	Dept. ID:	Project No:
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## Usage Requirements (tick box/s **Solution Auto** - *Training is offered on the day of NMR Induction*

- 1) 300MHz and 400MHz (AutoSamplers) (complete pages 3, 4, 5 and 6 only) *Contact Dr Adelle Amoore (ext: 54705 [a.amoore@unsw.edu.au](mailto:a.amoore@unsw.edu.au)) if you require these instruments.*

**Solution Manual** - *One-one training must be organised with Dr Donald Thomas (ext: 54706 [donald.thomas@unsw.edu.au](mailto:donald.thomas@unsw.edu.au)) or Dr Doug Lawes (ext: 54705 [d.lawes@unsw.edu.au](mailto:d.lawes@unsw.edu.au)) if you require these instruments.*

- 2) 400MHz / 500MHz / 600MHz / 600MHz (Cyroprobe NMR) (complete pages 3, 4, 5 and 6 only)

**Solid State** - *Contact Dr Aditya Rawal (ext: 54616 [a.rawal@unsw.edu.au](mailto:a.rawal@unsw.edu.au)) if you require these instruments.*

- 3) 300MHz / 700MHz (complete page 3 and 6 only)

**EPR** - *Contact Dr Donald Thomas (ext: 54706 [donald.thomas@unsw.edu.au](mailto:donald.thomas@unsw.edu.au)) if you require use of this instrument.*

- 4) EPR (complete page 3 and 6 only)

**CryoMill** - *Contact Dr Aditya Rawal (ext: 54616 [a.rawal@unsw.edu.au](mailto:a.rawal@unsw.edu.au)) if you require usage for this instrument.*

- 5) Spex – CryoMill (complete page 3, & 6 and obtain a room B55 lab induction form from staff member)

Your signature: \_\_\_\_\_

Date: \_\_\_\_\_

\*Supervisor's signature: \_\_\_\_\_

Date: \_\_\_\_\_

\*: Indicating the compulsory data fields

Office Use Only

GYRO:  RABI:  ACLS:  SWIPE CARD ACCESS:  CONFORMATION SENT TO USER:

OHS INDUCTION:  MICRO ACCESS:  USERS ALIAS: \_\_\_\_\_

# PICTURE NUMBER:

# USER CODE:

## SAFETY IN THE NMR FACILITY

**(Retain this page for your own records)**

This is a magnet (see photo below), it is part of a Nuclear Magnetic Resonance Spectrometer (NMR). The NMR Facility (room B41, Building F10) currently houses 9 NMRs.



**The main safety concerns are:**

- A)** The NMR magnets produce a **strong magnetic environment** (see Strong Magnetic Fields) and they attract metal objects such as tools, spanners, key-rings, paper clips, hairpins and umbrellas;
- B)** The NMR magnets are filled with **cryogenics**, which are liquids that are very cold, namely, liquid helium and liquid nitrogen (see Cryogenics). Cryogenics may cause **skin burns on contact** when in liquid form or may cause suffocation when in gas form and in large volumes, in a confined space.

### **Strong Magnetic Fields**

The NMR magnets are ALWAYS ON, which means they cannot be switched off. Strong magnetic environments are produced outside each NMR magnet; therefore, movable metal objects MUST NOT be taken within a 2 to 5 metre safety radius of each magnet (**marked by red chains**). Small, sharp metal objects flying towards the NMR magnets are highly dangerous. Larger metal objects can cause **fatal injuries** and seriously damage the magnets (cost of repairs or replacement can exceed \$200,000). Very large metal objects have been known to destroy NMR magnets resulting in the large-scale release of cryogenics (See Quench).

- Persons fitted with pacemakers should not enter rooms containing the NMR spectrometers.
- Persons fitted with metallic implants and prostheses should not get closer than the 2 to 5 metre safety radius of each NMR magnet (**that is, they must stay outside the red chains**).
- The magnetic environment may permanently damage analogue watches, calculators, credit cards and mobile phones. Keep those items more than 2 to 5 metres away from the centre of NMR magnets (**that is, keep items outside the red chains**).

### **Cryogenics**

Cryogenics are liquids that boil at very, very low temperatures, for example, **-268 degrees Celsius** for liquid helium and **-196 degrees Celsius** for liquid nitrogen. All NMR magnets use **liquid helium** and **liquid nitrogen** to maintain superconductivity.

**NMR Quench** (watch an example YouTube video here: <https://youtu.be/tPqduF5xB-o>)

A quench is the **rapid release of gaseous cryogenics** (helium and nitrogen) from inside the NMR magnet into the room; all personnel should **evacuate the NMR laboratory IMMEDIATELY**. A quench is identifiable by the **noise** of the escaping gas and **clouds of vapour**. Four oxygen meters are also distributed in room B41 (please ask a staff member for their locations) and will sense any drop in oxygen levels, activating an **alarm**.

## NMR Induction Safety Quiz

Please complete Q1 -5 in YOUR own time

Please arrive at least 15 mins before the start of the induction to complete Q6 - 9

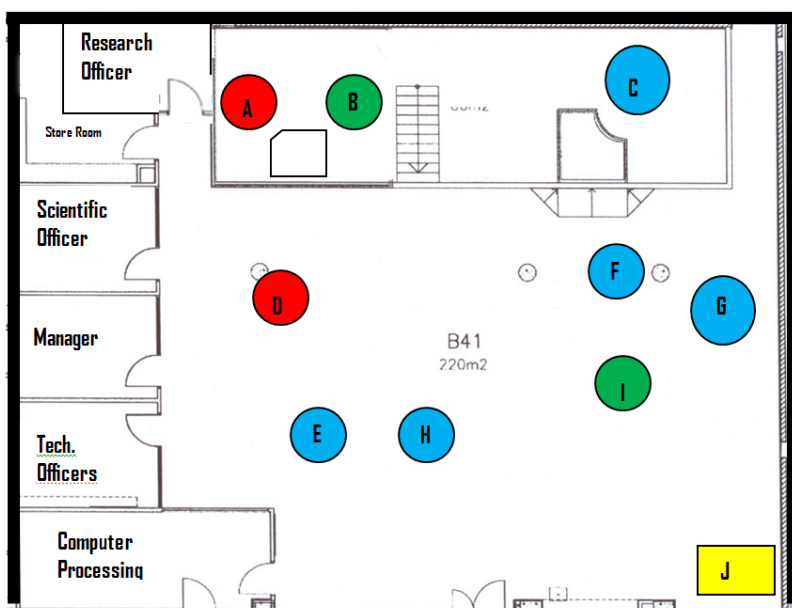
- 1) What is the purpose of the plastic red chain?
- 2) Can you list three objects that should NOT pass inside the plastic red chain?
- 3) What is a cryogen? Name the two liquid cryogens used in NMR magnets and their potential hazards.
- 4) What is a NMR quench? What should one do in an event of a NMR quench?
- 5) Lab coats, food, drinks and plastic/latex gloves should **NOT** enter the NMR Lab (B41).

True                       False

- 6) Indicate the location of items a to g on the map below (Please arrive at least 15 mins before the start of the induction in order to locate the items below) :

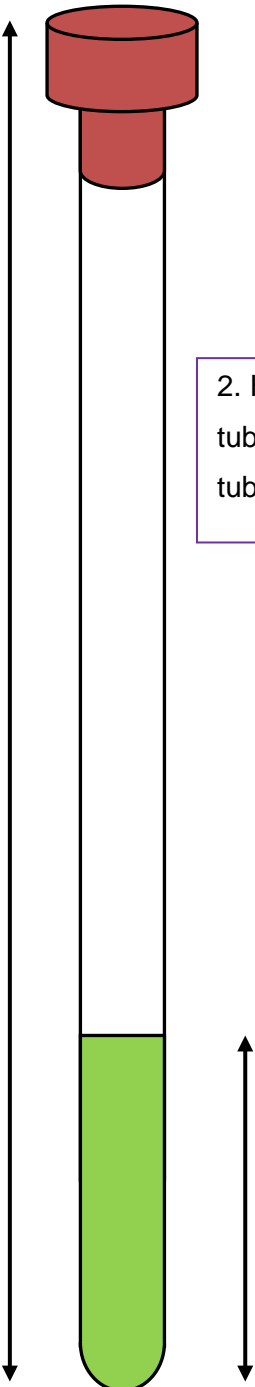
a. 2 x Fire blankets	b. 2 x Fire extinguishers	c. 2 x Emergency Exits
d. First aid box	e. 1 x Broken glass bin	f. telephone (in B41)
g. 3 x UNSW Emergency Procedure Posters (all in B41)		

- 7) For each instrument, indicate **i)** field strength in MHz (in **A-I only**), **ii)** main function/s (solution or solid) and **iii)** the instrument's nickname. (Please arrive at least 15 mins before the start of the induction to compete this question).



- |        |      |      |
|--------|------|------|
| A) i)  | ii)  | iii) |
| B) i)  | ii)  | iii) |
| C) i)  | ii)  | iii) |
| D) i)  | ii)  | iii) |
| E) i)  | ii)  | iii) |
| F) i)  | ii)  | iii) |
| G) i)  | ii)  | iii) |
| H) i)  | ii)  | iii) |
| I) i)  | ii)  | iii) |
| J) ii) | iii) |      |

8) How to prepare a perfect NMR tube for analysis (answers can be located near the broken glass bin). (Please arrive at least 15 mins before the start of the induction in order to complete this question).



1. What should you used to label the NMR tube?  
-----

2. How would you label your tube? (Illustrate this on the tube).

3. Maximum and minimum NMR tube lengths? (if submitting a sample on an auto-sampler)  
  
Max= ----- cm  
Min= ----- cm

4. How much deuterated solvent should be used in a 5mm NMR tube (if submitting a sample on an auto-sampler)?  
  
----- cm, mL or uL

9) These samples were prepared for the auto-sampler. What's wrong with samples 1-5? (Please arrive at least 15 mins before the start of the induction in order to complete this question.)

Tube 1-

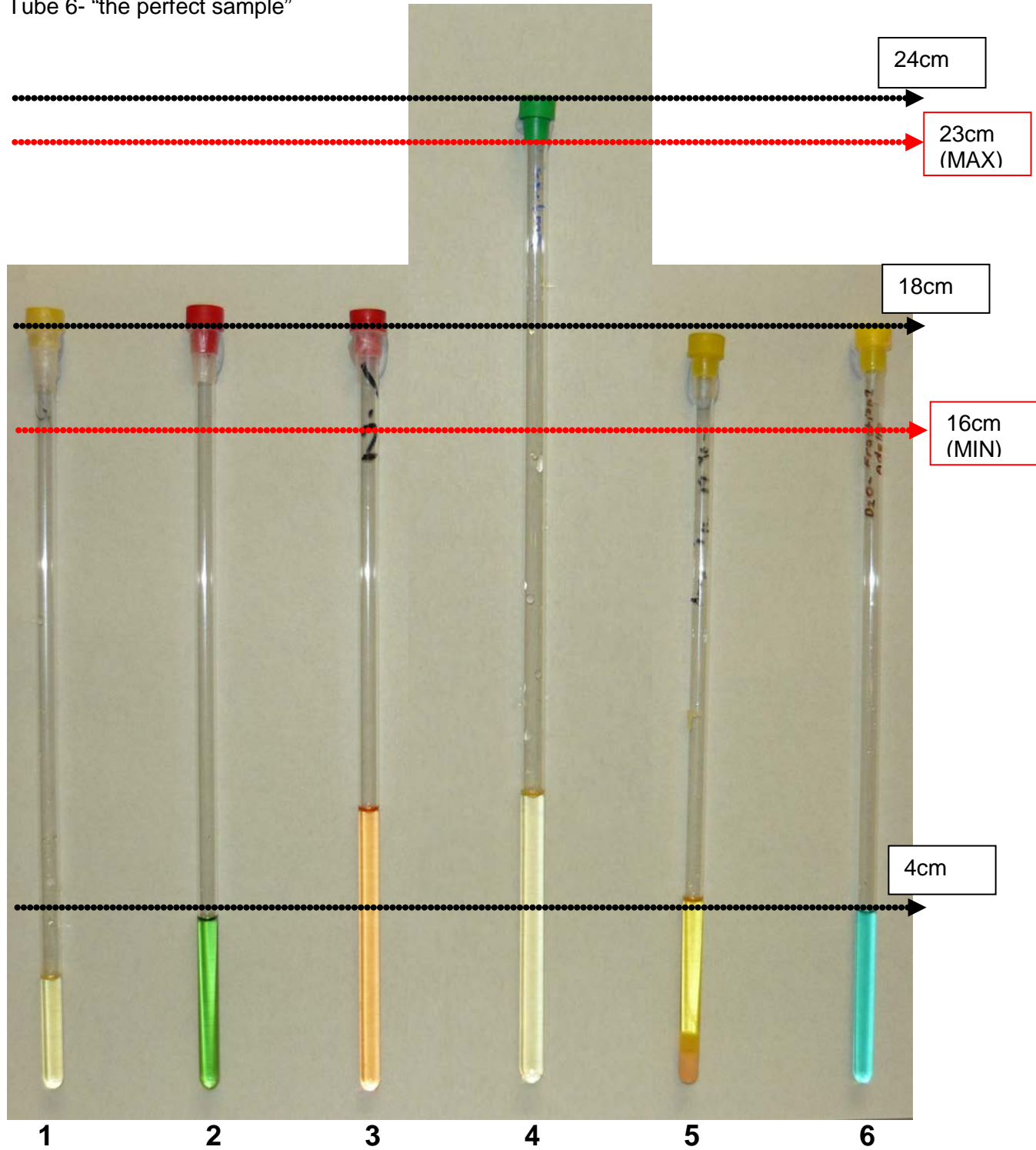
Tube 2-

Tube 3-

Tube 4-

Tube 5-

Tube 6- "the perfect sample"



# Nuclear Magnetic Resonance

## OHS Induction Form- New User



UNSW

This page **MUST** be read and each box ticked by the users seeking NMR access. If any of these statements below are unclear please discuss with the NMR staff.

### Your details:

Name:

### Requirements

New users are made aware of:	(tick when completed)
Swipe card access to B41 (NMR) will be activated on completion of this induction and registration.	<input type="checkbox"/>
Users may <b>NOT</b> lend their access card, nor <b>BORROW</b> other peoples access card.	<input type="checkbox"/>
Users are <b>NOT</b> to bring "friends" or "colleagues" into the NMR lab without (a) prior arrangement with a NMR staff and (b) appropriate safety induction of the second person.	<input type="checkbox"/>
The telephone in the NMR lab may be used in the event of an emergency. Users must make themselves aware of emergency contact details for security (Ext: 56666).	<input type="checkbox"/>
The identity of the first aid officer and their contact number is located on the first aid box.	<input type="checkbox"/>
If the Fire Alarm OR the Gas Panel Alarm are activated, <b>EVERYONE MUST</b> exit by the main door (B41) or from the computer room. Once you leave this facility make your way to the village green <b>via the stairs</b> .	<input type="checkbox"/>
Samples are the responsibility of the users and the NMR Facility does not accept any responsibility for loss or damage of samples left in the facility	<input type="checkbox"/>
Users must inform NMR Staff of <b>ANY</b> known highly hazardous NMR samples and provide a Risk Assessment for their handling. These samples can only be manually inserted and run on an ACLS bookable NMR instrument during NMR office hours (Mon-Fri, 10am-4 pm) with NMR Staff present unless otherwise pre-arranged.	<input type="checkbox"/>
User must <b>NOT</b> prepare samples in the NMR lab, <b>NO</b> chemicals are to be disposed of in this facility. The NMR facility <b>does not</b> have a chemical waste disposal system.	<input type="checkbox"/>
If a NMR tube breaks in the lab inform a staff immediately.	<input type="checkbox"/>
Data is the responsibility of the users and the NMR Facility does not accept responsibility for loss or damage of data.	<input type="checkbox"/>
Users must follow the provided Safe Working Procedures when using an instrument.	<input type="checkbox"/>
Users <b>MUST</b> be familiar with the NMR's Risk Assessment.	<input type="checkbox"/>
Training for <b>ALL</b> instruments may only be provided by NMR staff.	<input type="checkbox"/>
Users must <b>NOT</b> provide training to other users.	<input type="checkbox"/>
NMR staff will train new users on the auto-sample and also explains the rules in place.	<input type="checkbox"/>
Users must <b>NOT</b> wear a lab coat or plastic and or latex gloves in the NMR lab.	<input type="checkbox"/>
Users must <b>NOT</b> bring food or drinks into the NMR lab.	<input type="checkbox"/>
Users must <b>NOT</b> perform any functions or use any instruments which they have not been trained on.	<input type="checkbox"/>
A user/ user's supervisor will be charged for instrument time if they fail to turn up for booked sessions.	<input type="checkbox"/>
Users must cancel unwanted sessions with >24hrs notice and inform NMR staff.	<input type="checkbox"/>
Users must <b>NOT</b> install software on any of the unit's computers or change any settings on any computer in the unit.	<input type="checkbox"/>
Users must <b>NOT</b> download music, multimedia files or other files not directly related to their research work through any of the unit's computers.	<input type="checkbox"/>
<b>NO INTERNET</b> access on any of the instrument computers.	<input type="checkbox"/>
<b>NO USB</b> devices on any of the instrument computers.	<input type="checkbox"/>
Any work that is published or publicly presented, where all or a part of the work was undertaken in the NMR Facility, should acknowledge the role of the UNSW NMR Facility in providing access or contributing to or assisting in the work.	<input type="checkbox"/>
Access to this facility is a privilege which may be revoked if users do not operate instruments in the unit in a safe and responsible manner.	<input type="checkbox"/>
<b>Failure to comply with the above requirements will result in your NMR access being reviewed.</b>	<input type="checkbox"/>

### Signatures

Your signature:	NMR staff signature:
Date:	Date: