# **Standard Operating Procedure (SOP) Title: Use of Polarising Microscope**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 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:**

Polarising microscopy offers a very simple and rapid method of identifying liquid crystalline (LC) phase sequences with varying temperature.

|  |  |  |  |
| --- | --- | --- | --- |
| 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 damaged equipment. Report defects to the lab manager or floor technician.
* **DO** inspect the connection to the pump. Refer to the Use of Vacuum Pump SOP.

## **Procedure:**

1. Select the polarising filter by sliding the black lens holder below the camera module.
2. Place a small amount of the sample (0.1 to 1 mg) between thin glass cover slips.
3. Place the glass plate centrally on the heating block of the hot stage on the microscope, so that the sample is directly over the sapphire window.
4. Gradually increase the temperature of the heating block by increasing the temperature limit on the heater.

The heating block reaches the set temperature very quickly; therefore the limit should only be raised by 1 or 2 degrees at a time. Rapid heating can cause damage and may result in some phases being missed.

1. Once the maximum temperature has been reached, the phase transition temperatures can be checked by gradually cooling the sample.
2. Use the provided software to take pictures of the optical textures.

## **Disposal:**

* Follow guidance in the COSHH assessment for the disposal of the sample.
* Clean lenses with dry lint-free cloth. Dispose of microscope slides and glass cover slips either as clean glass waste or as chemically contaminated sharps.
* If the equipment is to be disposed of, ensure it is decontaminated and then dispose of it via the ‘Waste Electrical and Electronic Equipment route ([WEEE](http://www.imperial.ac.uk/estates-facilities/buildings/services/waste-disposal/waste-disposal-forms/weee-forms/))’.

## **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**

|  |  |  |  |
| --- | --- | --- | --- |
| 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 damaged arrange for repair or dispose of. | Low |
| Hazardous materials | Exposure via inhalation of hazardous reagents | No work with hazardous reagents outside of containment, ensure containment has appropriate extraction and filters (where relevant).  Ensure the equipment and sample preparation areas are cleaned after each use.  (Include hazards and controls of associated reagents in this or separate risk assessment) | Low |
| Electrical equipment and cables | Electrocution and electrical fire | Commercial equipment, do not modify.  Ensure regular portable appliance testing (PAT).  Visual inspection of equipment and cables prior to each use.  Immediate clean up of any spills.  Ensure plugs, sockets, cables and equipment positioned so as not to be at risk of ingress from liquids.  Ensure a CO2 extinguisher is available.  Ensure easy access to the power supply. | Low |
| Heavy item | Crushing injury | Equipment securely located on suitable work surface.  No lifting or moving of equipment. | Low |
| Hot surfaces | Burns, fire | The desired oil temperature MUST BE lower than the flash point of the oil.  Use thick–walled, round-bottom flasks in oil baths for reflux or distillation reactions. Clamp the reaction flask at a safe height with an adjustable clamp. If the reaction begins to overheat, the bath height can be immediately adjusted and replaced with a cooling bath.  Use slip-resistant insulated thermal gloves for handling hot samples, oil baths and heating blocks.  Remove all flammable substances from the area when using hotplate. | Med |

|  |  |
| --- | --- |
| **Additional control measures to minimise residual risks** | **Implementation date** |
|  |  |

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

|  |
| --- |
| **Emergency procedures** – describe the response(s) required by the user and lab members |
| In the event of an incident involving the **equipment itself,** turn off the power supply, unplug and place a sign on the equipment stating it is not to be used and arrange for repair.  **Electrical shock** - switch off power. Do not touch the affected individual until the power is definitely off. Seek immediate medical attention by calling 4444 (+44 20 7589 1000) and contacting nearby First Aid officer. Use a non-conductive lever to remove them from electrical source (e.g. a dry wooden broom handle).  **Electrical fire** – If ignition occurs but extinction is managed in a controlled manner, ensure a SALUS report is completed at the earliest opportunity. If the fire is not controllable, you must activate a fire alarm call point and evacuate. Inform Fire Safety Officers or Security of where the fire is and what it involves when they arrive at the building.  **Burns** - run site of injury under tepid water for 15 minutes if able (burn dressing available in first aid kits if location of the injury is awkward to rinse, e.g. leg) and contact a first aider. In the case of a serious burn, seek medical attention immediately.  Clear up **broken glass** using dustpan and brush, tweezers or other suitable equipment to prevent exposure to the glass and then place into the appropriate waste bin (clean or contaminated glassware).  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.  If **crushing injury** - contact first aider immediately – use ice/cool pack (if on hand only) to reduce immediate swelling – seek medical attention if required.  (Include emergency procedures associated with the use of hazardous substances if relevant) |

|  |
| --- |
| Recommended trainings and records: |
|  |

|  |  |
| --- | --- |
| 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: |
|  |  |
|  |  |