COSHH, RISK ASSESSMENT AND BIOLOGICAL SAFETY

The following information and instructions supplement the Safety Policy for the School, and are key elements to ensure that the Safety Policy is implemented effectively.

Whilst dealing with and being around biological (or chemical) risks may be second nature to many working in a biology or chemistry department, within the School of Engineering, there are many people with different backgrounds and levels of experience. Thus whilst you may be confident in handling biological species or (bio)chemicals, you need to be aware that other people working in your lab may be less familiar with the risks and ways of handling these things. In addition, if you find yourself undertaking (or being asked to undertake) biological or chemical procedures about which you do not feel confident, then, most importantly, you should ask your supervisor for the appropriate training, or contact one of the biological or chemical safety advisors listed in the main Safety document to arrange this training.

A COSHH Risk Assessment Form should be completed - see the following website:

http://www.gla.ac.uk/schools/engineering/informationforstaff/safety/risk%20assessmen/

It should be easily accessed by users in the laboratory as a printed copy; kept updated with regular reviews, and available for inspection by a member of the School's safety committee. When using hazardous biochemicals as well as other Biological agents (e.g. Cells, Bacteria), the chemical risk assessment parts of the Biological Risk Assessment form should also be filled in.

COSHH (2002) The Risk Assessment exercise for any activity is the key link to ensuring that we comply with legislation for safety at work. Written evidence, where appropriate, is the key factor in ensuring that there is a consistency of high standard across the department and that all staff and students are aware of, and respond correctly to potential hazards.

For biological organisms, you should ensure that you know the categorisation of the organism(s) being used, and follow the appropriate recommendations given by the Advisory Committee on Dangerous Pathogens. The documentation 'Approved List of Biological Agents' is currently available online at http://www.hse.gov.uk/pubns/misc208.pdf

Particular care should be exercised when handling material of human origin and any member of staff responsible for bringing such material into the School must ensure that it has been adequately screened (especially for HIV and hepatitis B, C & D viruses) before its arrival in the building wherever feasible. Appropriate records of such material must be maintained. Staff working with such materials should be familiar with the recommendations contained in the HSAC and ACDP guidance documents and give advance notice of work being carried out in the building to the School Safety Director. The School Safety Director should also be consulted about the use of biohazard materials of Class II and above, other pathogens and toxins.

Guidance Documents available on working with biological materials include:-

1. Safe Working and the Prevention of Infection in Clinical Laboratories. http://www.hse.gov.uk/pubns/priced/clinical-laboratories.pdf

2. Revised Advice on laboratory containment measures for work with tissue samples (2001). (paste link into browser) https://webarchive.nationalarchives.gov.uk/20100407175457/http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@ab/documents/digitalasset/dh_087529.pdf

3. Protection against blood borne infections in the workplace – HIV & Hepatitis; TSE Agents; Safe Working and the Prevention of Infection. http://www.hse.gov.uk/biosafety/diseases/blood-borne-virus.htm

4. Management and operation of microbiological containment laboratories http://www.hse.gov.uk/biosafety/management-containment-labs.pdf

5. Anti-Terrorism, Crime and Security Act (2001) List of Schedule 5 Pathogens and Toxins.(paste link into browser) http://www.gla.ac.uk/myglasgow/seps/az/biological%20safety/pathogensandtoxins/biological%20security%20for%20pathogens%20and%20toxins/

Handling of Cultures

Before starting work, you must:-

- make or read the relevant COSHH assessment and ensure that you know the categorisation of the organism(s) being used.
- Microbiological hazards must be assessed under COSHH and Scientific Advisory Committee on Genetic Modification regulations, as appropriate.
- ensure that supplies of an appropriate disinfectant (eg 1% chloros or Virkon) are available.

On finishing or interrupting work, you must:-

- Never leave contaminated material unattended unless it is sealed and clearly labelled.
- On leaving the laboratory, swab benches and worktops.

The safe handling of microbial cultures requires manipulative skill and so anyone intending to handle cultures must obtain advice from a member of their Group experienced in dealing with micro-organisms, or the School Biological Safety Advisor. In addition, the following points must be noted:-

- Wire loops should not be over-charged with liquid when flamed; the loop may 'spit' if heavily charged and the material which flies off is not necessarily sterile.
- Cultures of micro-organisms must not be pipetted by mouth. Use a propipette.
- Contaminated pipettes must not be laid on the bench, but released tip downwards into a jar of disinfectant (0.25% chloros) and completely immersed.
- Contaminated Pasteur pipettes and slides should also be totally immersed in a (separate) plastic jar (eg Jencons Sharp-Safe) of disinfectant; after disinfection, the jar should be drained, capped and disposed of in a biohazard waste bin that is regularly collected by a licensed contractor.
- Syringe needles, unsheathed, must be disposed of in a CinBin. Do not attempt to resheath needles.

Destruction/Disposal of Cultures

- Each lab group must have a written policy appropriate for the destruction of any viable micro-oranisms used.
- Microbiologically contaminated material should only be washed up or disposed of after effective treatment with disinfectant or after additional sterilisation by autoclaving or incineration.
- For pelleted material, cell supernatants or spilled live organisms (included contaminated glassware, swabs, etc) use fresh 1% chloros (1 in 100 dilution; 10,000 ppm) for at least 1 hour.
- For pipettes and mildly contaminated glassware use 0.25% chloros (1 in 400 diluton; 2,500 ppm), freshly prepared, for at least 1 hour.
- Used solutions should be disposed of down the sink with copious (at least 20-fold) volumes of water. If there is to be no additional sterilisation by autoclaving, disinfection should be extended for at least 24 hours.
- Contaminated material that it is unsafe to dispose of in a regularly collected biohazard bin should be autoclaved using a 'kill' run (ie, 134degC for 18 minutes). Polypropylene tubes (but not polycarbonate ones) can be autoclaved. Polycarbonate tubes may be disinfected by soaking them in Hibitane 1/2000 or hypochlorous acid solutions (eg Presept) but not in phenolic disinfectants.
- All microbiologically contaminated materials must be sterilised before disposal. Liquid cultures can be killed either by chemicals or by autoclaving. Culture plates should be autoclaved. Culture flasks, centrifuge tubes, bottles and caps must be properly sterilised after use with live cultures. Glassware should be autoclaved. Polypropylene tubes (but not polycarbonate ones) can be autoclaved. Polycarbonate tubes may be disinfected by soaking them in 0.25% chloros.
- Bags containing items awaiting autoclaving should be further contained with a robust container such as a plastic bin.

Accidents with Biological Hazards

- All spillages must be reported using an Injury or Dangerous Occurrence form even when no personal injury is involved.
- If hands become contaminated, they should then be washed using a suitable disinfectant (eg 70% methylated spirit (isopropyl alcohol) containing 0.5% Hibitane or a 1% solution of Savlon), before putting on disposable gloves in order to clean up. A contaminated laboratory coat must be removed to be autoclaved if practicable, or disinfected immediately and autoclaved later. A fresh laundered coat should be put on. Any contaminated personal clothing must also be removed and treated in the same way.
- If a tube, culture bottle, or flask is broken, the area should be flooded with disinfectant (e.g. 1% chloros or Hibitane 1/1000 or Virkon) immediately which should be allowed to act for 30-60 minutes after which the area should be cleaned up with water and allowed to dry. Broken glass should never be picked up with the fingers.
- Forceps or pan and brush should always be used and these should be disinfected after use.
- If bacterial cultures are spilt on the bench or floor, the nearest window must be opened and 10 minutes allowed for the aerosol and droplets to disperse. Work must be stopped in the area and a warning noticed posted. The spilt material should then be mopped up with suitable disinfectant (e.g. Hibitane) which should be allowed to act for 30-60 minutes, after which time the area

should be cleaned up with water and allowed to dry. The hands should then be washed with a suitable skin disinfectant (e.g. Hibiscrub).

Opening of ampoules

Ampoules may be opened with the minimum of risk as follows:
The bottom of the ampoule should be held in several layers of tissue to protect the hands and a file mark made at about the level of the middle of the cotton wool plug which is inside the tube. A red hot glass rod or sealed Pasteur pipette should be applied to the mark. The glass will crack allowing air to enter the ampoule and equalise the pressures. After a few seconds the ampoule should be wrapped in a few layers of tissue or held in a small ball of plasticine and broken along the crack. The tissues and ampoule neck can then be discarded into disinfectant. About 0.5ml of broth is added to the ampoule, very slowly, drop by drop, with a Pasteur pipette to avoid blowing dried material out. The contents may then be mixed without bubbling and withdrawn into a culture tube.

Aerosols and droplets

Aerosols constitute a major infection hazard and may persist in the air for some time.
Sources of aerosols and droplets include:-

- opening the screw-caps of universal containers
- opening of snap-on closures on plastic containers or plug stoppers
- rinsing Pasteur pipettes when transferring dilutions etc.
- breakage of containers in centrifuges
- accidental breakages
- homogenising by mechanical means (particularly at high speeds)
- ultrasonic treatment
- operation of centrifuges

Guard against excessive production of aerosols by, for example, careful, non-violent pipetting. When pipettes are rinsed, e.g. between dilutions, or the contents are discharged into media or disinfectant, the tip of the pipette should be submerged and the contents expelled gently, without bubbling.

For Modifications of pathogens in ACDP hazard group 2 which involve risk of aerosol production, a Class 1 microbiological safety cabinet or equipment designed to contain the aerosol must be used.

Special Procedures

Anyone embarking on work involving the handling of pathogenic organisms/viruses for gene Modification should consult the appropriate member of staff and have your technique fully checked by that staff member before proceeding.

Microbiological Safety Cabinets must be serviced annually. Additionally, a service operator protection test (KIdiscus) test should be carried out once a year.
See, for example, https://tools.thermofisher.com/content/sfs/brochures/BSC-Fumigation-Technical-Note.pdf