Safety Services Guidance

Control of Substances Hazardous to Health (COSHH) Regulations 2002 (As Amended)

Key word(s) :	Hazardous substances, chemicals, biological agents, risk assessment, controls, fume cupboards, microbiological safety cabinets, personal protective equipment
Target audience :	Managers, Supervisors, PIs, researchers, professional support staff

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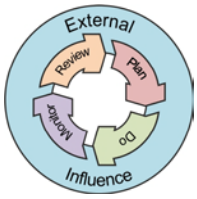

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Introduction

1. The Control of Substances Hazardous to Health Regulations 2002 (COSHH) (as Amended 2004) aim to protect people from the adverse **health** effects of a wide range of substances used at work.

2. A hazardous substance (including a preparation) is defined as a substance:

   - Which is described in the safety information as very toxic, toxic, harmful, corrosive or irritant;
   - For which the Health and Safety Executive has approved a workplace exposure limit (usually for substances which are inhaled);
   - Which is a biological agent[1];
   - Which is a dust of any kind, except dust which is a substance as above, when present at a concentration in air equal to or greater than –

     i) 10mg/m3 as a time weighted average over an 8 hour period, of inhalable dust; or

     ii) 4mg/m3 as a time weighted average over an 8 hour period, of respirable dust;

   - Which does not fall into any of the categories above but which when present or used in the workplace creates a risk to health (eg sensitising agents, welding/soldering fume etc).

3. The COSHH Regulations, which apply to all areas of the University, require that before any work involving the use of substances hazardous to health is carried out, the risk to health of those who might be exposed to these substances is considered and appropriate safety precautions are taken to prevent that exposure. These precautions are called control measures. The decision making procedure that identifies the safety precautions needed is a multi-step risk assessment process often called a COSHH assessment.

4. However, the COSHH assessment alone might not ensure that all the risks associated with the substance and activity being undertaken will be adequately controlled. There may be other hazards associated with a substance due to its physical properties (eg explosive, flammable, oxidising). Suitable precautions

[1] The definition of a 'biological agent' is: "any micro-organism, cell culture or human endoparasite, whether or not genetically modified, which may cause an infection, allergy, toxicity or otherwise create a risk to human health". Schedule 3 of the COSHH Regulations, complemented by the associated Approved Code of Practice (ACoP), establishes the legal criteria and good practice for assessing and controlling risks to health of work with biological agents.

must be taken to control these hazards as well, as required by the Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR). It would be good practice to combine these requirements into an overarching Chemical Risk Assessment (CRA). Any hazards associated with other aspects of the work, eg equipment, proximity of other hazards, must also be considered and this can be achieved by carrying out an assessment of risk of the whole activity, rather than separate risk assessments for each part of the work.

Scope

5. This document is provided to assist with the process of CRA and COSHH assessment throughout the University and applies to all areas where there is the potential for people to be exposed to substances that are hazardous to health, eg working in cleaning and landscape services, workshops and kitchen areas as well as laboratories.

6. The use of substances that are known to be carcinogenic, mutagenic and toxic for reproduction also fall under these Regulations and are discussed in a separate guidance document.

Competence of the assessor

7. The person carrying out the CRA or COSHH assessment must be competent to do so. Competence is defined as possessing sufficient knowledge, skill and experience to perform a task effectively. They will normally have completed the University training course on risk assessment (THS15E) as a minimum but may also have attended a specific course on COSHH assessment for either non-laboratory based staff (THS49) or laboratory based staff (THS50) available through the staff learning and development unit as appropriate.

8. Although the Head of Management Unit is responsible for ensuring that risk assessments are carried out, the actual task of making an assessment may be delegated to another person, from either within or outside the team.

9. It may be that the task is given to an inexperienced member of the team (such as a project or PhD student) as part of their training, but it is essential that the final judgement on the hazards, risks and appropriate controls is made by a person with the required competence. If the necessary experience is not held within the team, the manager should seek assistance from the School Safety Advisor or Risk and Compliance Manager.

Compliance

10. Where a risk assessment (of any type) identifies that particular control measures or precautions are necessary, they must be implemented. Thus, if the assessment identifies the use of a fume cupboard for a particular task, then all those doing that task must use the fume cupboard without fail. Similarly, where the assessment identifies the use of Personal Protective Equipment (PPE), such as laboratory coats, gloves and /or eye protection these items must be used. Non-compliance should be regarded as a serious and possibly disciplinary matter.

Approach to assessment

11. Wherever practicable, the COSHH assessment or CRA should look at the whole activity/procedure to be carried out. The hazardous properties of the substances used must be identified but the assessment of the risk must always be in the context of the proposed work. Some of the substances may have flammable, explosive or oxidising properties and these hazards also need to be considered and controlled. Other components of the assessment might reflect the use of electrical equipment, glassware, sharps, pressurised aerosols or sprayers.

12. Where possible, the opportunity should be taken to make use of generic COSHH assessments or CRAs. For example, generic assessments can be used by more than one group of people carrying out a defined procedure with a specific hazardous substance, eg building attendants using a proprietary cleaning product on floors, gardeners using herbicides or pesticides etc. All groups using a generic assessment must establish that the assessment fully covers their own circumstances.

13. Generic assessments, in the laboratory, can relate to families of compounds where the assessment focusses on common properties and can be presented as Standard Operating Procedures (SOPs) which are effectively the output from the risk assessment process and where there may be serious consequences (both of a safety nature or to the quality of the work) if a procedure is not done in a certain way by suitably trained people.

14. A systematic approach should be adopted for CRA and COSHH assessment. As far as possible, any newly devised procedures should fit into the existing health and safety structures within administrative units and would make reference to existing SOPs, codes of practice and/or local rules wherever possible. Where the proposed work includes the development of novel techniques or first use of generic groups of hazardous substances, consideration should be given to the development of codes of practice or SOPs for future reference.

Relationship with host institutions

15. If a group is closely integrated with a host institution, eg embedded in an NHS Trust site, it may be appropriate to use their local arrangements and procedures for risk assessment. This is perfectly acceptable, provided the standards are comparable or exceed the ones set out in this guidance.

Suitability of assessments and control measures

16. It is likely that in most Schools/Directorates there are already local policies and procedures in place and where appropriate SOPs are available. In many circumstances, the COSHH assessments or CRAs may conclude that by application of existing procedures, exposure to hazardous substances can be prevented or controlled to a level where there is no longer a risk to health. The assessment is then complete, but there is a responsibility to ensure that the identified procedures are the ones that are used in practice, to assess any new work activities and to review the assessments regularly.

17. If the exposure cannot be suitably controlled by applying the precautions identified in the assessment, consideration must be given to changing the work method or implementing additional control measures. In extreme cases the work might have to be stopped until suitable engineering controls have been installed. The assessment process may also identify additional training requirements for people carrying out the work.

18. Where real control problems are highlighted, contact the School Safety Advisor / Risk and Control Manager. Whilst it is not their responsibility to carry out assessments on behalf of others, they can provide information, support and advice.

19. The COSHH assessment or CRA is a scientific or operational management responsibility. It may be useful if local safety committees see and comment on assessments (this is a requirement for COSHH assessments for Hazard Group 2 biological agents). This can be used as a means of meeting the requirement to share information, request assistance in providing adequate control measures and helping others. They may well be able to contribute by identifying common problems for which a new code of practice or SOP would be useful and in helping to draw up such codes of practice.

20. The effectiveness of safety precautions should be monitored via local safety inspections.

Assessment process

21. The COSHH assessment identifies the hazards of substances that are harmful to health and evaluates the risks and likelihood of people being exposed to them in the context of the proposed work. A CRA combines the identification of hazards to health with physical hazards posed by the substance and the likelihood of those hazards being realised. In most instances, the controls that are suitable to prevent exposure to individuals in respect of health are also suitable to control the physical hazards.

22. It is therefore often appropriate to consider CRA and COSHH assessments on the basis of a procedure (whose description can be fairly broad, eg polyacrylamide gel electrophoresis, floor cleaning, sequencing of DNA) rather than on a particular substance.

23. To make a full assessment, the hazardous properties of each substance being used, generated or expressed as intermediates and/or by products must be identified.

24. Before proceeding with the CRA or COSHH assessment, the use of each substance must be justified and it must be confirmed that it cannot be substituted with a less hazardous substance, or even the same substance is a less hazardous form (eg. pellets rather than fine powders, solutions rather than gases, etc).

Information Sources

25. There is extensive information available about the hazards posed by commercially available chemicals (and mixtures of chemicals provided as kits for applications in life sciences and molecular biology, cleaning fluids, herbicides and pesticides), in the form of labels on bottles and packaging and also in Safety Data Sheets (SDS). SDS either accompany the substance on delivery or are available, free of charge, on line via the suppliers website (or LabCup when it is fully implemented). Prior to using any chemicals, these data should be examined.

26. There is a standard set of data that is provided in a SDS in 16 clearly labelled sections. This information includes: hazard identification (section 3), first aid measures (section 4), fire and explosion data (section 5), how to clear up after an accidental release (section 6), handling and storage requirements (section 7), exposure controls and personal protection (section 8), physical and chemical properties (section 9), stability and reactivity data (section 10), toxicological information (section 11) and disposal considerations (section 13).

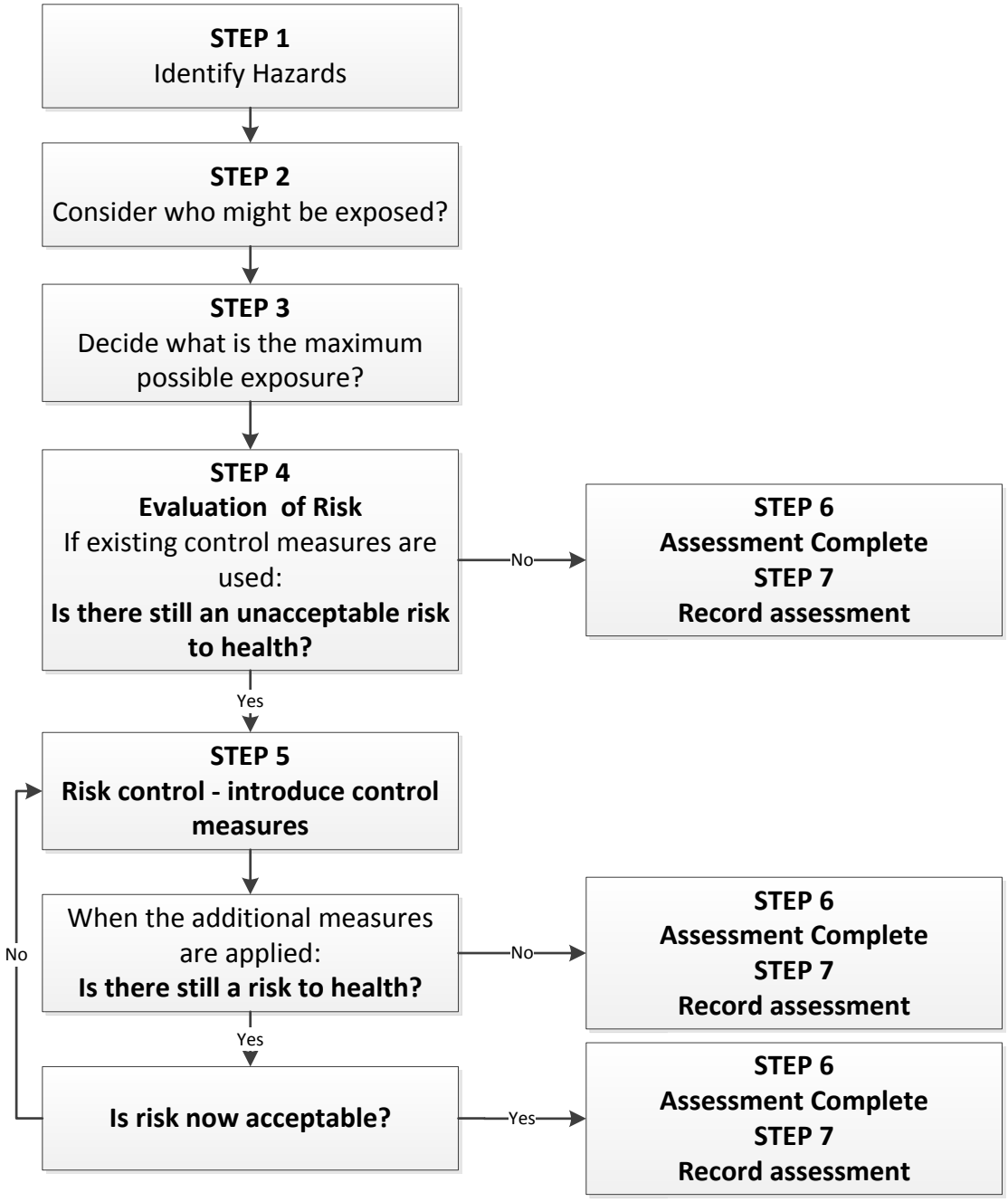
27. The principal source of information on biological agents is the Advisory Committee on Dangerous Pathogens (ACDP) publication 'The Approved List of Biological Agents.'

28. This is all valuable information when completing both a COSHH assessment and a CRA and will inform how and where the substance should be handled, used, stored and disposed of.

29. For new or novel compounds produced during the course of the work, detailed hazard information will not be known, but by consideration of information relating to analogous compounds, some indications of the hazards can be predicted, but the aim must be to avoid contact / exposure by use of controls including local exhaust ventilation and suitable PPE. The actual (or predicted) hazards of all products and by-products of reactions should be considered in the risk assessment.

COSHH Assessment Flowchart

30. The flow chart below illustrates the thought process that should be gone through when making an assessment.



31. In an ideal world, the COSHH assessment or CRA should form one part of a holistic risk assessment which would cover a complete procedure including:

- Set up
- Activities and apparatus used in the middle
- Clear up
- Storage of unused reagents
- Safe disposal of waste at the end, but many people choose to conduct the chemical part of the risk assessment separately and refer to other assessments or standard operating procedures for the equipment, which is also perfectly acceptable.

Step 1a: Identify the hazards - Chemical

32. Commercially available hazardous chemicals will be labelled with one or more of the following pictograms:

33. In addition to the pictograms, there will be Hazard (H) or Precautionary (P) statements associated with them, which consist of either H or P, a three digit number and text. The first number of the three digits in an H statement indicates whether the statement is associated with the physical properties (H2XX), the health effects (H3XX) or environmental effects (H4XX) of the substance, eg

    - H225 Flammable liquid
    - H336 Skin irritation
    - H441 Chronic aquatic toxicity

34. The precautionary statements are formatted in a similar way, P2XX numbers provide advice on how to use the substance safely, P3XX numbers indicate what a response to an exposure should be and P4XX numbers indicate storage requirements, eg

    - P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources
    - P303 If on skin (or hair) ….
    - P403 Store in a well – ventilated place

35. A full list of H and P statements are given in Appendices 1 and 2 respectively with analogous R and S phrases (which can be found on older bottles which were labelled under a previous set of labelling regulations).

36. In addition to the H and P statements there will also be a single signal word on the label which will either be ‘Danger’ or ‘Warning’, with ‘Danger’ indicating the most hazardous materials.

37. There are separate University Arrangements (Chapter 22) and guidance for work carried out with carcinogens, mutagens and substances toxic for reproduction. By their very nature, there are no absolutely safe exposure levels for these substances, therefore the specific requirements detailed in the documents above must be complied with.

38. Sensitisers and asthmagens may be marked as harmful.

39. Some chemicals are particularly corrosive and may require special precautions in the laboratory, especially if there is a spillage. Examples of these are hydrofluoric acid, bromine and phenol.

40. **Remember: higher hazard – potentially higher risk.**

Step 1b: Identify the hazards - Biological

41. Work with biological agents is also subject to COSHH assessment. Unlike assessments for chemicals, there are no lower or upper thresholds and it must be remembered that live biological agents can replicate in the right conditions. Assessment of risk in these circumstances is therefore generally more subjective and complex. The ACDP Approved List of Biological Agents and the ACDP publication 'Biological Agents: Managing the risks in laboratories and healthcare premises' are invaluable reference materials for assisting with the preparation of COSHH assessments involving biological materials.

42. If work is intended with a known pathogenic organism, the ACDP Approved List should be consulted to check which hazard group it belongs to and the route of infection which will inform the appropriate containment measures required. With materials that affect the respiratory tract, precautions must be taken to avoid making aerosols altogether (if at all possible) or to contain them if their generation cannot be avoided.

43. If the Approved List identifies Hazard Group 3 materials, containment Level 3 laboratories must be used for the work and the University Biological Safety Officer must be consulted before any of this work starts as notification to the Health and Safety Executive is required. Work with Hazard Group 4 materials is prohibited within the University as specialist containment facilities are required.

44. When human or human derived material is being used, the origin and history of the sample (whether this is tissue or cell lines) should be established so far as is possible. Checks should be made about the infection status of the material and how well a cell line is characterised. Universal precautions when working with human or human derived material require that the work is carried out at Containment Level 2 as a minimum standard.

45. For registered Genetically Modified (GM) projects, any findings in the risk assessments approved by local Biological and GM Committees relating to the project can contribute to the COSHH assessment and need not be repeated. The assessment will determine the Containment Level of the proposed work and thus the precautions and control measures that are required.

46. Work with animals and animal materials require the worker to undergo regular health screening/surveillance by the Occupational Health Service as rodents and other experimental animals are a common cause of respiratory sensitisation that can lead to chronic ill health.

Step 1c: Identify the hazards - other hazards

47. Other hazards include dusts. If work is likely to generate high concentrations of dust (eg in a workshop, kitchen) the assessment should consider ways of preventing exposure to the particles.

48. If exposure to two or more substances at the same time or immediately after each other is likely, then consideration must be given to added or synergistic effects, which may increase the level of harm.

Step 2: Identify who may be exposed and how

49. The proposed location for the work can have particular significance on who may be exposed, for example where Containment Level 3 laboratory facilities or specialised chemical laboratories are required, access to individuals not directly involved in the work may be restricted.

50. It is important to not only consider those who are doing the work and whether they are fully trained and competent, but there may be stages in the process where staff who are not members of the immediate team are involved and who may be vulnerable. These could include the Stores person receiving the goods, the autoclave operator, those disposing of waste or maintaining the equipment used. Their own line managers should ensure they are trained and that their own work is assessed, but additional information might be required from the COSHH assessment, highlighting the times when they might be at risk (subject to the appropriate control measures being in place).

51. There also may be reasons why the person may not be able to do the work, or might be adversely affected by the work, for example someone in the laboratory who suffers from allergies (eg animal allergens, allergens to one of the chemicals used, or to powder residues on certain types of glove). If there are other vulnerable people working in the vicinity, for example expectant mothers, young people, people with physical disabilities or learning difficulties, the assessment must be revaluated as additional administrative controls, (eg increased training or supervision) may be required to ensure the safety of these individuals.

52. In many areas of the University, workspaces are shared by a number of different groups, some of whom may be affected by the work carried out in the shared space. These areas could be as diverse as cleaning a corridor, or work in a multi-user laboratory or workshop. A further consideration is the possibility of other people, eg maintenance staff entering the work area and whether special rules, permits to work or additional training is required for these individuals.

53. How harm occurs depends on the hazardous properties of the chemical, how it gets into the body and whether it causes local, short lived effects (acute) at the site of contact, or whether it is stored in the body and concentrations build up over time and the effects are long lasting (chronic) or individuals become sensitised. These types of effects are described in the SDS.

54. Chemicals can enter the body by one of four ways; the most common being inhalation where powders, vapours, fumes etc, are breathed in. The second most common method is by direct contact, ie splashes to skin or mucosal membranes. Injection via sharps injuries or into uncovered open wounds (including uncovered cuts, grazes or patches of broken skin due to some medical conditions) is less common, but is foreseeable and does happen. The least common method of exposure is ingestion of the chemical by mouth, which can occur accidentally if principles of good laboratory practice and good hygiene are not enforced.

Step 3 - Deciding on the maximum exposure

55. To be strictly correct, the assessment of maximum exposure should be carried out assuming there are no control measures in place. Thus, when considering using a chemical in powder form, consideration is given to the maximum amount to be handled at once and on the basis of known information decide (in the following step) if the use of a fume cupboard, PPE or other measures are required.

56. It follows that smaller amounts of substances, or more dilute solutions, present less of a hazard than large amounts and more concentrated solutions. This is true whether the consideration is solely in connection with the harmful health effects of the substances or the likelihood of thermal runaway reactions.

57. It is however, inevitable that any judgement is tempered by previous knowledge and experience. In actual fact, a decision may have already been made (recorded in local rules, SOPs etc.) that a fume cupboard is required in which to carry out the work. However, this is still the time when the scale of the work should be considered and the significant risks of harmful exposure in the absence (or failure) of control measures.

Step 4 – Evaluation of risk

58. Understanding the routes of entry into the body is critical in the evaluation of existing controls and identification of additional controls to prevent exposure.

59. If it is considered that current measures or SOPs provide adequate protection, then the assessment is complete. However, there is often a concern whether the control measures are adequate, the following examples may illustrate this:

- A substance is known to be harmful by inhalation, but the work will take place where there is local extraction which is working as it should (eg 'on-tool' dust extraction for work being carried out in a workshop or in a fume cupboard or microbiological safety cabinet for work carried out in a laboratory) then no other controls may be necessary to prevent inhalation of that substance.
- A substance is known to be harmful by absorption through the skin and working to the SOP may not prevent exposure by this route. These controls would not be adequate and further controls would be needed that mean that the use of protective gloves (and/or other PPE) may be required. It may be noted that the use of PPE is one of the least effective controls because if it fails, it will fail to danger – gloves may rip etc.
- A substance is known to cause harm when it enters the body via skin penetration (eg biological agent), therefore adjusting the work process to avoid the need for sharp needles or glassware (plastic pipette tips, blunted needles or plasticware used instead) may be required to prevent exposure.
- Good working practices, good 'housekeeping' and good personal hygiene go a long way to prevent accidental ingestion of substances. This is why there must be no eating, drinking, smoking or application of cosmetics in areas where hazardous substances may be present. Other control measures may be needed to prevent ingestion which must be considered before a decision is made that nothing else is required.

60. An important part of any risk assessment is planning for dealing with an adverse event, eg having access to first aid kits, spill kits, fire extinguishers etc and where these are necessary, people being trained in their use.

Step 5 – Risk control

61. There is a cascade or hierarchy of control measures (see figure overleaf) to prevent exposure to hazardous substances. These controls should be considered systematically with elimination and substitution considered first. Substitution of one substance for another with similar properties but which is less harmful is sometimes possible (eg an attenuated rather than a virulent strain of pathogen), but another way to consider substitution is to think about the physical form that the substance takes, so consider whether a less harmful variant can be used, eg large pellets or a solution, rather than very fine powder.

62. Once a less hazardous but scientifically or operational equivalent option has been identified, it must be used unless the decision not to use it can be justified. Justification can be made, for example, on the inferior quality of results with the substituted product; it is much harder to make the case on cost grounds alone.

63. Once the decision has been made that there are no safer forms of the identified substances or there are no suitable less hazardous alternatives, other measures must be implemented to prevent or minimise exposure. These measures will predominantly reflect the route or routes of exposure.

64. Where the airborne route of exposure is identified, engineering controls to prevent inhalation should be considered first. Glove boxes, Class 3 microbiological safety cabinets and flexible film isolators provide total containment, fume cupboards or lower class microbiological safety cabinets provide partial containment; other local exhaust ventilation (on-tool extraction, capture hoods, down-draught tables etc) will also remove substances from the breathing zone of operators when used correctly. Local exhaust ventilation also has an important role in extraction and dilution of any fumes or vapours present, which on laboratory scale, should also prevent a build-up of explosive atmospheres.

65. If engineering control measures are necessary, they must be properly maintained and be subject to statutory tests on a regular basis. The procedures for doing this should be outlined in the local arrangements document for the School/Directorate/Building, as appropriate.

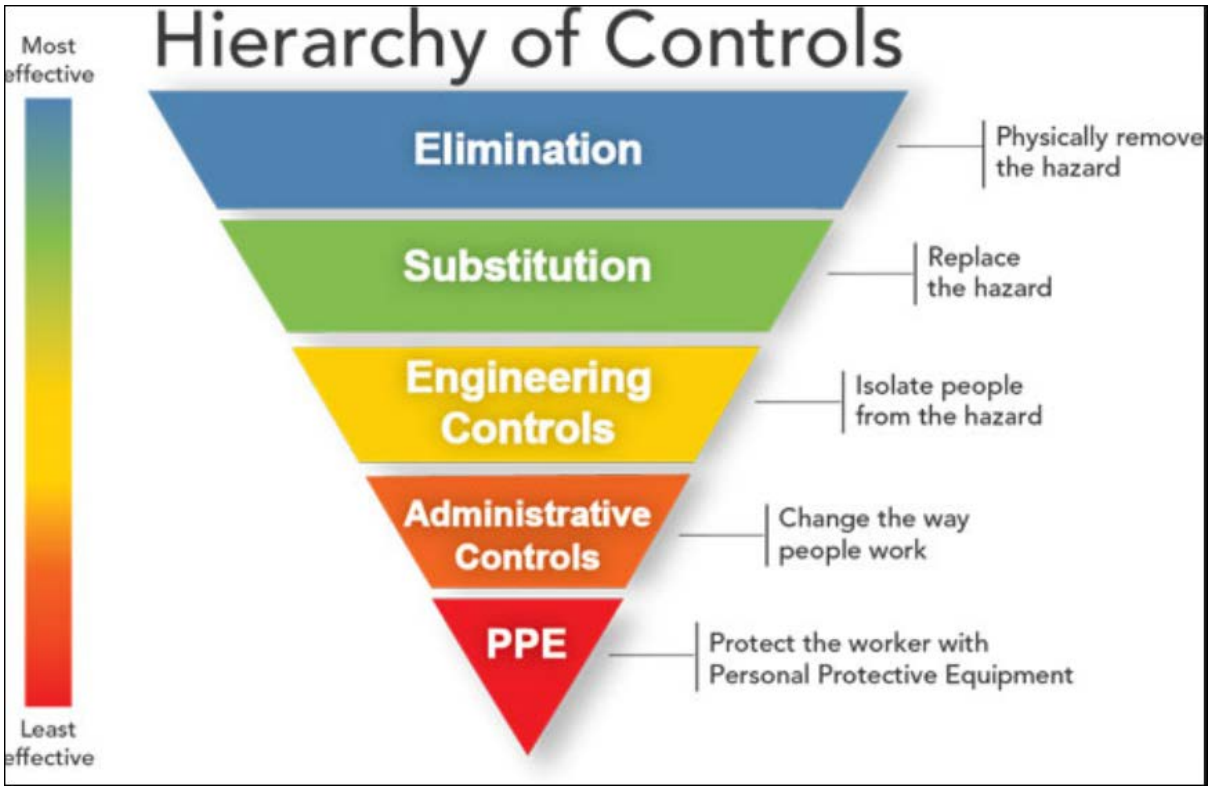


Figure: Hierarchy of Controls[2]

[2] Image reproduced with kind permission from the Institute of Occupational Safety and Health.

66. Administrative controls, such as the use of standard operating procedures, training, information and supervision; good laboratory practice and good workplace hygiene will protect to some extent against skin absorption and ingestion.

67. If absorption through the skin, eyes or mucosal membranes or injection via a puncture wound could result in harm, wearing some form of cover or barrier impervious to the substance (PPE) may be required to prevent contact, such as gloves, safety eyewear (visor, goggles, spectacles), aprons, laboratory coats etc.

68. PPE also includes Respiratory Protective Equipment (RPE), where exposure by inhalation cannot be controlled by the engineering controls in paragraph 62. Where a need has been established for re-usable RPE (eg airflow helmets), these must be maintained and tested every month in accordance with the HSE guidance on RPE maintenance. Any specific training requirements must be identified and provided.

69. In practice, a combination of measures is likely, although the principal requirement is that wherever it is reasonably practicable, adequate control of exposure should be achieved by means ***other*** than the use of PPE.

70. One of the main causes of injury in laboratory environments is where PPE is either not worn as it should be or is not correctly specified for the task being carried out. In the University there are a significant number of reported accidents where substances have got into eyes underneath or around standard safety spectacles which may mean that a better type of protection is required, eg a face visor or fully enclosed goggles.

71. Different types of gloves have different chemical resistance to commonly used reagents, and the level of protection afforded by one type of glove can vary between manufacturers. The information about the chemical resistance of gloves is available on glove manufacturers' websites and is included in the more recent versions of the SDS that are available for commercially produced chemicals and kits for molecular biology and protein purification etc.

72. Where the wearing of PPE is required to control exposure to hazardous substances it must be used appropriately and its' use must be enforced by local managers/supervisors. Procedures are required for the procurement, fitting, cleaning, storage, inspection, maintenance and eventual disposal of all PPE in accordance with HSE guidelines.

Additional considerations

73. Carrying out the CRA or COSHH assessment of actual work practices will be straightforward in many cases. However, there are considerations that might appear somewhat peripheral to the CRA or COSHH assessment but are relevant and should be taken into account.

74. ***Before purchasing*** any hazardous substances, consideration should be given to the quantities required and the storage facilities available. It can be a false economy to buy substances in bulk to later have to find money for expensive disposal costs. Special conditions may be required to store the material safely – eg ventilated and secure cupboards and there may need to be a programme of periodic inspection for some substances that are known to deteriorate in storage, eg dry out, polymerise, decompose etc. Full implementation of the University chemical inventory system (LabCup) could reduce the need for purchasing chemicals where only small quantities are needed.

75. ***Incompatible materials*** must not be stored close together, and biological agents must be stored in the appropriate level of containment facilities.

76. Different waste streams or treatments may be required for new projects or lines of work, eg access to an autoclave.

77. The assessment should also document ***emergency procedures*** that should be followed and whether current arrangements are satisfactory. General laboratories will require access to spillage kits and specialist first aid treatments for chemical injuries (Diphoterine eyewashes and sprays) and containment laboratories a suitable disinfection policy, validated where necessary.

78. This guidance primarily focuses on the properties of substances that are hazardous to health and managing the risks associated with these properties. However, in a broader context, there may also be flammable or explosive hazards associated with the same substances, and there may be other hazards actually associated with the work processes that also need to be controlled to avoid harmful outcomes to the operators (eg working for long periods in a cold room, hunched over a microscope or using display screens). Other tasks could involve manual handling activities or equipment (centrifuges, microtomes, machine tools) that could present risks which must also be controlled.

Workplace monitoring and health surveillance

79. If the COSHH assessment identifies a requirement for monitoring of the workplace and/or health surveillance for employees, it must be done. For laboratory work, the need for workplace monitoring is likely to be exceptional,

although individuals working with sensitisers and asthmagens for extended periods of time may need to register with Occupational Health for ongoing health surveillance. Any decision to adopt workplace monitoring, rather than implementing measures to prevent significant exposure should be discussed with the local School Safety Advisor / Risk and Compliance manager or University Safety Coordinator as this would warrant further investigation.

Step 6 – Completion of assessment

80. Once the risk control measures have been decided, there is a requirement to recheck whether there would still be a risk to health. If the decision is that the remaining risk is acceptably low, the actual assessment is complete. If the risk is still unacceptably high, the assessment must be reviewed and additional control measures introduced before the work proceeds.

Step 7 – Recording the assessment

81. The conclusions of the CRA or COSHH assessment should be recorded. These will include the measures to control exposure to the hazards and other requirements such as any special training and the need for the person doing the work to have the necessary skills, ability and knowledge to carry it out. It should also include actions to be taken in the event of an emergency, eg failure of controls and therefore chemical exposure to individuals, spillage and fire.

82. It is highly likely that the results of the assessment will indicate that existing laboratory codes of practice or SOPs can be applied. If a previous assessment or current code of practice does not cover the proposed work, the additional details should be added.

83. The COSHH assessment, whether this is a stand-alone assessment or is part of an assessment for a complete activity which includes the use of chemicals, should be recorded according to local requirements/arrangements. The assessment may be recorded electronically provided that everyone who might need to use the assessments can access it in this format, or on paper. It should be signed by the assessor. A record should be kept of who has used the assessment.

84. The completed assessments should also be checked and signed by a person with the necessary competence to identify chemical hazards, assess risk and decide whether the proposed control measures are reasonable and confirm that they are in place. The checker could be the Principal Investigator/Supervisor/manager or could be formally delegated by them to another competent person (eg senior Post Doctoral Research Associate).

85. It is likely that where more than one group is using similar substances and similar procedures, they may wish to adopt assessments made by another group. This is perfectly acceptable provided that the adoptive PI/Supervisor countersigns the assessment. The PI/Supervisor should retain a copy of the assessment and it should be stored according to local procedures and the University Records Retention Schedule. A copy should be available in each defined area where the work is done and an explanation of the findings of the assessment given to all staff, students or visitors as appropriate. (Note the findings of the risk assessment could be incorporated into the method for an experiment, eg via laboratory scripts for undergraduate and taught masters use).

86. Where higher risk scenarios are being assessed, eg where complex calculations have to be validated by another independent and competent person, or where a control measure is the attendance of a first aider etc, the person responsible for checking the assessment should have attended the University's risk assessment course or equivalent and will probably be a Chartered professional with expertise in the task being considered.

Monitoring and Review

87. Monitoring is necessary to meet two main objectives to ensure:

- The control measures identified through the COSHH assessment are being implemented and are effective. If the assessment is suitable and sufficient for the work, each control measure that has been identified is necessary to prevent or control exposure to risk. Compliance is therefore necessary to protect workers and a legal requirement.
- The resultant procedures continue to be appropriate. The review process, below, provides a point of reference to decide if the assessment remains valid, but regular monitoring can identify problems in the interim.

88. All CRA and COSHH assessments should be reviewed regularly and whenever there is cause to believe they are no longer valid, eg when significant changes have taken place such as: introduction of new equipment, higher concentrations or volumes of chemicals used, personnel become pregnant or work is being done by young or vulnerable people (eg students on work experience), or an accident/incident has occurred.

Responsibilities

89. The task of carrying out COSHH assessments can be delegated to any competent individual, but PIs/Supervisors/Managers have responsibility for ensuring that

work carried out by their groups/teams has been assessed and that these assessments are appropriate.

90. Everyone who carries out risk assessments, including COSHH assessments must be competent to do so.

91. Specific training in COSHH assessment is provided by the Staff Learning and Development Unit. Courses are available for both laboratory based and non-laboratory based staff.

92. Schools and Directorates may use the general risk assessment template to record their COSHH and risk assessment findings, but there may be additional local training requirements if bespoke forms have been developed.

Further information (not already hyperlinked)

Control of Substances Hazardous to Health Regulations 2002 (as amended), L5, HSE Books, ISBN 9780717665822

Dangerous Substances and Explosives Atmospheres Regulations 2002, L138, HSE Books, ISBN 9780717666164

The Approved List of biological agents Advisory Committee on Dangerous Pathogens, HSE Publications

Biological agents: Managing the risks in laboratories and healthcare premises Advisory Committee on Dangerous Pathogens, HSE Publications

Respiratory Protective Equipment at Work, HSG53 HSE Books, ISBN 9780717664542

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Appendix 1 Hazard Statements

Code	Statement	Comparable R Phrase
	EUH0 Special EU Supplementary General Physical Hazard Statements**	
EUH001	Explosive when dry	R1
EUH006	Explosive with or without contact with air	R6
EUH014	Reacts violently with water	R14
EUH018	In use, may form flammable/explosive vapour-air mixture	R18
EUH019	May for explosive peroxides	R19
EUH029	Contact with water liberates toxic gas	R29
EUH030	Can become highly flammable in use	R30
EUH031	Contact with acids liberates toxic gas	R31
EUH032	Contact with acids liberates very toxic gas	R32
EUH044	Risk of explosion if heated under confinement	R44
EUH059	Hazardous to the ozone layer	R59
EUH066	Repeated exposure may cause skin dryness or cracking	R66
EUH070	Toxic by eye contact	R39-41
EUH071	Corrosive to the respiratory tract	
	EUH2 Special EU rules for supplemental label elements for certain substances or mixtures**	
EUH201	Contains lead. Should not be used on surfaces liable to be chewed or sucked by children	
EUH202	Cyanoacrylate. Danger. Bonds skin and eyes in seconds. Keep out of the reach of children	
EUH203	Contains Chromium (VI). May produce an allergic reaction	
EUH204	Contains isocyanates. See information supplied by the manufacturer	
EUH205	Contains epoxy constituents. See information supplied by the manufacturer	
EUH206	Warning! Do not use together with other products. May release dangerous gases (chlorine)	
EUH207	Warning! Contains cadmium. Dangerous fumes are formed during use. See information supplied by the manufacturer. Comply with the safety instructions	
EUH208	Contains (name of sensitizing substance). May produce an allergic reaction	
EUH209	Can become highly flammable in use or Can become flammable in use	
EUH210	Safety data sheet available on request	
	H2 Physical Hazard Statements**	
H200	Unstable explosives	
H201	Explosive; mass explosion hazard	
H202	Explosive, severe projection hazard	
H203	Explosive; fire, blast or projection hazard	

Code	Statement	Comparable R Phrase
H204	Fire or projection hazard	
Code	**Statement**	**Comparable R Phrase**
H 205	May mass explode in fire	
H220	Extremely flammable gas	R12
H221	Flammable gas	R10
H222	Extremely flammable aerosol	R12
H223	Flammable aerosol	R10
H224	Extremely flammable liquid and vapour	R12
H225	Highly flammable liquid and vapour	R11
H226	Flammable liquid and vapour	R10
H228	Flammable solid	R10
H240	Heating may cause an explosion	R5
H241	Heating may cause fire or explosion	R5, R7
H242	Heating may cause a fire	R7, R12
H250	Catches fire spontaneously if exposed to air	R17
H251	Self heating: may catch fire	
H252	Self heating in large quantities: may catch fire	
H260	In contact with water releases flammable gases which may ignite spontaneously	R15-17
H261	In contact with water releases flammable gas	R15
H270	May cause or intensify fire; oxidizer	R8
H271	May cause fire or explosion; strong oxidizer	R9
H272	May intensify fire; oxidizer	
H280	Contains gas under pressure; may explode if heated	
H281	Contains refrigerated gas; may cause cryogenic burns or injury	
H290	May be corrosive to metals	
	H3 Health Hazard Statements**	
H300	Fatal if swallowed	R28
H301	Toxic if swallowed	R25
H302	Harmful if swallowed	R22
H304	May be fatal if swallowed and enters airways	R65
H310	Fatal in contact with skin	R27
H311	Toxic in contact with skin	R24
H312	Harmful in contact with skin	R21
H314	Causes severe skin burns and eye damage	R34, R35
H315	Causes skin irritation	R38
H317	May cause an allergic skin reaction	R43
H318	Causes serious eye damage	R41
H319	Causes serious eye irritation	R36
H330	Fatal if inhaled	R26
H331	Toxic if inhaled	R23
H332	Harmful if inhaled	R20

Code	Statement	Comparable R Phrase
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled	R42
H335	May cause respiratory irritation	R37
H336	May cause drowsiness or dizziness	R67
H340	May cause genetic defects (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard)	R46
Code	**Statement**	**Comparable R Phrase**
H341	Suspected of causing genetic effects (state route of exposure if it is conclusively proven that no other routes of exposure can cause the hazard)	R68
H350	May cause cancer (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard)	R45
H350i	May cause cancer by inhalation	R49
H351	Suspected of causing cancer (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard)	R40
H360	May damage fertility (H360F) or the unborn child (H360D) (state specific effect if known) (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard)	R60 (H360F), R61 (H360D)
H361	Suspected of damaging fertility (H361f) or the unborn child (361f) (state specific effect if known) (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard)	R62 (H361f), R63 (H361d)
H362	May cause harm to breast fed children	R64
H370	Causes damage to organs (or state all organs affected, if known) (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard)	R39/23, R39/24, R39/25, R39/26, R39/27, R39/28
H371	May cause damage to organs (or state all organs affected, if known) (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard)	R68/20, R68/21, R68/22
H372	Cases damage to organs (or state all organs affected, if known) through prolonged or repeated exposure (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard)	R48/23, R48/24, R48/25
H373	May cause damage to organs (or state all organs affected, if known) through prolonged or repeated exposure (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard)	R48/20, R48/21R48/22
	H4 Environmental Hazard Statements**	
H400	Very toxic to aquatic life	R50
H401	To avoid risks to human health and the environment, comply with the instructions for use	
H410	Very toxic to aquatic life with long lasting effects	R53
H411	Toxic to aquatic life with long lasting effects	R51-53
H412	Harmful to aquatic life with long lasting effects	R52-53
H413	May cause long lasting harmful effects to aquatic life	R53

Appendix 2 Precautionary Statements

Code	Statement	Comparable S Phrase
	P1** General Precautionary Statements	
P101	If medical advice is needed, have product container or label at hand	S45
P102	Keep out of reach of children	
P103	Read label before use	
	P2** Prevention Precautionary Statements	
P201	Obtain special instructions before use	
P202	Do not handle until all safety precautions have been read and understood	
P210	Keep away from heat / sparks / open flames / hot surfaces - No Smoking	
P211	Do not spray on an open flame or other ignition source	
P220	Keep / Store away from clothing/…/combustible materials	
P221	Take any precaution to avoid mixing with combustibles/..	
P222	Do not allow contact with air.	
P223	Keep away from possible contact with water, because of violent reaction and possible flash fire	
P230	Keep wetted with…	S5
P231	Handle under inert gas	S6
P232	Protect from moisture	S8
P233	Keep container tightly closed	S7
P234	Keep only in original container	
P235	Keep cool	S3
P240	Ground / bond container and receiving equipment	
P241	Use explosion-proof electrical / ventilating / lighting equipment	
P242	Use only non-sparking tools	
P243	Take precautionary measures against static discharge	S33
P244	Keep reduction valves free from grease or oil	
P250	Do not subject to grinding / shock / friction	
P251	Pressurized container: Do nor pierce or burn, even after use	
P260	Do not breathe dust / fume / gas / mist / vapour / spray	S23
P261	Avoid breathing dust / fume / gas / mist / vapour / spray	S24
P262	Do not get in eyes, on skin, or on clothing	S25
P263	Avoid contact during pregnancy / while nursing	
P264	Wash thoroughly after handling	S28
P270	Do not eat, drink or smoke when using this product	S20-21
P271	Use only outdoors or in a well-ventilated area	
P272	Contaminated work clothing should not be allowed out of the work-place	
P273	Avoid release to the environment	
P280	Wear protective gloves / protective clothing / eye protection / face protection	S36
P281	Use personal protective equipment as required	
P282	Wear cold insulating gloves / face shield / eye protection	

Code	Statement	Comparable S Phrase
P283	Wear fire / flame resistant / retardant clothing	
P284	Wear respiratory protection	
P285	In case of inadequate ventilation wear respiratory protection	S38
Code	Statement	Comparable S Phrase
	P3** Response Precautionary Statements	
P301	If swallowed:	
P302	If on skin:	
P303	If on skin (or hair)	
P304	If inhaled:	
P305	If in eyes:	
P306	If on clothing:	
P307	If exposed:	
P308	If exposed or concerned:	
P309	If exposed or if you feel unwell:	
P310	Immediately call a POISON CENTRE or doctor / physician	
P311	Call a POISON CENTRE or doctor / physician	
P312	Call a POISON CENTRE or doctor / physician if you feel unwell	
P313	Get medical advice / attention	
P314	Get medical advice / attention if you feel unwell	S45
P315	Get immediate medical advice / attention	
P320	Specific treatment is urgent (see … on this label)	
P321	Specific treatment (see … on this label)	
P322	Specific measures (see … on this label)	
P330	Rinse mouth	S64
P331	Do not induce vomiting	
P332	If skin irritation occurs:	
P333	If skin irritation or rash occurs:	
P334	Immerse in cool water / wrap in wet bandages	
P335	Brush off loose particles from skin	
P336	Thaw frosted parts with lukewarm water. Do not rub affected area.	
P337	If eye irritation persists:	
P338	Remove contact lenses, if present and easy to do so. Continue rinsing	
P340	Remove to fresh air and keep at rest in a position comfortable for breathing	S63
P341	If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing	
P342	If experiencing respiratory symptoms:	
P350	Gently wash with plenty of soap and water	
P351	Rinse cautiously with water for several minutes	S28
P352	Wash with plenty of soap and water	
P353	Rinse skin with water / shower	
P360	Rinse immediately contaminated clothing and skin with plenty of water before removing clothes	

Code	Statement	Comparable S Phrase
P361	Remove / take off immediately all contaminated clothing	S27
P362	Take off all contaminated clothing and wash before reuse	
P363	Wash contaminated clothing before reuse	
P370	In case of fire:	
P371	In case of major fire and large quantities:	
P372	Explosion risk in case of fire	
P373	DO NOT fight fire when fire reached explosives	
Code	Statement	Comparable S Phrase
P374	Fight fire with normal precautions from a reasonable distance	
P375	Fight fire remotely due to the risk of explosion	
P376	Stop leak if safe to do so	
P377	Leaking gas fire: do not extinguish, unless leak can be stopped safely	
P378	Use … for extinction	
P380	Evacuate area	
P381	Eliminate all ignition sources if safe to do so	
P390	Absorb spillage to prevent material damage	
P391	Collect spillage	
	P4-- Storage Precautionary Statements	
P401	Store …	
P402	Store in a dry place	S8
P403	Store in a well ventilated place	S9
P404	Store in a closed container	S7
P405	Store locked up	S1
P406	Store in corrosive resistant / … container with a resistant inner liner	
P407	Maintain air gap between stacks / pallets	
P410	Protect from sunlight	
P411	Store at a temperature not exceeding … ^{o}C/ ..^{o}F	
P412	Do not expose to temperatures exceeding 50 ^{o}C / 122 ^{o}F	
P413	Store bulk masses greater than …kg/ …lbs at temperatures not exceeding ..^{o}C / ^{o}F	
P420	Store away from other materials	
P422	Store contents under …	
	P5-- Disposal Precautionary Statements	
P501	Dispose of contents / container to …	

Document control box	
Title	Control of Substances Hazardous to Health (COSHH) Regulations 2002 (As Amended)
Link to Policy or Chapter	University Health & Safety Arrangements Chapters 3, 9, 13, 22
Date issued:	August 2018 Major review including GHS symbols and hyperlinks to other external and internal guidance; introducing concept of holistic chemical risk assessment.
Issued by:	Safety Services
Implementation date:	August 2018
Version:	3.0
Next review date:	Upon significant change
Owner of this document:	Head of Safety Services, Dr Patrick Seechurn
Lead contact:	Elaine Armstrong