

Hydrofluoric Acid Guidance			
Policy	Code of Practice	Guidance ✓	Procedure
Organisation-wide ✓		Local	
Approved by the University Health & Safety Committee			
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The purpose of presenting this document to the University Health & Safety Committee			
Standard 3 year review ✓ Changes in practice and/or legislation... New policy document...			

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1. Purpose

The University has a legal duty under the Health and Safety at Work etc. Act 1974 to ensure, so far as is reasonably practicable, the health, safety and welfare of employees, students and others who may be affected by its activities.

Hydrofluoric acid (HF) is an extremely hazardous substance. Accidents involving HF can result in serious injury or death. HF is a colourless aqueous solution of hydrogen fluoride which fumes at concentrations above approximately 60%.

HF presents a particular risk because, in addition to causing severe chemical burns, fluoride ions readily penetrate the skin and may cause systemic toxicity. Fluoride ions bind calcium and magnesium ions in the body, potentially leading to electrolyte imbalance, decalcification of bone, cardiac arrhythmias and death. Fatal poisoning has been reported following exposure of as little as 2.5% of body surface area to concentrated HF.

2. Scope

This procedure applies to staff, students, contractors, and where applicable visitors to Brunel University of London. No work involving hydrofluoric acid may be undertaken unless it is fully compliant with this guidance and the Control of Substances Hazardous to Health Regulations 2002 (COSHH).

3. Policy details

If HF must be used then appropriate management arrangements and safe systems of work must be put in place for its purchase, storage, use and disposal. The only effective way to prevent HF injuries is through the implementation of a proper safety management system covers the areas below:

3.1. Training

Anyone who or uses Hydrofluoric acid must be suitably trained and have the necessary skills to carry out their job safely. Particularly for new employees or research students should receive training and be supervised closely. They should understand the risks associated with Hydrofluoric acid.

3.2. Handling and Use

NO WORK INVOLVING HF CAN BE CARRIED OUT OUTSIDE NORMAL WORKING HOURS. If it is not necessary to use Hydrofluoric acid, then it must not be used. The lowest concentration and the smallest volume possible of HF should be used to achieve a task.

Prior to using hydrofluoric acid, a Risk and COSHH assessment for the dilution of commercially supplied HF to the correct concentration must be carried out and a separate COSHH and Risk assessment for any procedure, process or experiment involving Hydrofluoric Acid. This assessment should include arrangements for the disposal of any surplus acid. All HF solutions must be properly labelled.

Procedures that require the use of Hydrofluoric acid must have a standard operating procedure. Reactions involving hydrofluoric acid can only be carried out in designated labs in

fume cupboards with a high extraction rate and good containment. HF warning notices should be on display, on the laboratory door and where the experiment is being carried out.

Never use Hydrofluoric acid outside of a fume cabinet. Users must stand at the fume cupboard rather than sit when working with HF to avoid spilling over the legs. Arrangements should be in place so that when hydrofluoric acid is being used individuals do not work on their own.

A buddy system should be operated whereby two HF trained people are wearing the appropriate PPE for the use of HF. So that in the event of a spill these two have access to an appropriate spill kit and can summon First Aid if necessary

3.3. Storage

Storage Considerations

- Always store HF in a clearly labelled container and always ensure that there is secondary containment of the primary container, i.e. a container within a container.
- Never store HF in glass or metal containers. Always store HF in polyethylene, polypropylene or Teflon containers. Be aware that prolonged storage of HF can cause plastic materials to become brittle.
- Ensure that concentrated HF is always stored in a secure chemicals cabinet or laboratory.
- Storage of HF in fume hoods should be avoided where possible. Otherwise store small amounts of weak solutions in sealed containers when necessary.
- Store HF containers as close to the ground as possible away from pedestrian routes and away from incompatible chemicals, e.g. metals, organic compounds.

3.4. Personal Protective Equipment (PPE)

When working with any concentration of HF suitable personal protective equipment (PPE) must be worn. In so far as is possible there should be no exposed /uncovered skin on a HF user. The use of PPE is to provide a last line of defence against HF exposure. PPE is not a substitute for safe systems of work.

3.5. Gloves

Gloves should always be considered as offering only a limited simple barrier protection and no protection against long term contact with HF. Assume a very short breakthrough time for all gloves. Once contaminated gloves should be removed immediately and the hands washed with running water. Before use all gloves should be inspected for damage. Damaged gloves should be discarded.

Two pairs of gloves should always be worn when working with HF. An inner disposable pair made from a suitable material such as nitrile (but not latex) should be worn under an outer heavy-duty pair. The nature of the outer pair will depend on the concentration of the acid being used and the nature of work process. The outer glove pair should always be constructed of a heavy-duty material which reaches to at least the mid forearms and were possible the elbows. Materials such as PVC, Neoprene and Natural Rubber are suitable for outer gloves.

When the outer gloves become contaminated, they should be immediately removed and soaked in a caustic solution before being worn again. The outer gloves should be washed down with clean water before removing them.

The answering of telephones, the using the computers, etc. should be avoided when working with HF. Contaminated gloves should be washed in a caustic solution before disposal in an appropriate manner.

3.6. Protective Clothing

Protective clothing is designed to offer a simple physical barrier to HF contamination. Assume a very limited breakthrough time for all protective clothing.

Always wear a closed full length laboratory coat. When handling concentrated acid also wear a chemical apron over the laboratory coat made from a suitable HF resistant material, e.g. PVV, Natural Rubber, etc.

Do not wear shorts, skirts or open toed shoes when working with any concentrations of HF. If desired a full body acid suit may be worn in lieu of a lab coat.

3.7. Face / Eye Protection

Always wear safety glasses or goggles when working with any concentration of HF.

When working with concentrated HF wear a full-face shield over the safety glasses / goggles.

3.8. Respiratory Protection

The use of respiratory protection when working with HF under normal circumstances is prohibited. The use of HF should never generate the need to wear respiratory protection. The need to wear respiratory protection under normal circumstances of use indicates a failure of safety management.

When dealing with HF spillages outside of a fume hood a full-face mask with inorganic / acid gas filters should be worn.

Contaminated PPE and all normal clothing should be removed immediately and washed in a caustic solution before being examined for damage. Damaged PPE must be disposed of immediately. Face masks must be disposed of after dealing with a spillage.

3.9. Hydrofluoric Acid First Aid

In areas where HF work is taking place it is advisable that some members of staff are trained in Hydrofluoric acid first aid. It takes two people to affect a first aid response to a HF exposure.

The HSE, Chemical Industries Association and the National Poisons Service joint guidance for treatment for skin exposure is to immediately decontaminate with a high flow of water for a maximum of one minute. Therefore, HF work should only be done where there is a high flow of water or an emergency shower. The neutralisation agent calcium gluconate will need to be applied for 15 minutes continuously.

3.10. Emergency Procedures

3.10.1. Spillage

All users of HF must be given guidance on what to do in the event of a spillage. Spillages can be neutralised and absorbed with calcium carbonate or calcium hydroxide.

Then transferred to a sealed container and disposed of as hazardous chemical waste. Contaminated surfaces can be washed down with calcium carbonate or calcium hydroxide solution. In the event of a large spillage outside of the fume cupboard, evacuate the lab immediately, prevent access and call assistance.

3.10.2. Fire

In a fire HF will release noxious, corrosive and toxic fumes. Operate the planned fire drill for the area in question. On arrival, emergency services should be informed that HF is present in the area affected. Carbon dioxide, water, halon or chemical foam extinguishers may be used. Self-contained breathing apparatus and a protective chemical suit will be required to fight fire.

4. Responsibilities

4.1. University Council / Vice-Chancellor & Leadership Team

The University's senior leadership — including Council, the Vice-Chancellor and President, and the Executive Board/Leadership Team — hold ultimate responsibility for health and safety governance. They are accountable for setting the strategic direction of the University, ensuring it reflects statutory duties (e.g., under the Health and Safety at Work etc. Act 1974), and that adequate resources, oversight, and organisational frameworks are in place. They champion a culture of safety and continuous improvement across the institution.

4.2. Senior Managers

Senior Managers — including Directors, Associate, Directors, Heads of Department, Executive Deans and equivalent roles — are responsible for translating policy into action within their areas of control. This includes implementing health and safety arrangements, ensuring risk assessments are conducted, supervising local operational committees, and making sure staff and students understand their health and safety duties.

4.3. Line Mangers

Line managers and supervisors play a critical operational role in maintaining safe environments day-to-day. They must ensure risk assessments are current and recorded, oversee induction and training, supervise safe systems of work, inspect local activities, lead incident investigations, and escalate issues appropriately. They also make sure new equipment is assessed for hazards and that relevant controls and competencies are in place.

Research Supervisors or equivalent are responsible for;

- Ensuring that the use of hydrofluoric acid is avoided wherever reasonably practicable, and where use cannot be eliminated, that the associated risks are reduced to as low as reasonably practicable
- Where HF use cannot be eliminated, adequate resources are provided to ensure safe use
- This guidance is communicated to all relevant staff and students.
- Ensuring that only trained, competent and authorised persons are permitted to work with HF
- Ensuring adequate supervision of HF activities
- Ensuring that laboratories, equipment and emergency facilities are suitable and maintained
- Ensuring compliance with waste disposal and emergency procedures

4.4. Individual Staff and Students

All users of hydrofluoric acid must comply fully with this guidance, COSHH assessments and standard operating procedures.

All staff and students are expected to take reasonable care for their own health and safety and that of others. This includes following University policies and procedures, cooperating with safety arrangements, reporting hazards, incidents or near misses promptly, and engaging in required training and consultations. Staff must also ensure work areas and routines are safe and support continuous safety improvement.

4.5. Contractors, Visitors and Others on University Premises

Contractors, visitors, and external partners must comply with Brunel's health and safety policies while on campus. Those responsible for arranging visits must ensure contractors and visitors receive relevant safety information and understand emergency procedures and local hazards.

4.6. Competent Health & Safety Support

Brunel's Health, Safety & Environment Team (HSET) provide specialist advice, support, and training. They facilitate risk assessment guidance, promote best practice, help interpret legislation, and support organisational compliance activities. Managers and staff should seek specialist input where needed.

5. Legal and other requirements

This guidance supports compliance with, but is not limited to, the following legislation:

- Health and Safety at Work etc. Act 1974
- Control of Substances Hazardous to Health Regulations 2002 (COSHH)
- Management of Health and Safety at Work Regulations 1999
- Personal Protective Equipment at Work Regulations 1992
- Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR), where applicable
- Hazardous Waste Regulations 2005