



Information for employees and students working at the Faculty of Science (W&N)

This AMD information sheet describes the specific risks of working with fluorides. Before you start working with HF, you must attend a special training on the risks and measures in case of exposure.

1 Hydrogen fluoride and other fluorides

1.1. Fluorides

Hydrogen fluoride (HF) is a compound with etching capacity and is often used in concentrated form specifically for that reason. It is also known under the names of hydrofluoric acid and anhydrous hydrogen fluoride. HF may be found under CAS number [7664-39-3]. Diluted HF solutions are used on a regular basis in the lab as well. However, you should also be wary at home: wheel rim cleaners, wall cleaners, glass cleaners (GS4, flusol forte), and rust removal agents may be diluted HF!



Though HF is an acid, the danger lies in the exposure to the fluoride ion (F^-). This ion is easily absorbed into the body by inhalation, through the skin, or after ingestion, and works as a systemic poison. These dangerous properties, as well as the precautions mentioned in this information sheet, also apply to other substances that release fluoride ions in contact with water or bodily fluids, for example, HF/pyridine or ammonium fluoride! Please read: "HF and other fluorides", when the text mentions "HF".



Here, HF got into the glove.
The glove's imprint is still visible.

1.2. Harm by fluoride ions

Exposure to HF may occur by ingestion, inhalation, spillage on the skin, or splashing in eyes. The HF concentration, the extent of the exposure, and the swiftness of first aid, are decisive for the consequences for and the harm to the victim. HF is absorbed quite rapidly by the body. At the site of exposure it leads to (local) blisters and/or burns, or may lead to tissue necrosis and permanent damage to the eyes. In addition, it may end up in other parts of the body (systemic effects) through the bloodstream or lungs. The fluoride ions release calcium ions from your bones, that may deposit in vital organs. In the worst case this will lead to death through organ failure and severe poisoning.

HF concentrations of >50% lead to acute poisoning, blisters and tissue being eaten away. This is extremely painful. However, you might not even feel the initial exposure to lower concentrations! Delayed effects are possible up to 24 hours after exposure. The pain comes later, with a chance that you may not even relate it to HF exposure!

2 Working safely with HF

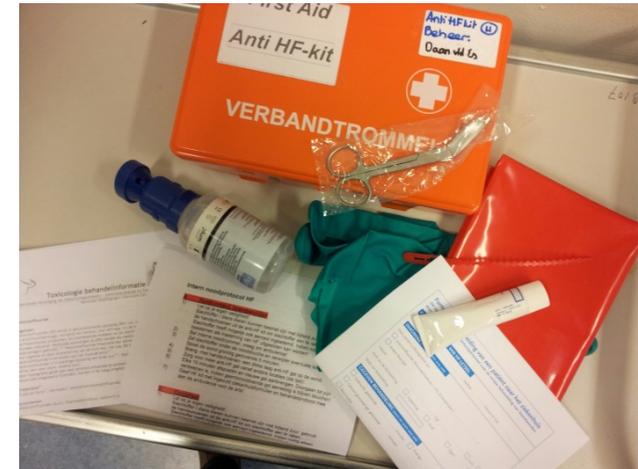
- Before you can start working with HF, you should make sure that there is a special first-aid kit, the so-called **anti-HF kit** (see the picture in Chapter 3) present in the lab. If the kit is not present, please ask the AMD to issue an extra kit and instructions; alternatively you may find the kit's owner and ask him/her for instructions. Without this kit and the accompanying training, you are not allowed to start!
- Please read the first-aid protocol in the kit beforehand. Please also have your fellow room occupants read this protocol: in case of any future emergencies they are probably the first ones that are able to provide help. Swift action may limit the extent of the injury!
- That is why you should never work with HF on your own, but always in the presence of colleagues. Working with HF is allowed only during office hours, when emergency responders (BHV's) may be called in. The emergency response team (BHV team) has extra tubes of anti-HF gel for when they are needed. So, [make sure you know how to sound the alarm \(AMD infosheet A040\)](#) and mention the fact that it is a call about an HF-exposure, when you call it in.
- *Never* use your mouth to pipette HF! Use an adjustable pipette with pipette tips, or a glass pipette with a pipette bulb. Furthermore, do not pipette directly from a bottle of concentrated HF. First, pour a small amount in a beaker inside a fumehood, and work from there. If you don't, not only the pipette tip, but also a large part of the outside of the pipette comes into contact with HF. If you put down the pipette after that, other surfaces may be contaminated, or colleagues may inadvertently touch traces of HF with their bare hands.
- Plan your actions with HF, and consider beforehand what you may need for the collection of waste or clean-up:
 - Perform a "dry" practice run of the experiment to familiarize yourself with the actions with HF. Routine lowers the chance of errors.
 - Please also keep the neutralizing agent at hand, in case you spill. You can use a calcium carbonate solution, or special HF-absorption grains.
- Please wear your personal protective equipment: a lab coat, HF resistant gloves, and safety glasses that fit your face well. Normal lab gloves are not sufficient! *The concentrated acid easily penetrates latex as well as nitril gloves. As protection against concentrated solutions (up to 60%) gloves made of neoprene, butyl or viton are recommended. As protection against higher concentrations only butyl or viton suffice.* [\[Source: Wikipedia\]](#)
- When working with HF, always use a properly functioning fumehood with the sash set at operating setting (40 cm).

3 First aid after exposure to fluorides: the anti-HF kit

After exposure to HF, a proper response is required by applying one of the emergency protocols provided by the anti-HF kit: for skin contact, eye contact, inhalation, and spills. Proper knowledge of the protocol is a must. This kit contains:

ATTENTION: *The victim must **always** report to a hospital, because of the possibility of systemic and / or delayed effects!*

- 1 tube of 25 ml “anti-HF gel” (calcium gluconate 2,5%).
This is an antidote for the skin that binds fluoride ions and releases calcium ions, thus limiting the injury. When aiding as emergency responder, please only apply the gel with gloves on, so you do not come into contact with fluoride ions yourself!
- 1 eye wash pouch bottle
- 1 pair of first-aid scissors to cut away clothing
- 1 pair of thick, green, HF-resistant gloves (brand/type: KCL Camatril velours)
- 1 red plastic bag with binder for contaminated waste
- Information sheet HF-risks
- Internal emergency protocol HF
- 1 hospitalization form
- Hospital protocol NVZA/RIVM: [toxicology treatment information \(Dutch link\)](#)



Please register all actions that you have taken, on the hospitalization form, and hand over the anti-HF kit to the ambulance paramedics! The *toxicology treatment information* in it will shorten the time required by the physician, and it will make it immediately clear that it involves HF injuries.

[Report every incident](#) according to the university's incident report procedure (see AMD infosheet A030 *What to report?*).