

Information Sheet

Safe handling of hydrogen fluoride and hydrofluoric acid (HF)

Hydrogen fluoride and hydrofluoric acid (molecular formula: HF) are largely used in laboratories of the ETH Zurich. As the properties and therefore, also the hazards of these chemicals are different than those of other acids, special precautions and safety measures have to be respected when handling these substances.

Pure hydrogen fluoride:
Hydrofluoric acid:

gaseous
aqueous solution of hydrogen fluoride

Tab. 1: Labeling, hazard statements and precautionary statements for HF

Labeling according to GHS (new system)		
<p>Danger!</p>	H300	Fatal if swallowed
	H310	Fatal in contact with skin
	H314	Causes severe skin burns and eye damage
	H330	Fatal if inhaled
	P260	Do not breathe dust / fume / gas / mist / vapors / spray
	P264	Wash hands thoroughly after handling
	P280	Wear protective gloves / protective clothing / eye protection / face protection
	P284	Wear respiratory protection
	P301+310	If swallowed: Immediately call a poison center or doctor/physician
	P302+350	If on skin: Gently wash with soap and water

Why is hydrofluoric acid so dangerous?

General properties:

- relatively weak mineral acid
- not flammable
- evaporates at 80°C
- aggressive against glass → **NEVER use glassware when handling hydrofluoric acid!**
- miscible with water
- characteristic odor (even at very low concentrations)

Caustic Effect:

- Depends on concentration, temperature, duration of contact, amount
- Symptoms of Skin burns and damage to eyes or mucosa may occur after a latency period
- HF diffuses very easily through the skin into tissue cells → necrosis

Toxicity:

- Imbalance of the calcium- and magnesium metabolism, caused by the formation of insoluble salts
- Immediate poisoning of cells caused by the formation of soluble salts
- Bones can be irreversibly damaged

Be very careful and cautious when handling hydrofluoric acid or hydrogen fluoride!

How can I protect myself?

- Respect the safety measures stated in the material safety data sheet (MSDS)
- Never work alone
- Always use equipment which is suitable for handling these chemicals (no glassware!)
- Flasks containing hydrofluoric acids have to be handled slowly and with care.
- Always wear **complete and suitable personal protective equipment (PPE)**; depending on the concentration, PPE include:
 - safety goggles and face shield
 - lab coat, apron
 - protective gloves
- **Before starting your work**, get information on what to do in case of emergency / First Aid. Check if there is an HF Emergency Kit available in your lab. If not, order one via cabs@ethz.ch.



Fig.1: HF Emergency Set

- always handle these chemicals in a fume hood (with exhaust washing system, if needed)
- amount / concentration: **as low as possible, as diluted as possible**
- mark all containers - also waste containers - and if necessary, also the workplace
- all equipment in contact with these chemicals has be rinsed thoroughly with water after use
- Spilled liquids and splashes have to be cleaned up immediately! The surfaces have afterwards to be wiped thoroughly with plenty of water.

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