

# HF Instruction

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Safety Office Faculty of  
Science (AMD)



Universiteit Leiden  
The Netherlands

Leiden University. The university to discover.

# Hydrogen fluoride

HF is a ~~strong~~ acid



HF is a systemic poison with delayed effects

due to FLUORIDE ions

Fluoride ions etch almost every inorganic material

# Contents

- Exposure to HF and effects
- Precautions and Anti-HF kit
- What to do in case of HF exposure

# Effects

- Injury depending on
  - Concentration
  - Exposure time
  - % affected skin area
- Local (skin, eye, mucous membranes):  
chemical burns, blisters, necrosis
- Systemic (skin, respiration, ingestion):  
electrolyte disbalance, reaction fluor ions with calcium from bones, precipitation calcium salt in organs, may lead to heart failure and death.

# HF skin exposure

Two types of effects

- Concentration > 50%:
  - Acute toxic effect
  - Very painful (blisters and tissue destruction)
- Concentration < 20%:
  - delayed effects (up to 24 h)
  - Pain follows

# Injury by hydrogen fluoride (1)



HF (high concentration) inside glove  
Marks of glove visible on skin  
Reddish-white decoloration and large blisters

# Injury by hydrogen fluoride(2)

- Dutch medical magazine  
(*Nederlands tijdschrift voor geneeskunde*)

## Case: “ somebody with necrosis on a finger tip”

Day 0: man works with cleaner (containing < 20% HF) to remove graffiti.

Day 1: goes to hospital, sore index finger, swollen and blue. X-ray shows no broken bone. Is sent home with bandage and advised to rest.

Day 2: goes to hospital again, even more pain. Also his thumb and ring finger are swollen around the nail. Index finger shows signs of necrosis. Only now the man tells about the work on day 0. Doctors apply calcium levulate gel to the whole hand.

Day 3: the index finger is also infected and the top ligament is amputated. Nails of the other 2 fingers are extracted because the antidote does not pass the nails. Calcium levulate gel is applied to the whole hand again.

After 6 weeks the amputation wound is healed.

# Precautions

- Work in closed system if possible
- Always in fumehood
  
- Work carefully (practise “as if”)
- Good planning of work (never alone)
  
- Lab coat, safety goggles, special gloves (see last slide)
  
- Anti-HF kit at hand
- Calcium carbonate solution to neutralise spills



# Anti-HF kit

- Know the contents:
  - Anti dote: tube calcium gluconate 2,5% and eyewash bottle
  - Internal emergency protocol HF (NL/Eng)
  - Gloves, scissors, plastic waste bag
  - Hospital form and protocol

# Treatment

- Exposure route? Read emergency protocol
- Directly start treatment/acting
- Call BHV / ambulance
- Give form and kit to ambulance personnel
- Report any incident to AMD

# Now that you know all this

Does the benefit of using HF outweigh the risks?  
Are there alternatives (= best precaution!)?

You will never work without an anti-HF kit present

You make sure people in your environment know  
the risks and first aid protocol

You will instruct those working with HF under your  
supervision / in your lab

# Finally

This instruction was about HF

HF is a systemic poison with delayed effects  
due to FLUORIDE ions

This effect may be present in other substances that generate fluoride ions.  
Always read the MSDS!

# Suitable gloves

- For HF you need thick chemical gloves (not the general thin type from the box in the lab)
- “Suitable” gloves for working with HF and other chemicals can be found from supplier’s chemical resistance guide like [http://www.ansellpro.com/download/Ansell\\_8thEditionChemicalResistanceGuide.pdf](http://www.ansellpro.com/download/Ansell_8thEditionChemicalResistanceGuide.pdf) (or: Google *glove guide chemical resistant*)
- Green gloves in the anti-HF kit are of type “Camatril velours” (supplier KCL) which is nitrile and is a “multipurpose” glove selected for first aid use. Supplier’s data: HF resistance for <40% HF is 120 min and >48% HF is 30 min

ALWAYS EXAMINE GLOVES BEFORE USE!