

# HEXAFLUORINE®

SOLUTION

Emergency Washing Solution Specific to Hydrofluoric Acid Hazard

## HF HAZARD

Hydrofluoric acid (HF) is a chemically weak acid ( $pK = 3.2$ ). HF is partially dissociated in  $H^+$  and  $F^-$  ions when in solution in water.

HF is a hazardous acid for the human body for two reasons:

- **It is corrosive.** When dissociated,  $H^+$  ions are released. They can lead to formation of cutaneous or ocular chemical injuries.
- **It is toxic.** When dissociated, fluoride  $F^-$  ions are released.  $F^-$  ions are able to chelate cells calcium  $Ca^{2+}$  and magnesium  $Mg^{2+}$  ions thus causing a painful physiological unbalance that can even lead to a cardiac arrest. Release of extracellular potassium  $K^+$  ions are responsible for pain.

Same hazard exists with mixtures of chemicals that release fluoride  $F^-$  ions in an acidic medium ( $pH < 7$ ).

## ▶ HEXAFLUORINE® emergency washing solution has a multiple action:

It removes rapidly harmful chemicals ( $HF$ ,  $H^+$ ,  $F^-$ ) from the surface of the exposed tissue thanks to a **mechanical washing and dilution**.

As it is a **hypertonic solution**, it limits the penetration of chemicals through the tissues by osmotic action.

It can **act on the  $H^+$  proton** in order to limit HF's corrosive action.

It **chelates fluoride ions  $F^-$**  to stop their aggressiveness.



## Efficacy and Innocuousness

*Ex vivo*<sup>1,2</sup> and *in vivo*<sup>3</sup> studies showed that washing with HEXAFLUORINE® solution, when used in the first minute following the splash gives better results than an emergency washing with water, even if the HF is very concentrated (70% HF).

### Examples of industrial use of HEXAFLUORINE® solution:

- 32 cases of concentrated HF splashes, concentrated or diluted, pure or as mixture, have been published<sup>4,5</sup>
- Pain stops rapidly after every washing, this eases secondary care.
- No sequelae have been reported after those accidents, among which 5 could have been fatal.
- Lost time of work is minimized

The use of an active emergency washing solution such as HEXAFLUORINE® solution, immediately after the splash, helps **to limit or to prevent HF penetration and reaction with human tissues**. Development of the lesion, associated complications and sequelae are also limited.

Several applications of Calcium Gluconate may be recommended for medical treatment of proven injuries, following the protocol of the medical doctor in charge.

▶ All information is available on [www.prevor.com/hexafluorine](http://www.prevor.com/hexafluorine)

1 - "Analysis of hydrofluoric acid penetration and decontamination of the eye by means of time-resolved optical coherence tomography" Burns, June 2008 ;34(4):549-55

2 - "Comparative Experimental Decontamination of concentrated Hydrofluoric Acid (HF) in an ex vivo Human Skin Model" communication orale présentée au congrès de International Society for Burns Injuries, septembre 2008, Montréal, Québec

3 - "Hexafluorine for emergent decontamination of hydrofluoric acid eye/skin splashes" Semiconductor and Safety Association Journal, 2000, Summer, 14 :30-33

4 - "Efficacy of Hexafluorine® for emergent decontamination of hydrofluoric acid eye and skin splashes" Veterinary and Human Toxicology, 2001, 43(5): 263-265

5 - "An improved method for emergent decontamination of ocular and dermal hydrofluoric acid splashes" Veterian and Human Toxicology, 2002, 46(4): 216-218

# Technical information regarding HEXAFLUORINE® solution

## 1 . DESCRIPTION

HEXAFLUORINE® solution: Emergency washing solution for cutaneous and ocular splashes of hydrofluoric acid and its acidic fluoride derivatives.

## 2 . CLAIMS

- First aid device for washing splashes of hydrofluoric acid (HF) or acidic solutions containing fluorides.
- HEXAFLUORINE® solution mechanically draws away the excess chemical and dilute it. It prevents aggressive substance penetration, stops the acid action and chelates fluoride ions.
- At the workplace, HEXAFLUORINE® solution used within the first minute following the splash, helps to remove the chemical before it causes the injury.
- In case of delayed washing, HEXAFLUORINE® solution allows to limit the development of the injury and facilitates the secondary treatments such as calcium gluconate application which acts on fluoride F<sup>-</sup> ions. This minimizes the risk of severe sequelae.
- HEXAFLUORINE® solution may also be used on all acids.

## 3 . MAIN FEATURES

- Colorless liquid
- Mechanical effect by washing and dilution: main effect of the washing, physical effect.
- Hypertonic liquid: secondary physical osmotic action
- Amphoteric and chelating molecule that fixes acids and chelates fluorides F<sup>-</sup> ions: secondary effect in addition to mechanical effect.
- Shelf life: 2 years

## 4 . SAFETY / INNOCUOUSNESS

- CE 0459 marking
- Class IIa Medical device, may be used on injured tissues
- Non-irritant (to eye and skin), non-toxic (DL<sub>50</sub> > 2000 mg/kg)
- Non-sensitizing
- Sterile solution (sterilized by autoclave)
- Manufactured in France by PREVOR laboratory

## 5 . INSTRUCTIONS FOR USE

### ■ Storage:

HEXAFLUORINE® solution freezes at -1 °C and recovers its properties when warming up. It remains stable up to 100 °C.

### ■ Recommended temperature of use:

between 15 and 35 °C

### ■ Use as emergency washing after a cutaneous or an ocular hydrofluoric acid splash:

1. Start washing as soon as possible with HEXAFLUORINE® solution, preferably within the minute following the splash and as first intention

2. Remove clothing or/and contact lenses
3. Continue the washing (for about 3 minutes for an eye and 5 minutes for skin)
4. Use the entire dispenser
5. Seek specialized medical advice

### ■ Use as delayed washing:

1. Wash for 3 to 5 times longer than the time of contact of hydrofluoric acid on the eye or skin. Ocular washing should not last for more than 15 minutes.
2. According to a therapeutic protocol determined by the medical doctor in charge, apply calcium gluconate gel on skin.
3. Seek specialized medical advice.

## 6 . PACKAGING



- 500 mL **Portable Eyewash**
- **Wall-mounted station** with 2\*500 mL Eyewashes and 1\*200 mL AfterwashII® solution bottle  
**Optional:** 1\*40 g tube of 2.5 % calcium gluconate gel
- 5 L **Autonomous Portable Shower (DAP)**
- **Full station** containing 1 Autonomous Portable Shower (5 L), 2\*500 mL Eyewashes, 1\*200 mL AfterwashII® solution bottle.  
**Optional:** 1\*40 g tube of 2.5 % calcium gluconate gel
- All dispensers are standard-compliant to EN 15154 part 3 and 4 and recommended by the French National Health Insurance Department (2008).

## 7 . MEDICAL DEVICE VIGILANCE

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