DIPHOTERINE® solution

CAPTURES THE CORROSIVE AND ELIMINATES IT

PREVOR
ANTICIPATE AND SAVE
Toxicology Laboratory & Chemical Risk Management

In accordance with the Standard EN 15154

CE 0459

The chemical burn

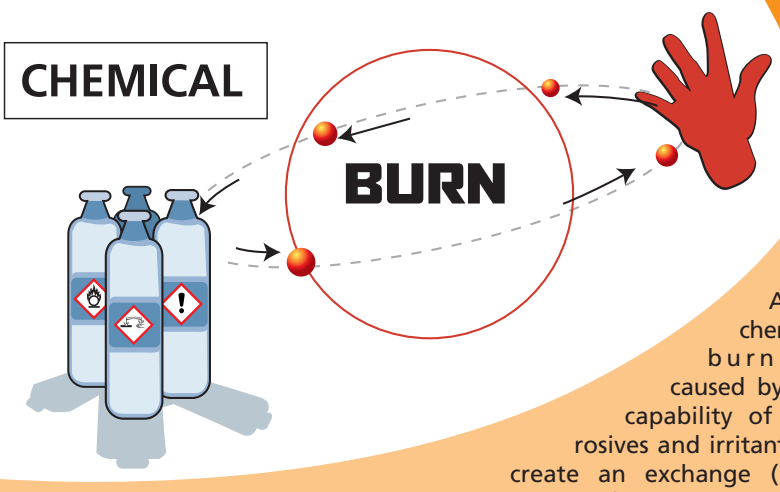
Two categories of chemicals can provoke a burn by a direct contact: corrosives and irritants.
The seriousness of the chemical burn depends on the number of cells destroyed and will be more significant in the case of corrosives. In some cases, the aggressive product can also have toxic or harmful effects, the consequences of which should not be neglected.

The aggressive chemicals

CORROSIVE	IRRITANT
	
Concentrated acids and bases	Solvents, oils…
SIGNIFICANT REACTIONS	WEAK REACTIONS
IRREVERSIBLE EFFECTS	REVERSIBLE EFFECTS

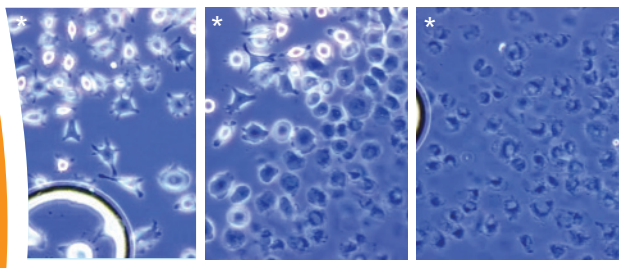
Specific danger if combined with toxic risk
(example - Hydrofluoric acid)

The mechanism of a chemical burn



A chemical burn is caused by the capability of corrosives and irritants to create an exchange (ion, proton, electron…) with the tissues of the skin or the eye. The degree of the burn will depend on the number of molecules destroyed and on the type of modification (reversible or irreversible)

The action of soda NaOH:



Healthy cells as seen under a microscope

Addition of soda 0.5N (2%)

Cells are completely destroyed

* *Picture source: ACTO, Prof. Norbert Schrage, Aachen.*

The principles of emergency washing

To stop the aggressive reactions

- There are 6 types of aggressive chemical reactions

H^+ • Acid •

OH^- • Basic •

• Oxidising •
TRANSFER E^-

• Reducing •
TRANSFER E^-

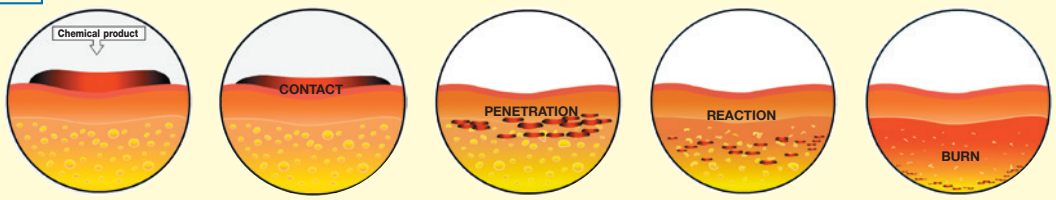
• Chelating •
Ca^{++}

• Solvent •
ACETONE
ETHANOL

To be effective regardless of the type of accident and to avoid the risk of error for the victim, it is necessary to be able to stop these 6 aggressive reactions.

A POLYVALENT PRODUCT IS ESSENTIAL

To stop the evolution of the burn

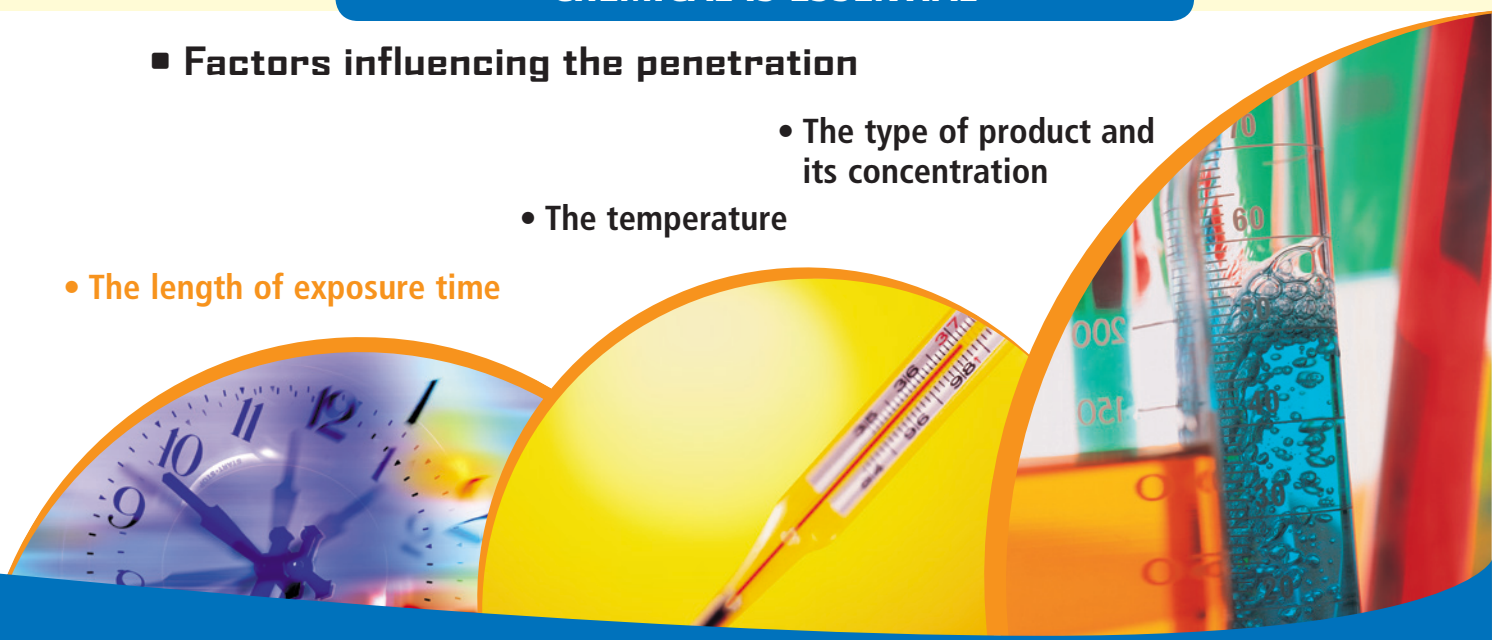


A chemical burn is initiated by the contact between the aggressive product and the skin or the eye. Following this contact, a part of the aggressive chemical will penetrate into the tissue and cause destruction of the cells.
To effectively decontaminate the splash, it will be necessary, not only to decontaminate the product on the surface, but also to control its penetration inside the tissue.

A PRODUCT ABLE TO STOP THE AGGRESSIVE CHEMICAL IS ESSENTIAL

■ Factors influencing the penetration

- The type of product and its concentration
- The temperature
- The length of exposure time



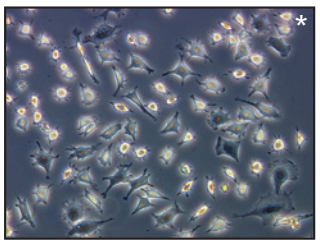
First-aid treatment:
From water...

The principles of washing with water

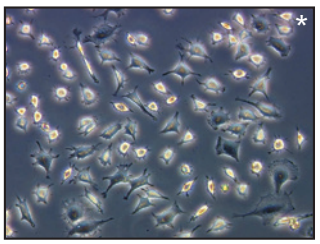
- a washing of the surface to remove quickly the aggressive product
- the dilution of the chemical to reduce its aggressiveness
- a universal product avoids the risks of error at the time of the accident

What are its limitations?

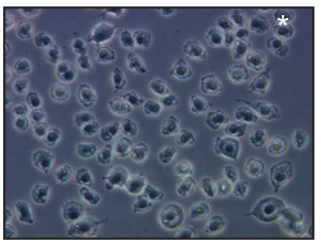
- the concentrated products which penetrate very quickly
- the intervention time of 10 seconds which is not always achievable
- the washing comfort : risk of hypothermia under a water shower
  difficulty to open the eye



Healthy cells as seen under a microscope.



The beginning of washing: water penetrates inside the cells and makes them expand.



The end of washing : cells are destroyed because water causes them to burst.

**photo : ACTO, Pr. Norbert Schrage, Aix la Chapelle*

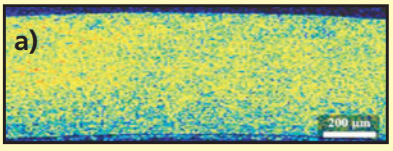
The ideal product in case

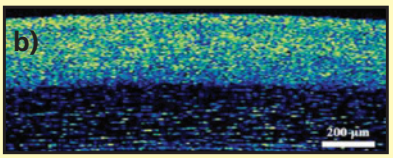
Retain the advantages of water:

- Fast washing of the surface
- Single protocol

Ex vivo test on the eye

Efficacy of the active washing with DIPHOTERINE® solution:
Ex Vivo EVEIT Model - OCT





Rabbit corneas, 16 minutes after an application of 500 µL 1M NaOH for 20 s.

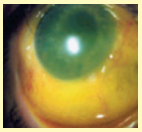
a) without any washing
b) with DIPHOTERINE® solution washing

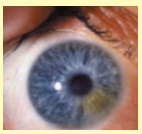
Corrosive penetration is stopped.
The structural changes in the stroma are negligible. The endothelium is completely preserved.

Sources : Burgher, Mathieu, Fosse, Rihawi, Gérard, Merle, Schrage, Ocular chemical burn : Experimental proof of the influence of key parameters on the diffusion and the decontamination. 114th Congress of the SFO Paris May 2008.

EXPERIENCE FEEDBACKS:

Result on the eye with a delayed washing





DIPHOTERINE® solution a better healing

> Ammonia ocular burn, wash

- Assessment before washing scale, which usually requires
- After a washing with 1 litre and 6 months of appropriat requiring a corneal graft, a

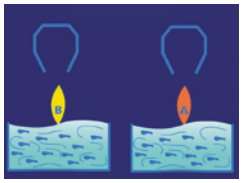
Sources : Gérard M, Merle H, Chiambaretta F, Ri ocular burn. Burns 2002;7:670–3.

DIPHOTERINE® solution is recognized as a reference solution by the SFO, Fren

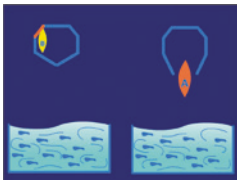
...to DIPHOTERINE® solution

• The principles of washing with DIPHOTERINE® solution

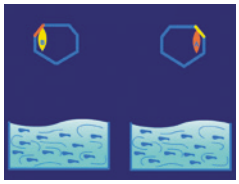
- It is a liquid which enables it to obtain the same effect as water on the surface of the skin or eye.
- DIPHOTERINE® solution is an amphoteric chelating agent, which enables it to stop the aggressiveness of the chemicals in a polyvalent way (***for HF and its derivatives, use the HEXAFLUORINE® solution)***.
- DIPHOTERINE® solution mechanism can be illustrated as follows:



DIPHOTERINE® solution will attract the chemical in contact with the tissues.

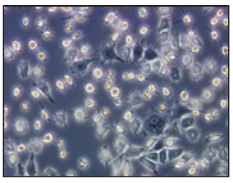


The acid site of DIPHOTERINE® solution will fix bases to make them harmless.

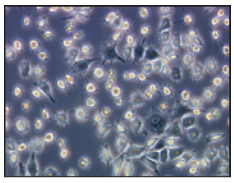


The basic site of DIPHOTERINE® solution will fix acids to make them harmless.

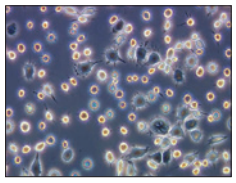
- DIPHOTERINE® solution, unlike water, will **stop the penetration** of the chemical.



Healthy cells as seen under a microscope.



Beginning of the washing with DIPHOTERINE® solution: the cells contract slightly.



End of the washing: the cells are preserved.

of a chemical splash must:

Bring improvements to compensate for the limitations of water:

- Guarantee a total efficacy whatever the product
- Increase the intervention time
- Improve washing comfort to increase the effectiveness

n retains an interest in delayed washing for

ned with DIPHOTERINE® solution after 1 hour

with DIPHOTERINE® solution: grade IV burn on the Roper-Hall
a corneal graft to achieve healing.

of DIPHOTERINE® solution within one hour after the splash
e care, the victim regained a visual acuity of 14/20 without
first in the history of medicine.

gal Rigal D, Schrage N. An amphoteric rince used in the emergency treatment of a serious

RESULTS

EXPERIENCE FEEDBACK:

Results on the skin in emergency

Independent retrospective study conducted by Dr Donaghue, chief medical officer of Alcoa Australia (alumina refineries). It covers 180 cases studied from May 1st 2005 to April 30th 2008, specifically on the skin.

Severity scale and associated signs	FIRST AID EMERGENCY SOLUTION	
	First washing with a DIPHOTERINE® DAP	First washing with water
1 (no sign)	**52,9%** (73 cases)	**21,4%** (9 cases)
2 (erythema)	**39,1%** (54 cases)	**54,8%** (23 cases)
3 (blisters)	**7,2%** (10 cases)	**19,0%** (8 cases)
4 (more serious)	**0,7%** (1 case)	**4,8%** (2 cases)
TOTAL	**100%** (138 cases)	**100%** (42 cases)

Criteria used:

1 : Time elapsed between the chemical splash and clinical evaluation.
2 : Time elapsed between the chemical splash and application of DIPHOTERINE® solution.
3 : Percentage of skin surface affected by the chemical.

ch Society of Ophtalmology and the DOG, Deutsche Ophtalmologische Gesellschaft

How to use

A sterile washing solution

Dispensers for the skin, in the form of micronised sprays (optimising the surface of contact)

ALL THESE PACKAGES MEET THE NEW EUR

DAP

Wall mounted station extreme cold

MINI DAP

MICRO DAP

> To decontaminate an entire body

Typical equipment for locations where there are large quantities of chemicals :
- Production areas
- Warehousing areas
- Off-loading and decanting areas

> To decontaminate a face or an arm

An ideal complement for a Wall Mounted Eyewash, where the quantities of chemicals are limited:
Laboratories

> To decontaminate a hand

Ideal personal equipment for small splashes:
Workshops
Maintenance personnel

Washing must begin within the first minute following the splash

Protocol DIPHOTERINE®

1/ Go away from the danger

2/ Get undressed

DIPHOTERINE® solution?

To be used immediately after the accident

Dispensers for the eyes, equipped with an ergonomic eyecup, which assists the opening of the eye for a more effective washing

OPEAN STANDARD EN 15154 PARTS 3 AND 4

LPM

LMPE

Wall mounted station extreme cold

SIEW

Supplied with the holster

> To decontaminate an eye

To carry on oneself or to put in the work area:
- Laboratories
- Warehousing areas

Portable eyewash: when the equipment must be mobile: first aid kits, emergency vehicles, infirmaries

Washing must begin within the first minute following the splash

> Kit for chemical splashes

In areas where fixed equipments are appropriate:
- Laboratories
- Production areas
- Warehouse areas
- Decanting areas

> Personal equipment to decontaminate an eye:

Ideal for the maintenance personnel
Imperatively worn by individual

Washing must begin within the first 10 seconds following the splash

l for the first aid intervention with solution in the event of a chemical splash

3/ Wash as quickly as possible, respecting the instructions for use of DIPHOTERINE® solution

4/ Alert

5/ Seek medical advice

PREVOR

ANTICIPATE AND SAVE

Toxicology Laboratory & Chemical Risk Management

People saving People

WE HELP YOU TO FACE CHEMICAL HAZARDS

01 Understand chemical products

RISKS

DIAGNOSE

MASTER

TOXICITY

BURNS

DEEPEN

ANALYZE

02 Find solutions

SAFETY

DECONTAMINATION

PROTECT

HEALTH

ANTICIPATE

SAVE

ENVIRONMENT

NEUTRALIZER/ ABSORBER

MAKE THE COLLECTION EASIER

MANAGEMENT ASSISTANCE

03 Advise

ACCOMPANY

UNIVERSITY TEACHING

TRANSFER KNOWLEDGE

HELP TO EVALUATE

STANDARDISATION

SHARE

REGULATION

TRAIN

References
They are trusting us

AIR LIQUIDE - AKZO NOBEL - AOSTE - AP-HP - ARCELORMITTAL - ARJOWIGGINS ARKEMA - ASTRAZENECA - BAYER - BONDUELLE - BRENNTAG - CARGILL - CEA CEPHALON - CLARIANT - COCA COLA - CRISTAL UNION - DANONE - DASSAULT DCNS - DOW - ECOLAB - EDF - ERAMET - FAREVA - GDF SUEZ - HOLCIM HUNTSMAN - IBERDROLA - IMERYS - INTERNATIONAL PAPER - IPSEN - IRSN ITALCEMENTI - LACTALIS - L'OREAL - NESTLE - PREZIOSO - QUARON - RIO TINTO ROQUETTE - ROULLIER - SAFRAN - SAINT GOBAIN - SAIPOL - SANOFI - SERVIER SIAAP - SIGMA ALDRICH - SNCF - SOLVAY - SUDZUCKER - TEREOS - TERRENA THALES - TOTAL - VALEO - VALLOUREC ET MANNESMAN - VEOLIA - VINCI - YARA YVES ROCHER...

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