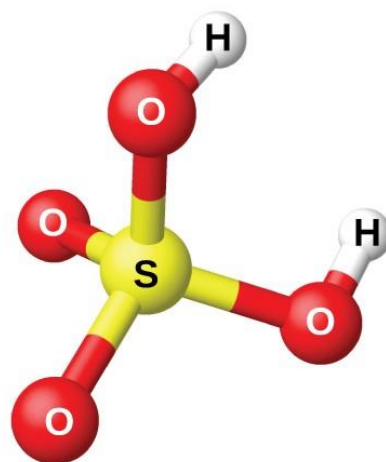


Mapa Professional keeps you informed...

A look at the EN ISO 374: 2016 standard
Which materials are suited to sulfuric acid?



A few words to begin...

Sulfuric acid is used in many industries. It is considered as an extremely corrosive product for users when concentrated and handling it requires special care.

In the case of protective gloves, certain materials should be avoided when handling concentrated product. This is the case for nitrile. Mapa Professional therefore offers alternatives adapted to users' needs.

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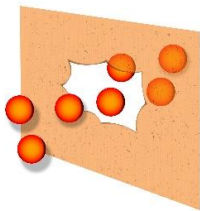
Which alternatives to nitrile does Mapa Professional offer for handling concentrated sulfuric acid?



The Experts at Mapa Professional keep you informed

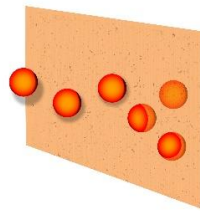
Three criteria must be met to ensure that a material provides effective chemical protection:

Resistance to penetration



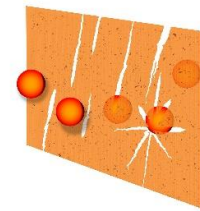
Penetration, or sealing, describes the process of a chemical passing through due to imperfections or porosity in a glove (holes, etc.).

Resistance to permeation



Permeation is diffusion, on a molecular scale, of a chemical through the material making up the glove.

Resistance to deterioration



Deterioration is the alteration of the physical properties of the glove (swelling, hardening, cracking, etc.) due to contact with a chemical.

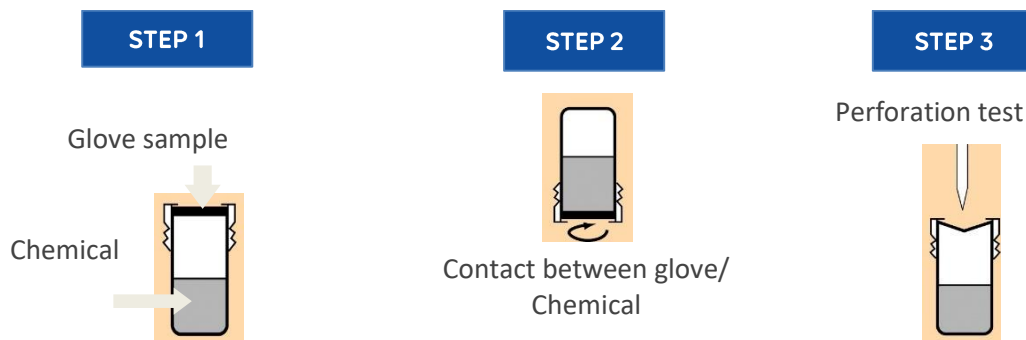
EN 374: 2003 addressed penetration and permeation only.

The revised standard **EN ISO 374: 2016** now also addresses **deterioration**. However, no level of deterioration has been established. The standard requires that the result of the deterioration be provided to the user in the user manual.



How do we measure deterioration of a glove?

Deterioration is tested by measuring the force of perforation (EN 388) before and after exposing the glove to a given chemical for 1 hour.



Deterioration (%) = $(F0 - F1)/F0 \times 100$
F0: force of perforation without contact with the chemical
F10: force of perforation after 1 hour of contact with the chemical

Resistance to deterioration is **essential information** to ensure optimum protection for users of chemical protection gloves. The permeation test is carried out **statically**, which can lead to a **positive test result even when the glove is deteriorated**. In actual conditions of use, the **wearer is not protected** since the passing of the chemical through the glove can be largely altered by the deteriorated state of the material.

Did you know?

The concentration of acids and bases is a key criterion for choosing a suitable glove. Indeed, when the acid or the base is diluted, the material deterioration is less significant and a broader choice of gloves can be offered.

Nitrile glove with sulfuric acid 96%





Nitrile glove with sulfuric acid 50%





How does it work for sulfuric acid?

If only the permeation result is taken into account, it seems that nitrile gloves are suited to this chemical. However, **the deterioration test clearly confirms that the material is not suitable for use with sulfuric acid 96%** (see table below). For this reason, MAPA has chosen not to certify sulfuric acid 96% (L) for its Nitrile gloves.

	Material	Permeation	Deterioration	Photo	Result
Sulfuric acid 96% (L)	Nitrile	30 min (Ultranitrile 485) at 180 min (Ultranitrile 493)	70% to 80%		deteriorated
	Polychloroprene (Neoprene)	200 min (UltraNeo 340) at 480 min (UltraNeo 407)	2% to 22%		good condition









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Which alternatives can be chosen for handling with concentrated sulfuric acid?

Polychloroprene and **natural latex** are the most suitable materials and provide **optimum protection to wearers**. The presence of chlorine in polychloroprene increases the resistance of the polymer to oxidising agents such as sulfuric acid.

A few examples of gloves suited to concentrated sulfuric acid:

Material	Glove reference	Permeation time	Deterioration
Natural latex	Alto 260 	480 min	24%
	Alto 298 	480 min	30%
Polychloroprene (Neoprene)	UltraNeo 407 	480 min	2%
	UltraNeo 420 	225 min	6%
	UltraNeo 450 	225 min	6%
	UltraNeo 339 	223 min	22%
	UltraNeo 340 	200 min	14%
	UltraNeo 401 	115 min	17%



Points to remember

1. How has the ISO 374: 16 standard changed?

The standard initially addressed only two criteria - penetration and permeation - in the assessment of the chemical performance of a glove. Today, the revision of this standard includes a third criterion, which is deterioration.

2. Why can nitrile not be used for handling concentrated sulfuric acid?

During use, a nitrile glove deteriorates significantly when it comes into contact with concentrated sulfuric acid. For this reason, MAPA Professional has chosen not to give the L classification to its Nitrile gloves.

3. Which gloves are suited to concentrated sulfuric acid?

The alternatives proposed for handling concentrated sulfuric acid are as follows: natural latex and polychloroprene (Neoprene).

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The standard EN ISO 374: 2016 is not sufficient when choosing the most suitable glove since the standard covers only a small range of chemicals and uses a permeation time of 30 minutes.

To ensure optimum protection for the wearer for a given chemical, it is important to **refer to the chemical in question** and use the **actual permeation time**.

For handling concentrated sulfuric acid, choose between **the Alto range in natural latex**, and **the UltraNeo range in polychloroprene (Neoprene)** and find the glove best suited to your needs using our online selection guide <http://www.mapa-pro.net/our-gloves/protections/chemical-protection.html>.