A simplified method for monitoring of in-use performance of chemical protective gloves

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Gloves are frequently used as protection against chemical hazards

Whilst they can provide excellent protection, in many cases this does not happen, simply because those selecting and deciding how the gloves should be used do not understand how complex this is.

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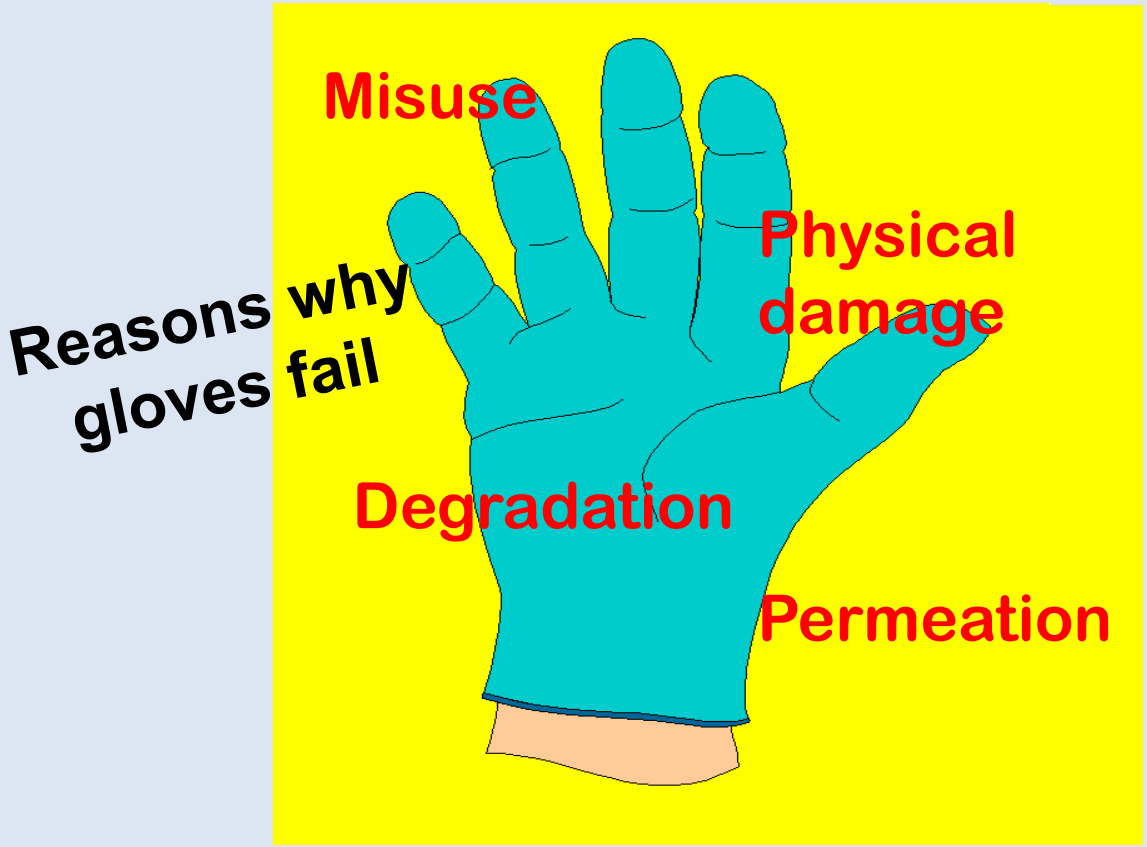


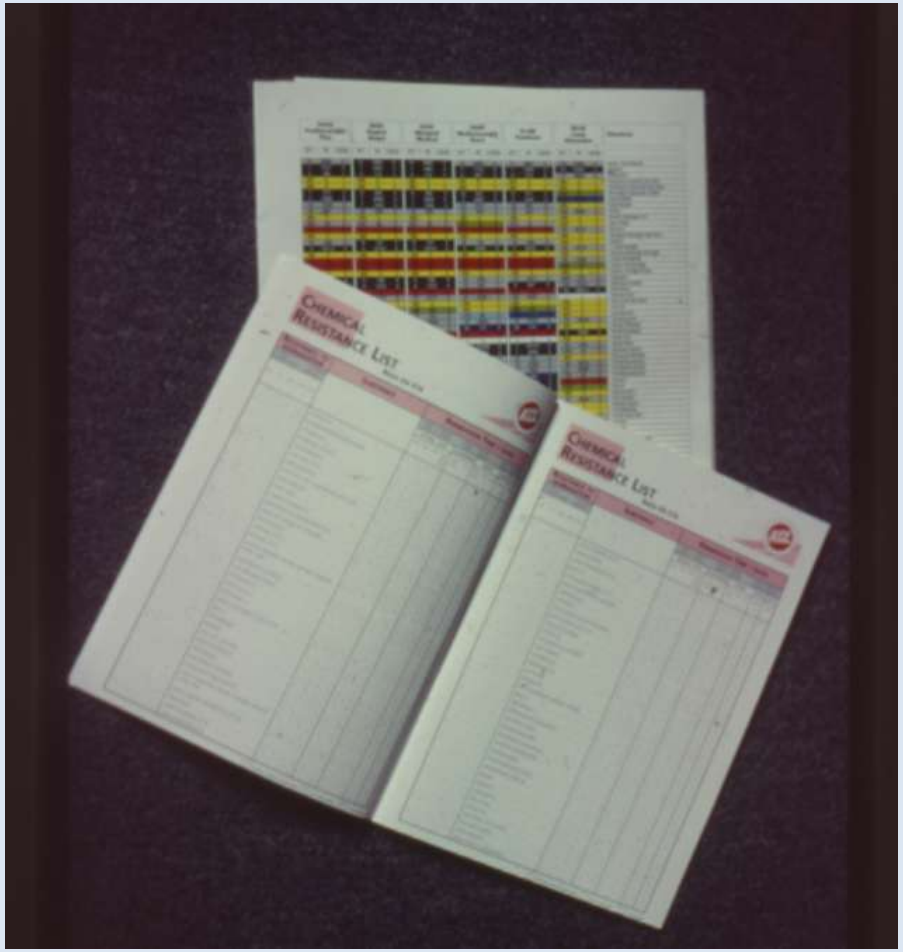
Assessing the SMUT (Safe Maximum Use Time) for chemical protective gloves is complex!

There are many factors which affect how long a glove may be used with safety.

Decrease ←	BTT	→ Increase
Degradation		Volatility
High temperature		Intermittent contact
Mechanical damage		Incomplete contact
Mixtures		Low temperature
Abrasion		Mixture strength
Flexing and stretching		Frequent glove washing
Ageing		
Poor maintenance		

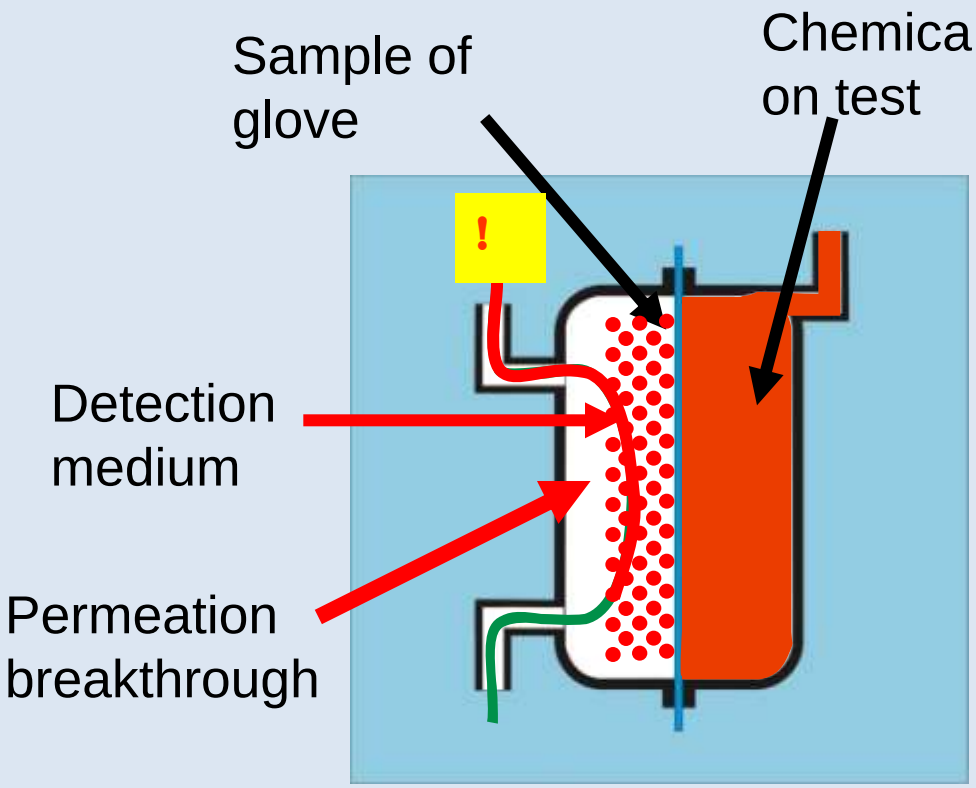
Exactly how we correlate these is uncertain!

Permeation Breakthrough Time . . .



Manufacturers must provide permeation breakthrough data for their gloves for the chemicals for which they claim the glove may be used.

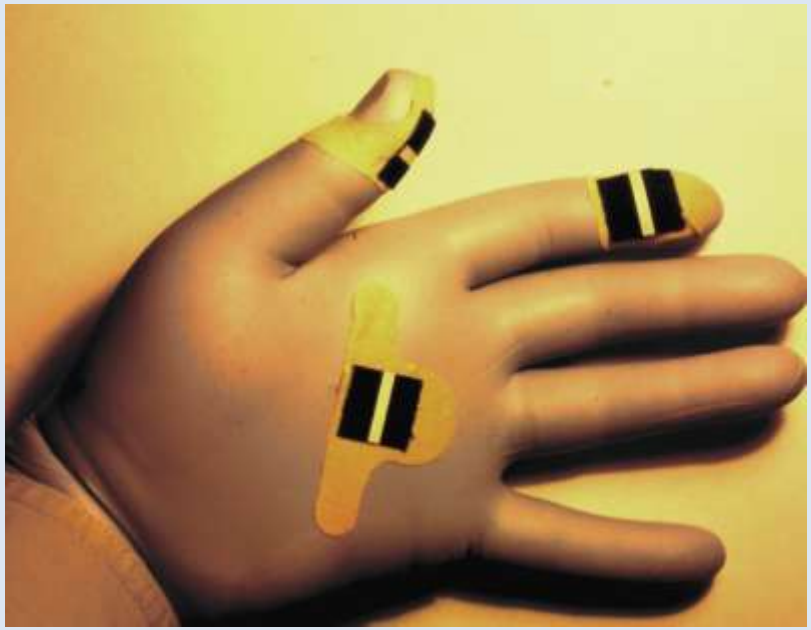
However, this is just the start.



Test is at room temperature, specified as 23ºC 1ºC. When gloves are worn temperature will be considerably higher.

Tests only permeation. Does not allow for degradation, flexing, stretching, abrasion, pressure etc.

Effect of temperature on BTT		
Chemical	BTT @ 23⁰C	BTT @ 35⁰C
n-Butanol	>480	240 (50%)
Diethylamine	60	6 (10%)
Dipentene	>480	36 (7.5%)
Isobutanol	>240	>240 (100%)
Methyl Ethyl Ketone	>1440	>240 (16%)



Tests were performed using activated carbon patches underneath the working glove.

At pre-determined intervals the work was stopped, the working glove removed and the patches replaced. Patches were placed in individual sealed pouches and sent to Prof. Rowell at Sunderland University for analysis.

The patches that first showed evidence of the chemical under test gave an indication of the effective use time for that glove with that chemical for that task.

The results showed that glove performance varied widely depending upon many factors.

A most significant factor was the nature of the task being performed.

In a factory nitrile gloves were being used as chemical protection. The chemical under investigation was xylene.

The manufacturers' data gave the permeation breakthrough time of the glove in use as 36 mins.

Two different tasks were investigated:

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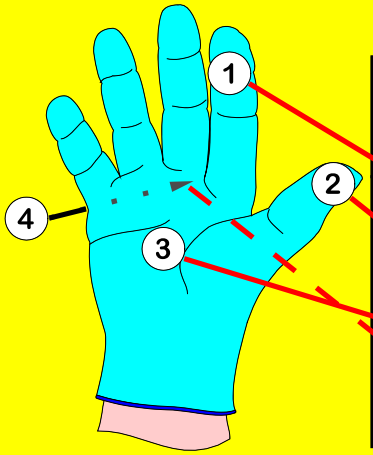
Task 1

Components were being taken from wire baskets and placed on to a conveyor. Contact between glove and xylene was limited to occasional, minor splashes.

No chemical was detectable inside the gloves after two hours.

Task 2

The operator was putting his hands into a tank containing xylene and removing components. These were then wiped and placed on a workbench prior to assembly.



μl detected

Location	Time: (mins) 5	15
1	0	0.35
2	0	0.07
3	0.16	3.16
4	0.33	1.32

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