PermaSURE® - the future of chemical suit selection

Lakeland
Protect Your People™

The PermaSURE® for ChemMax® Toxicity Modeller provides a simple and quick way to calculate how long you are safe against over 4000 chemicals.

If you are involved in chemical suit selection you will be familiar with chemical permeation test breakthrough times - often incorrectly used to indicate whether a wearer is safe or not against a specific chemical.

However, test breakthrough does not indicate when the chemical first breaks through the fabric, but is recorded when the RATE OF PERMEATION reaches 1.0µg / min / cm^2*.

** In the CE standard test. The ASTM standard test uses 0.1ug / min / cm^2.*

Thus, as the graph indicates, at the point of test breakthrough the chemical has already been permeating through the fabric and may have come into contact with the user.

The problem of temperature.

All permeation tests are conducted at 23°C in order to ensure compatibility of results. However, it is known that permeation rate increases with temperature, so if you work in a higher temperature, permeation will be faster than indicated by a test.

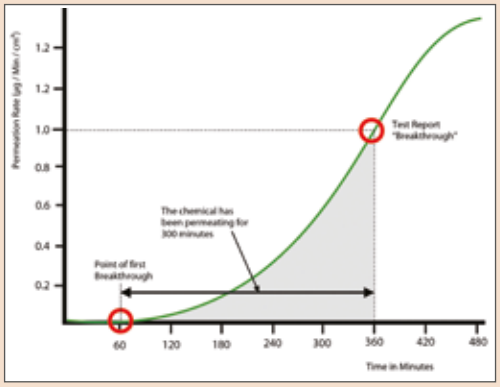
Does this mean you are safe or not?

Without more analysis of the volume permeated and the toxicity of the chemical, you simply don't know.

The fact is, permeation testing is designed and suitable for comparisons of fabric permeation resistance performance but provides no information about how long a user is safe against a specific chemical.

Fortunately safe-use times can be calculated. Two methods are described overleaf.

Graph of Permeation Rate



Only through calculation of chemical volumes permeated and an understanding of the toxicity of the chemical can a 'safe-use time' be assessed.

PermaSURE® provides a quick and easy way to make such assessments and to calculate real-world safe-use times.

How to calculate safe-use times

Selection of a chemical suit should include consideration of how three groups of factors affect the choice:

1. The chemical? The most critical factor. "How long am I safe?"

2. The task/ hazard type? What form is the hazard? Dust? Liquid? Gas? Aerosol, light or jet spray?

3. Physical / enviroment factors What physical or other factors in the environment might influence garment choice?

For a step-by-step guide to relevant factors, see the Lakeland Guide to Chemical Suit Selection

Permeation test breakthrough does not indicate safe-use of a suit.
A critical part of the chemical assessment is the calculation of a safe-use time.

How to calculate safe-use times → Two key pieces of information are required → Volume permeated; Chemical Toxicity — How much of it will cause harm?

There are TWO methods:

Method 1 Manual

Research to identify information required

A. Rate of permeation of the chemical through the fabric.
Can be assessed from some full permeation test reports. Consider possible effect on permeation rate of real-world temperature.

B. Toxicity of the chemical: 'what volume may cause harm?'
Can be identified from various sources including some Safety Data Sheets.

Calculate possible volume permeated:

Permeation Rate
x
Area of Contamination
x
Duration of Contamination
=
Volume Permeated

Compare **volume** permeated with **chemical toxicity**:

If volume permeated < chemical toxicity = SAFE

If volume permeated > chemical toxicity = NOT SAFE

Manual calculation is challenging because of the difficulty in obtaining key information such as permeation rates and chemical toxicity limits. It is also very difficult to account for variations in temperature. Thus manual calculations are inevitably time consuming and inaccurate.

Manual calculation of a 'safe-use' time can take anything from several hours to several weeks, subject to information availability.

Method 2 PermaSURE®

Log onto PermaSURE®

works on any browser-enabled device

Free to use for users of Lakeland's ChemMax® chemical suits.

Select suit type PermaSURE® works with ChemMax® 3, ChemMax®4 Plus and Interceptor® Plus

Input real world data Suit Temperature - *What is the likely temperature of the suit in use?*
Exposure Time - *How long will the task take?*

Select Chemical Over 4,000 chemicals in the database.

Click Calculate Within seconds, PermaSURE® models the permeation rate, calculates volume permeated and indicates whether you will remain safe in the input exposure time.

PermaSURE® uses molecular modelling to accurately calculate permeation rates and volume permeated according to temperature.

It then compares this to published toxicity limit data on the specified chemical to indicate the safe-use time.

Contact Lakeland to learn more about **chemical suit selection**, the **ChemMax® range of chemical suits** or a demo of the free **PermaSURE® safe-use time toxicity modeller**.