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Att.: Nicole Miller

Date
November 2, 2012
Your ref.:
Our ref.: G1906606Ver2/JH

Test report

Sample material

Sample identification	Chemical Protective Glove: Lab no. G1906606: Nitril NextGen no 171070412
Test Chemical	96% Sulphuric acid, 40% sodium hydroxide and n- Heptane as challenge chemical Monitoring breakthrough of 50% Sulphuric acid and 40% sodium hydroxide continuously with pH - meter and n-Heptane is monitored continuously by GC/FID.
Receipt of samples	August 30, 2012
Analytical period	September 3 – November 2, 2012

Applied methods

Method	Parameter	Break through LOQ value	U _m ①
EN 374-3	Permeation rate and break through defined as 1 µg/cm ² /minute	0.01 µg/cm ² /min.	20%
ASTM F739	Permeation rate and break through defined as 0.1 µg/cm ² /minute	0.01 µg/cm ² /min.	20%

Principle:

The protective glove was fixed between the two compartments of a standard permeation cell. The outer side of the glove in test was covered with a solution of the challenge chemical – hence the glove was exposed continuously. The whole test area of 19.4 cm² was exposed. The cell temperature was kept at 23 °C through out the test.

Method GC/FID:

The internal side of the cell was flushed with synthetic air as collection medium in an open loop and the permeation of volatile organic solvents was monitored continuously by passing part of the collection medium to a flame ionisation detector (FID), calibrated against toluene. For determination of permeation rate the substance specific response factor was applied. This method was applied to the challenge chemical n-Heptane.

Method for detecting the test chemical 50% Sulphuric acid and 40% sodium hydroxide:

The internal side of the cell was flushed with water as collection medium in a closed loop and the permeation of sulphuric acid and 40% sodium hydroxide was monitored continuously by pH and conductivity electrode placed in the loop.

The determination has been carried out in triplicate.

① U_m (%): The expanded uncertainty U_m is equal to 2 x RSD%, see also www.eurofins.dk. Keyword: Uncertainty

Test Result

Test results are summarised in table 1 below. See detailed results on the following pages. Test data and results for protective glove Nitril NextGen no 171070412 are reported below in table 2 to 7 and the permeation recordings in figure 1 to figure 3

The test results relate only to the items tested.

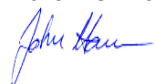
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Analytical results

Tabel 1. Permeation test results

Glove: Nitril NextGen no 171070412						
			Breakthrough time		Permeation rate at steady state	Performance level
			EN 374-3	ASTM F739	ASTM F739	EN 374-1
No.	Challenge chemical / product tested	CAS	Min	Min	µg /cm ² /min.	
1	40% sodium hydroxide	1310-73-2	>480	>480	< 0.01	6
2	96% Sulphuric acid	7664-93-9	2.4	0.5	0.2	0
3	n-Heptane	142-82-5	>480	15	0.60	6

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John Hansen
MSc. Chemistry

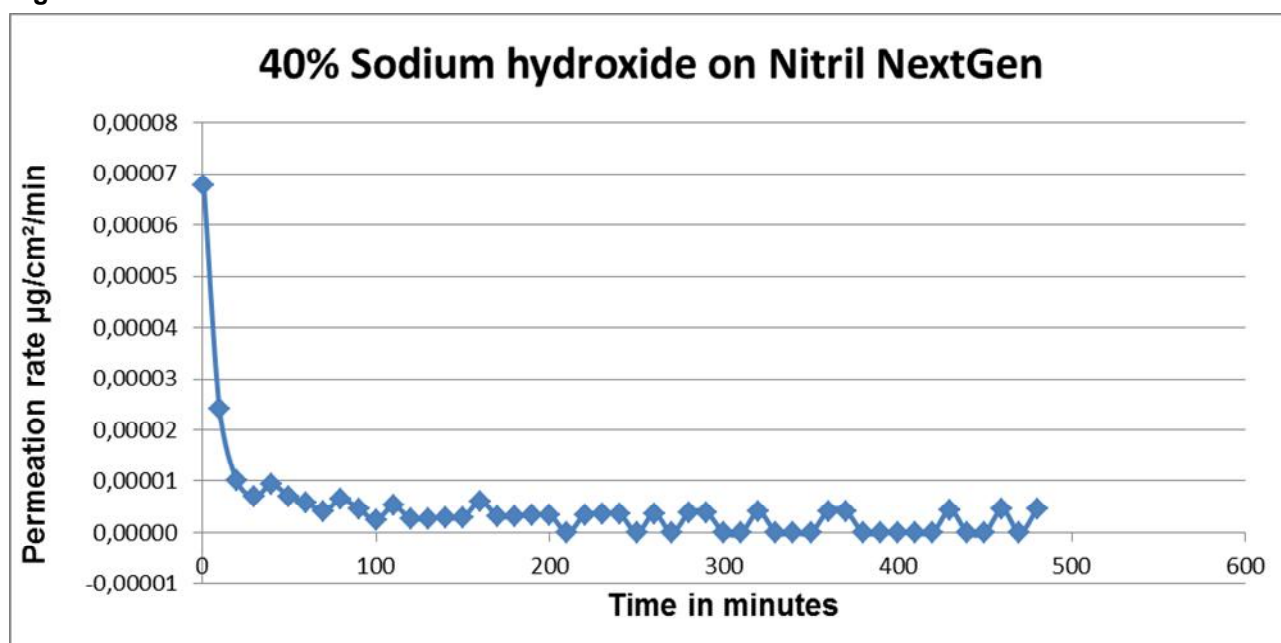
Analytical results

Table 2. Test Conditions Sodium hydroxide
Test Conditions

Test chemical		Test parameters	
Challenge chemical	Sodium hydroxide	Collection system	Closed loop
Cas no.:	1310-73-2	Contact type	Continuous
Supplier/Product	Merck - 1.06498	Collection media	Water
Purity/concentration	>99%/40%	Collection volume	140 ml
Chemical state	Liquid	Analytical method	pH monitoring
Glove sample		Sampling frequency	1 minutes
Brand	Nitril NextGen	Test temperature	23 °C
Type	Nitril	Test duration	500 minutes
Condition	New single layer	Minimum detection rate	0.01 µg/cm ² /min.
Glove area exposed	19.5 cm ²	Calibration	Buffer solution pH 7.01 and 4.00
Thickness in mm			
Weight/area in g/m ²			

Table 3. Results, Sodium hydroxide:

Sample	Nitril NextGen no 171070412			
Cell no.	1	2	3	Mean
Breakthrough ASTM (minutes)	>480	>480	>480	>480
Breakthrough EN (minutes)	>480	>480	>480	>480
Permeation rate steady state µg/cm ² /min.				< 0.01
Performance level EN				6
Post test condition	No visual changes			

Figure 1. Permeation curve


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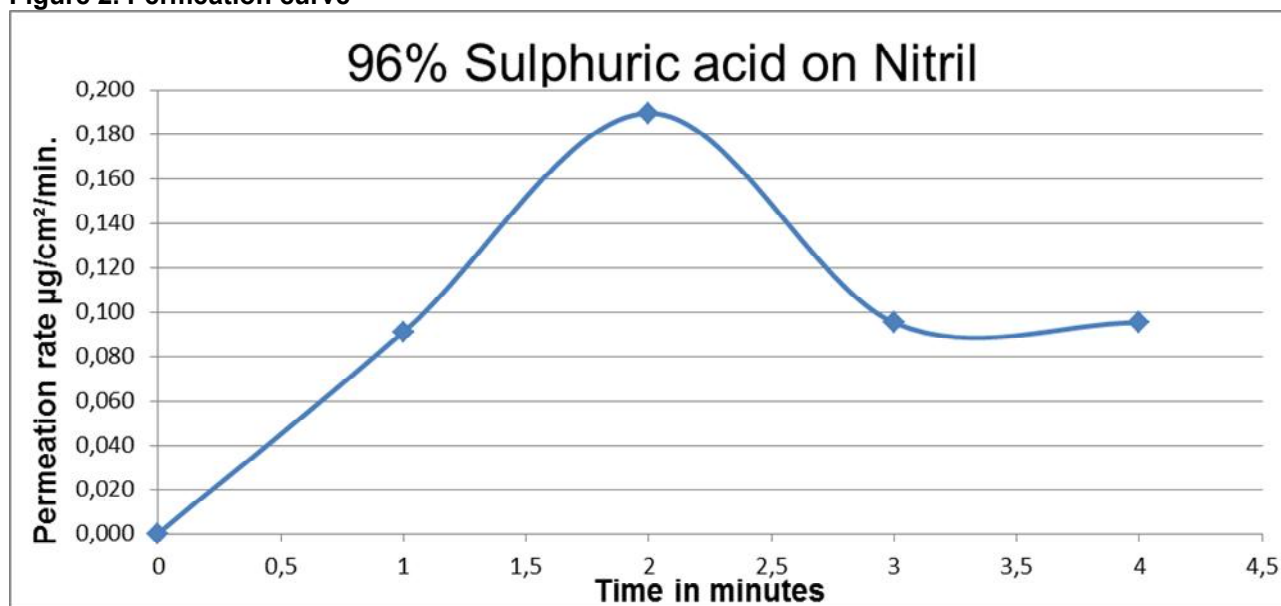
Analytical results

Table 4. Test Conditions for Sulphuric acid

Test chemical		Test parameters	
Challenge chemical	Sulphuric acid	Collection system	Closed loop
Cas no.:	7664-93-9	Contact type	Continuous
Supplier/Product	sigma-aldrich 30743	Collection media	Water
Purity/concentration	95-97 %	Collection volume	140 ml
Chemical state	Liquid	Analytical method	pH monitoring
Glove sample		Sampling frequency	1 minutes
Brand	Nitril NextGen	Test temperature	23 °C
Type	Nitril	Test duration	500 minutes
Condition	New single layer	Minimum detection rate	0.01 µg/cm ² /min.
Glove area exposed	19.5 cm ²	Calibration	Buffer solution pH 7.01 and 4.00
Thickness in mm			
Weight/area in g/m ²			

Table 5. Results, Sulphuric acid:

Sample	Nitril NextGen no 171070412			
Cell no.	1	2	3	Mean
Breakthrough ASTM (minutes)	0.0	0.3	1.1	0.5
Breakthrough EN (minutes)	0.0	3	4	2.4
Permeation rate steady state µg/cm ² /min.				0.2
Performance level EN				0
Post test condition	Glove dissolves after 5 - 8 minutes			

Figure 2. Permeation curve


The test results relate only to the items tested.

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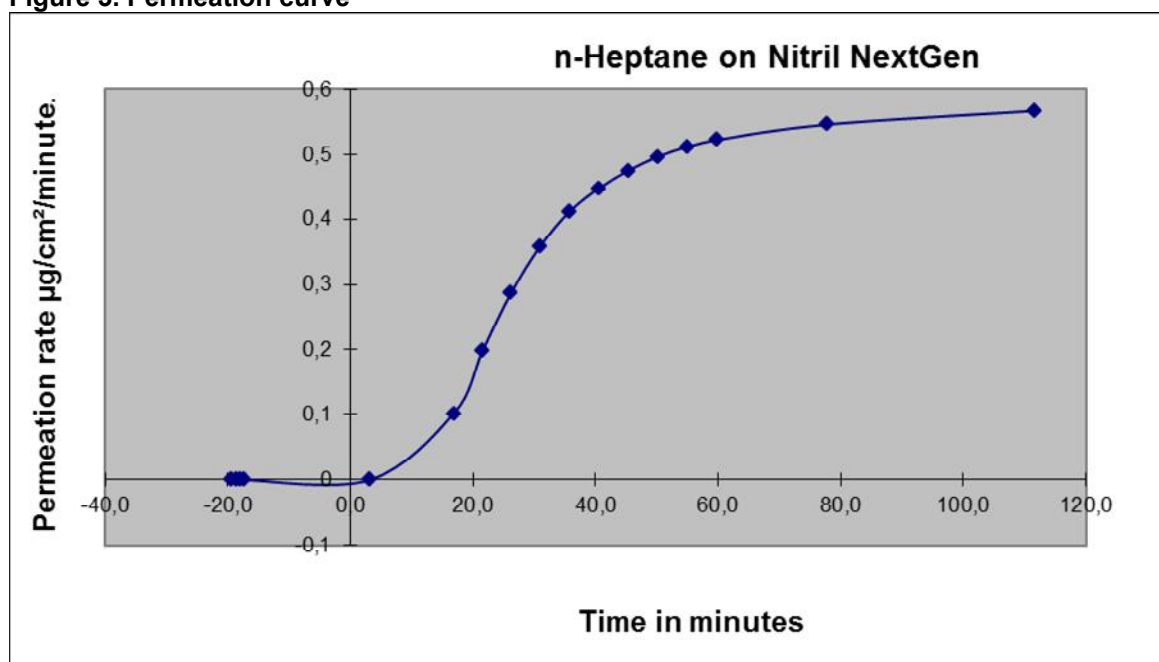
Analytical results

Tabel 6. Test Conditions

Test chemical		Test parameters	
Challenge chemical	n-Heptane	Collection system	Open loop
Cas no.:	142-82-5	Contact type	Continuous
Supplier/Product	Sigma Aldrich 37873	Collection media	Syntetic air
Purity/concentration	99 %	Collection flow rate	0.24 l/min.
Chemical state	Liquid	Analytical method	GC/FID
Glove sample		Sampling frequency	5minutes
Brand	Nitril NextGen no 171070412	Test temperature	23 °C
Type	Nitril	Test duration	480 minutes
Condition	New single layer	Minimum detection rate	0.01 µg/cm ² /min.
Glove area exposed	19.5 cm ²	Calibration	Toluene 38.8 µg/l
Thickness in mm			
Weight/area in g/m ²			

Tabel 7. Results, Permeation of n-Heptane:

Sample	Nitril NextGen no 171070412			
Cell no.	1	2	3	Mean
Breakthrough ASTM (minutes)	12	17	17	15
Breakthrough EN (minutes)	> 480	>480	>480	>480
Permeation rate steady state µg/cm ² /min.	-	-	-	0.60
Performance level EN	-	-	-	6
Post test condition	No visual changes			

Figure 3. Permeation curve


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