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# Biodegradable Nitrile Examination Gloves

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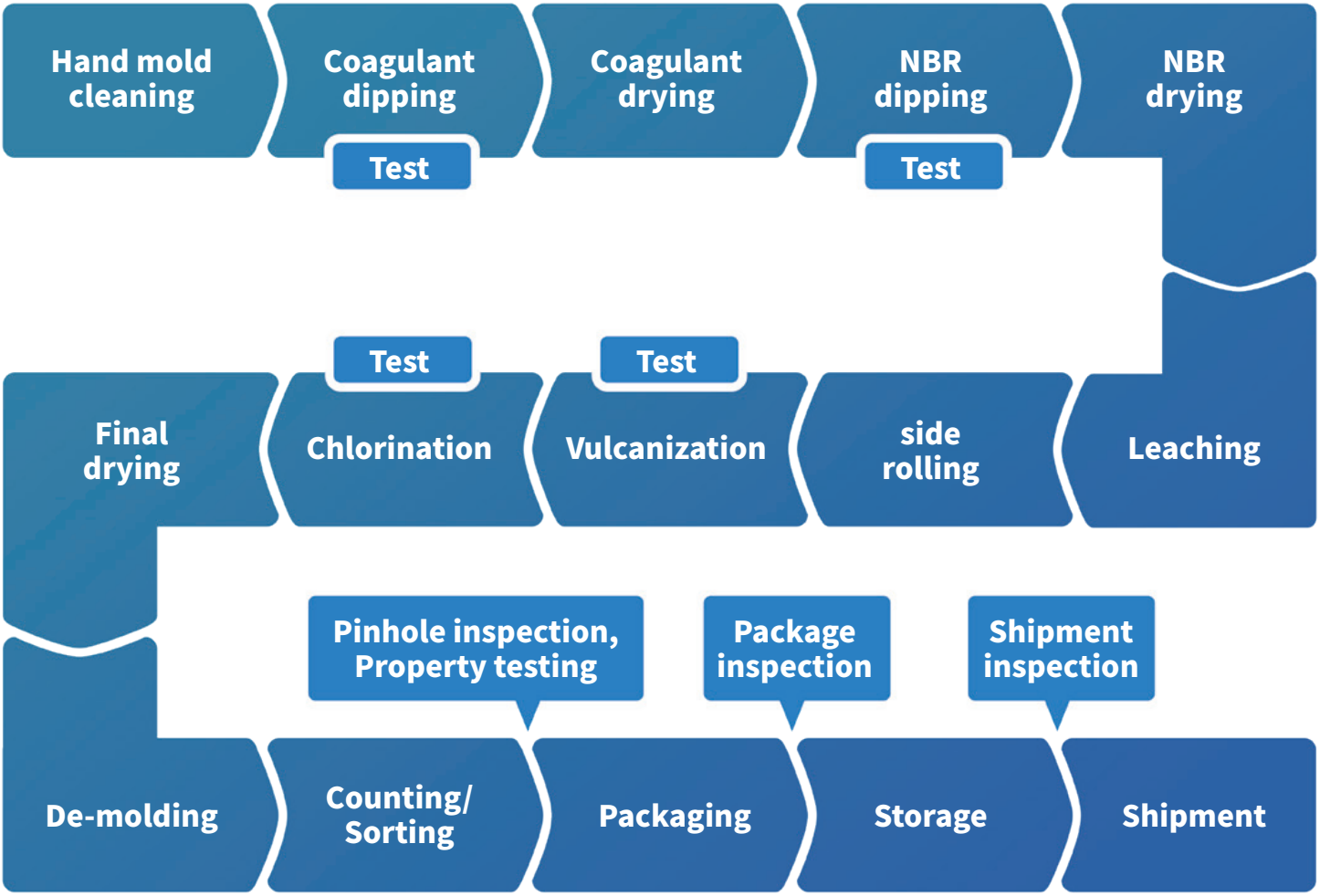
# Nitrile Gloves Factory

Saniflex nitrile gloves are produced with high speed, double track production lines and surface-treated by chlorine which makes gloves smooth and easier to wear.
Advanced quality management model can efficiently maintain the quality of gloves over the corresponding standard for different fields.
Reasonable technology design and energy management system can effectively reduce the energy consumption. Meanwhile, advanced water recycling system and chemicals recycling system can synergistically reduce the sewage discharge.
All these assistant systems make production lines more efficient and environmentally-friendly.

## Nitrile Gloves Production & Quality Management Model



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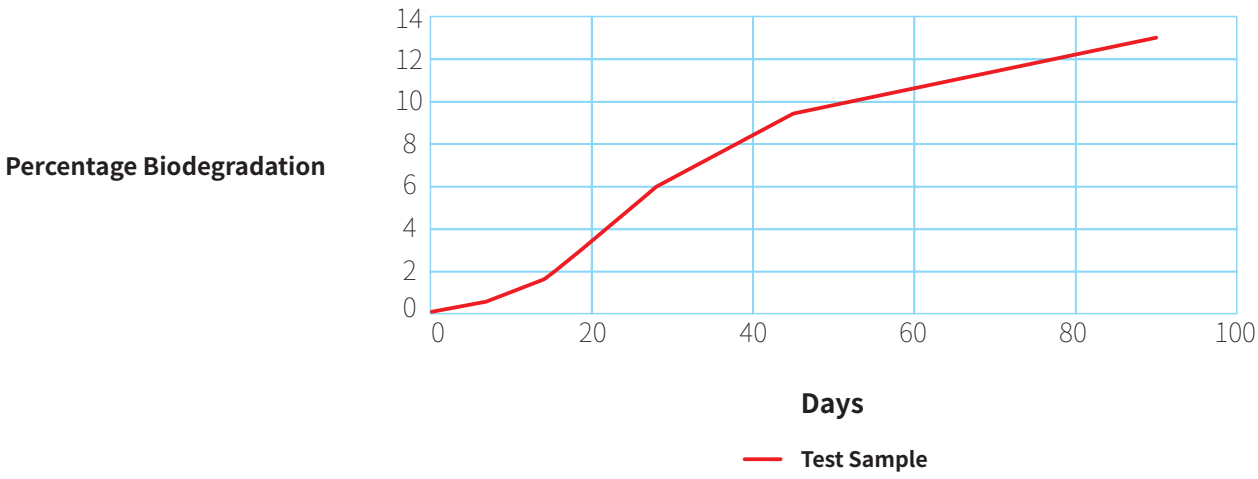
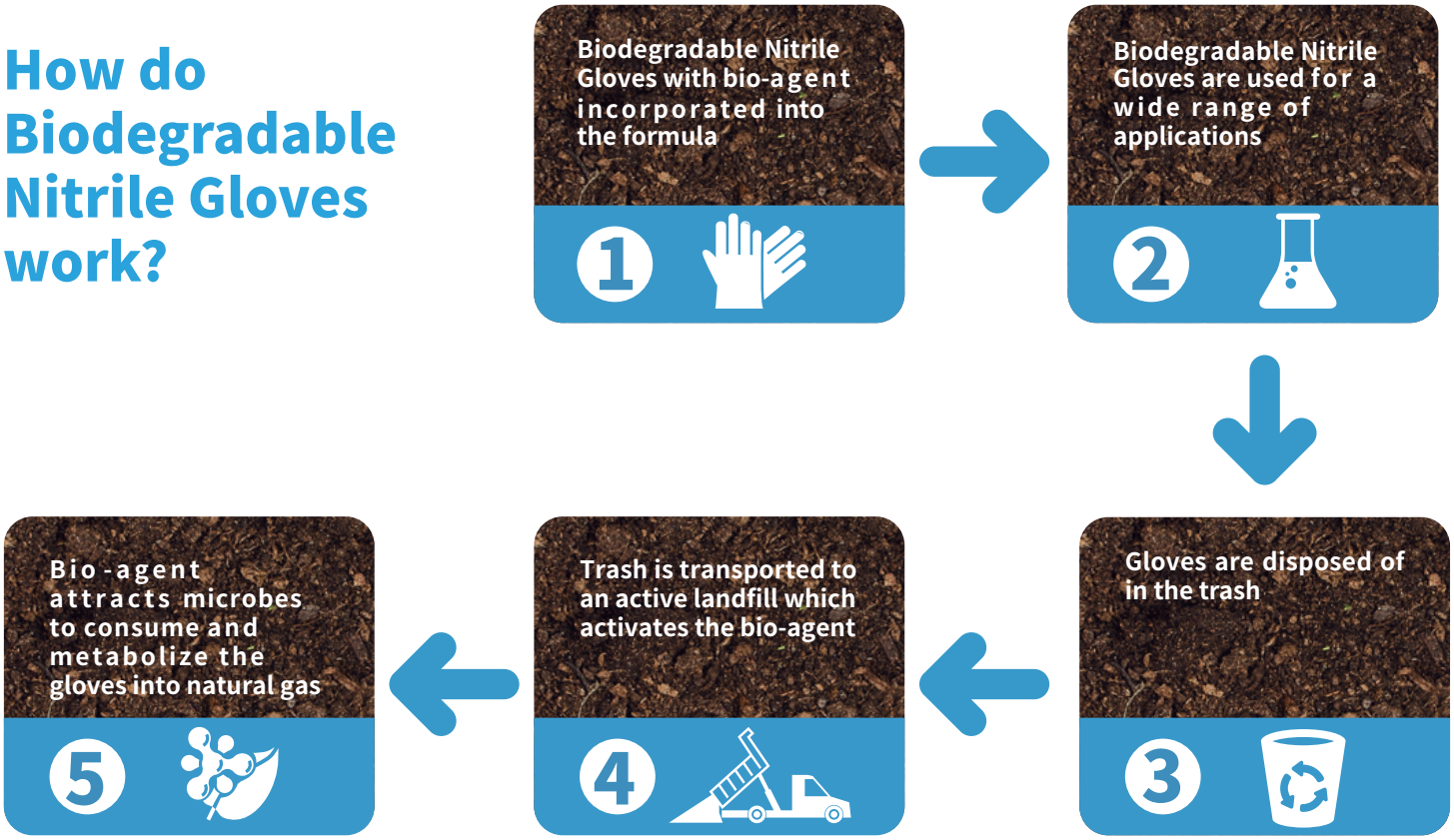
# Biodegradation ability and process




## Biodegradation rate will increase with the extension of time

| Biodegradation test | | |
|---|---|---|
| 45days | Standard biodegradation rate ⩾ 5% | Test results ≈ 9.57% |
| 90 days | Standard biodegradation rate ⩾ 10% | Test results ≈ 13.14% |

## How do Biodegradable Nitrile Gloves work?



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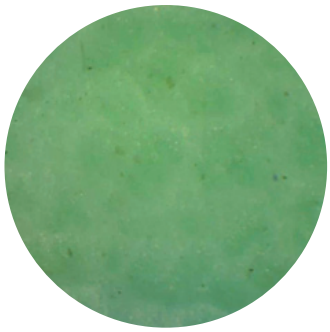
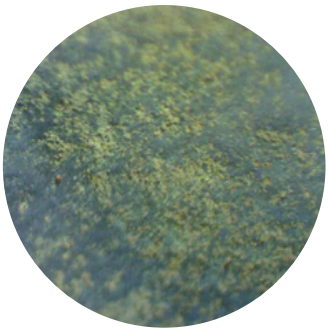
# Biodegradation mechanism and characteristics



Before Degradation



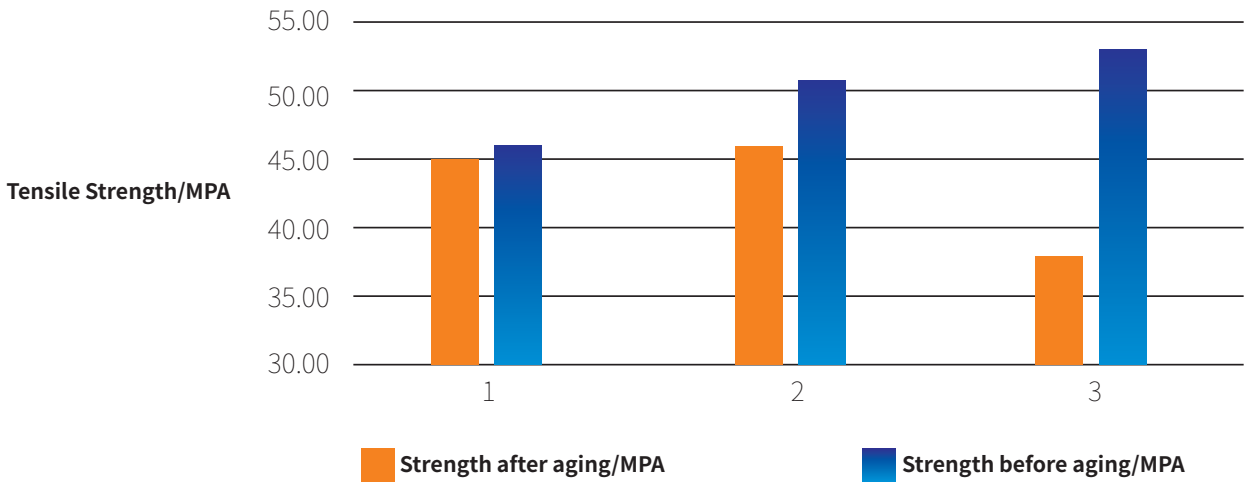
After Degradation

**Butadiene:** Butadiene monomer is present as the gaseous state in the atmosphere, which can be degraded by chemically induced hydroxyl free radicals, ozone or nitro free radicals. In addition, It is moderately mobile in soil and easily volatilized to the atmosphere by significant volatility. It has biodegradable but weakly bioconcentrating.

**Acrylonitrile:** Acrylonitrile is used by microorganisms in two main ways :

1. Acrylonitrile is first converted to acrylamide by nitrile hydrase, and then converted to acrylic acid by amidase;
2. Acrylic acid is produced directly under the action of nitrile hydrolase. Finally, it is absorbed and metabolized into CO2 and water by microorganisms

**Properties:** Biodegradable nitrile gloves do not degrade under normal conditions, and their performance is the same as that of ordinary nitrile gloves. The gloves degrade only in microbial soil.




The introduction of degradation additives does not affect nitrile gloves' overall mechanical properties and aging resistance!

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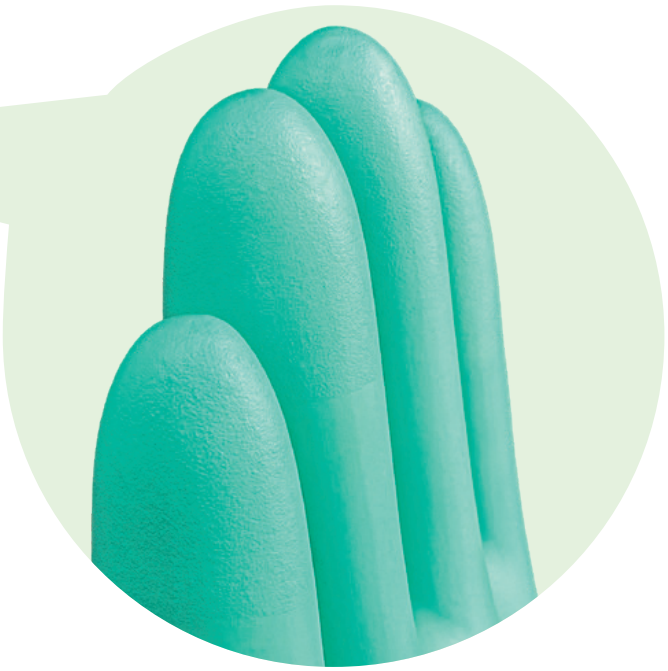
# Biodegradable Nitrile Examination Gloves



Textured Fingertips

OEM | LATEX | NON STERILE | AQL 1.5

Biodegradable Nitrile Examination Gloves are specially designed to biodegrade in both anaerobic and aerobic conditions in landfills.

## Features

- 100% Nitrile, Biodegradable, Powder-Free, Surface-Chlorinated
- Available in green, blue, blue violet
- Beaded cuff ensures easy donning and prevent roll down
- Textured fingertips enhanced wet and dry grip
- Decreased risk of allergies
- Excellent chemical splash protection
- Protection against bacteria and fungi
- Superior strength with better puncture resistance
- Excellent tactile sensitivity

## Standard Quality

EN374 | EN 455 | ASTM D6319 | ASTM D5511

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# Specification

## 2.5 Mil Biodegradable Nitrile Gloves

Glove Length (mm/inches) min:
240 / 9.5
Palm Thickness (mm/mil):
0.06±0.02/2.4±0.8
Finger Thickness (mm/mil):
0.09±0.02/3.5±0.8
Unite Weight (g):
S 3.0±0.3g
M 3.3±0.3g
L 3.6±0.3g
XL 4.0±0.3g

## 3 Mil Biodegradable Nitrile Gloves

Glove Length (mm/inches) min:
240 / 9.5
Palm Thickness (mm/mil):
0.08±0.02/3.2±0.8
Finger Thickness (mm/mil):
0.12±0.02/4.8±0.8
Unite Weight (g):
S 4±0.3g
M 4.4±0.3g
L 4.7±0.3g
XL 5±0.3g

## 4.0 Mil Biodegradable Nitrile Gloves

Glove Length (mm/inches) min:
240 / 9.5
Palm Thickness (mm/mil):
0.10±0.02/4.0±0.8
Finger Thickness (mm/mil):
0.16±0.02/6.4±0.8
Unite Weight (g):
S 5±0.5g
M 5.5±0.5g
L 6±0.5g
XL 6.5±0.5g

# Application

CHEMOTHERAPY
MEDICAL
DENTISTRY
PET CARE
LABORATORY
JANITORIAL
HOUSEHOLD
HAIRDRESSING
INDUSTRIAL
AUTOMOTIVE
DIY
FOOD HANDLING

# Packaging Information

## Exterior Design

100 pcs/box

Size 225*120*63mm

**100**
Units


## Carton Design

10 boxes/carton

Size: 330*250*240mm

**1000**
Units

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# Medical Devices Registration Receipt

**Anlage 1**
(zu § 4 Abs. 1 Nr. 1 DIMDIV)
Formularnummer 00381686

## Allgemeine Anzeigepflicht nach §§ 25 und 30 Abs. 2 MPG
## General Obligation to Notify pursuant to §§ 25 and 30 (2) Medical Devices Act, MPG

### Formblatt für Medizinprodukte, außer In-vitro-Diagnostika
### Form for Medical Devices except In Vitro Diagnostic Medical Devices

| **Zuständige Behörde / Competent authority** | | | |
|---|---|---|---|
| | Code<br>**DE/CA20** | | |
| | Bezeichnung / Name<br>**Bezirksregierung Düsseldorf, Dezernat 24** | | |
| | Staat / State<br>**Deutschland** | | Land / Federal state<br>**Nordrhein-Westfalen** |
| | Ort / City<br>**Düsseldorf** | | Postleitzahl / Postal code<br>**40474** |
| | Straße, Haus-Nr. / Street, house no.<br>**Cecilienallee 2** | | |
| | Telefon / Phone<br>**+49-211-4750** | | Telefax / Fax<br>**+49-211-4752671** |
| | E-Mail / E-mail<br>**dez24.mpg@brd.nrw.de** | | |

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**Anlage 1**
(zu § 4 Abs. 1 Nr. 1 DIMDIV)
Formularnummer 00381686

| **Anzeige / Notification** | | | |
|---|---|---|---|
| | Registrierdatum bei der zuständigen Behörde<br>Registration date at competent authority<br>**21.04.2022** | | Registriernummer / Registration number<br>**DE/CA20/00186672** |
| | Rechtsgrundlage / legal basis<br>☐ Medizinprodukte (93/42/EWG bzw. 90/385/EWG) / German Medical Device Act (93/42/EWG or 90/385/EWG)<br>☐ Artikel 120(3) Verordnung (EU) 2017/745 (Legacy Device) / Article 120(3) Regulation (EU) 2017/745 (Legacy Device)<br>☒ Verordnung (EU) 2017/745 (MDR) / Regulation (EU) 2017/745 (MDR) | | |
| | Typ der Anzeige / Notification type<br>☒ Erstanzeige / Initial notification<br>☐ Änderungsanzeige / Notification of change<br>☐ Widerrufsanzeige / Notification of withdrawal | | |
| | Frühere Registriernummer bei Änderungs- und Widerrufsanzeige<br>Previous registration number if notification has been changed or withdrawn | | |
| | Anzeigender nach § 25 MPG / Reporter pursuant to § 25 Medical Devices Act, MPG<br>☐ Hersteller / Manufacturer<br>☒ Bevollmächtigter / Authorised Representative<br>☐ Einführer / Importer<br>☐ Verantwortlicher für das Zusammensetzen von Systemen oder Behandlungseinheiten nach § 10 Abs. 1 und 2 MPG / Assembler of systems or procedure packs pursuant to § 10 (1) and (2) Medical Devices Act, MPG<br>☐ Betrieb oder Einrichtung (aufbereiten) nach § 25 Abs. 1 MPG i. V. m. § 4 Abs. 2 MPBetreibV<br>Institution (processing) pursuant to § 25 (1) Medical Devices Act, MPG in connection with § 4 (2) MPBetreibV<br>☐ Betrieb oder Einrichtung (sterilisieren) nach § 25 Abs. 2 i. V. m. § 10 Abs. 3 MPG<br>Institution (sterilizing) pursuant to § 25 (2) in connection with § 10 (3) Medical Devices Act, MPG | | |

| **Anzeigender / Reporting organisation (person)** | | | |
|---|---|---|---|
| | Code<br>**DE/0000049303** | | |
| | Bezeichnung / Name<br>**Share Info GmbH** | | |
| | Staat / State<br>**Deutschland** | | Land / Federal state<br>**Nordrhein-Westfalen** |
| | Ort / City<br>**Düsseldorf** | | Postleitzahl / Postal code<br>**40549** |
| | Straße, Haus-Nr. / Street, house no.<br>**Heerdter Lohweg 83** | | |
| | Telefon / Phone<br>**01795666508** | | Telefax / Fax |
| | E-Mail / E-mail<br>**Eu-rep@share-info.cn** | | |

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**Anlage 1**
(zu § 4 Abs. 1 Nr. 1 DIMDIV)
Formularnummer 00381686

| **Hersteller / Manufacturer** | | | |
|---|---|---|---|
| | Bezeichnung / Name<br>**GUANGDONG KINGFA SCI.&TECH.CO., LTD.** | | |
| | Staat / State<br>**CN** | | |
| | Ort / City<br>**Qingyuan City, Guangdong Province** | | Postleitzahl / Postal code<br>**511545** |
| | Straße, Haus-Nr. / Street, house no.<br>**N0.28 Delong Avenue, Shijiao Town, Qingcheng District** | | |
| | Telefon / Phone<br>**+86-13570952157** | | Telefax / Fax |
| | E-Mail / E-mail<br>**yuxiaoge@kingfa.com.cn** | | |

| **Sicherheitsbeauftragter für Medizinprodukte nach § 30 Abs. 2 MPG 9)**<br>**Safety officer for medical devices pursuant to § 30 (2) Medical Devices Act, MPG** | | | |
|---|---|---|---|
| | Bezeichnung / Name<br>**Jiehan Li** | | |
| | Staat / State<br>**Deutschland** | | Land / Federal state<br>**Nordrhein-Westfalen** |
| | Ort / City<br>**Kaarst** | | Postleitzahl / Postal code<br>**41564** |
| | Straße, Haus-Nr. / Street, house no.<br>**Windvogt 38** | | |
| | Telefon / Phone<br>**017670057022** | | Telefax / Fax |
| | E-Mail / E-mail<br>**jiehanl@hotmail.com** | | |

| **Vertreter / Deputy (optional)** | | | |
|---|---|---|---|
| | Bezeichnung / Name | | |
| | Telefon / Phone | | Telefax / Fax |
| | E-Mail / E-mail | | |
| | ☒ Erstanzeige / Initial notification<br>☐ Änderungsanzeige / Notification of change | | |

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**Anlage 1**
(zu § 4 Abs. 1 Nr. 1 DIMDIV)
Formularnummer 00381686

| **Medizinprodukt (Erstmaliges Inverkehrbringen) / Medical device (First placing on the market)** | |
|---|---|
| | Klasse / Class<br>☒ I<br>☐ I - steril / sterile<br>☐ I - mit Messfunktion / with measuring function<br>☐ I - steril und mit Messfunktion / sterile and with measuring function<br>☐ I - Wiederverwendbare chirurgische Instrumente / Reusable surgical instruments<br>☐ I - Wiederverwendbare chirurgische Instrumente und steril / Reusable surgical instruments and sterile<br>☐ I - Wiederverwendbare chirurgische Instrumente mit Messfunktion / Reusable surgical instruments with measuring function<br>☐ I - Wiederverwendbare chirurgische Instrumente mit Messfunktion und steril / Reusable surgical instruments with measuring function and sterile<br>☐ IIa<br>☐ IIb<br>☐ III<br>☐ III - hergestellt unter Verwendung von Gewebe tierischen Ursprungs im Sinne der Verordnung (EU) Nr. 722/2012<br>manufactured utilising tissues of animal origin in terms of Commission Regulation (EU) No 722/2012<br>☐ Aktives implantierbares Medizinprodukt / Active implantable medical device<br>☐ Aktives implantierbares Medizinprodukt - hergestellt unter Verwendung von Gewebe tierischen Ursprungs im Sinne der Verordnung (EU) Nr. 722/2012<br>Active implantable medical device - manufactured utilising tissues of animal origin in terms of Commission Regulation (EU) No 722/2012 |
| | App (Software auf mobilen Endgeräten) ☐ ja / yes ☒ nein / no |
| | Nummer(n) der Bescheinigung(en) / Certificate number(s) |
| | Handelsname des Produktes / Trade name of the device<br>**Nitrile examination gloves** |
| | Produktbezeichnung / Name of device |
| | Nomenklaturcode / Nomenclature code |
| | Nomenklaturbezeichnung / Nomenclature term |
| | Kategoriecode / Category code<br>**03** |
| | Kategorie / Category<br>**Zahnärztliche Produkte** |
| | Kurzbeschreibung deutsch / German short description<br>**Die Nitril-Untersuchungshandschuhe sind zum Tragen an den Händen von medizinischem und ähnlichem Personal vorgesehen, um eine Kontamination zwischen medizinischem Personal und dem Körper des Patienten zu verhindern. Dies ist ein puderfreies, unsteriles Gerät zum einmaligen Gebrauch.**<br>**Modell: KG-1303, KG-1104, KG-1106, KG-1107, BIO-G01, BIO-G02, BIO-G05** |

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**Anlage 1**
(zu § 4 Abs. 1 Nr. 1 DIMDIV)
Formularnummer 00381686

Kurzbeschreibung englisch / English short description
**The nitrile examination gloves are intended to be worn on the hands of health care and similar personnel to prevent contamination between health care personnel and the patient's body. This is a single-use, powder-free, non-sterile device.**
**Model: KG-1303, KG-1104, KG-1106, KG-1107, BIO-G01, BIO-G02, BIO-G05**

**Medizinprodukte (Aufbereiten) / Medical devices (Reprocessing)**

☐ Semikritische Medizinprodukte / Semicritical medical devices
- ☐ Gruppe A / Group A
- ☐ Gruppe B / Group B

☐ Kritische Medizinprodukte / Critical medical devices
- ☐ Gruppe A / Group A
- ☐ Gruppe B / Group B
- ☐ Gruppe C / Group C

Nummer der Bescheinigung / Certificate number

Sterilisationsverfahren / Sterilisation procedures
- ☐ Dampfsterilisation / Steam sterilisation
- ☐ Gassterilisation / Gas sterilisation
- ☐ Strahlensterilisation / Radiation sterilisation
- ☐ andere / others

Angewandtes Verfahren / Applied procedure

Ich versichere, dass die Angaben nach bestem Wissen und Gewissen gemacht wurden.
I affirm that the information given above is correct to the best of my knowledge.

Ort / City: **Duesseldorf**

Datum / Date: **2022-04-21**

Name: **Jiehan Li**

Unterschrift / Signature

**Bearbeitungsvermerke / Processing notes**
Nur von der zuständigen Behörde auszufüllen / To be filled in only by the competent authority

| Bearbeiter / Person responsible | Telefon / Phone |
|---|---|

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# ASTM-D5511 Biodegradable Level Test Reports

intertek
Total Quality. Assured.

**Test Report** Number: SZHH01677022

Applicant: GUANGDONG KINGFA SCI.&TECH.CO.,LTD.
NO.28 DELONG AVENUE, SHIJIAO TOWN,
QINGCHENG DISTRICT, QINGYUAN CITY,
GUANGDONG PROVINCE, CHINA

Date: Apr 15, 2022

Attn: WANG HUANTING

Sample Description:
The submitted sample said to be :
Item Name : **(1) Nitrile gloves**
(sample information was provided by the applicant)

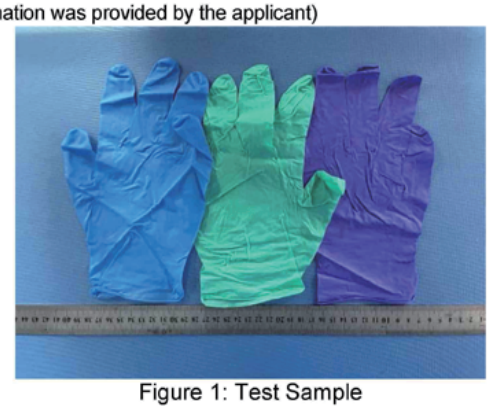

Figure 1: Test Sample

Tests conducted:
As requested by the applicant, refer to attached page(s) for details.

Authorized by:

Jingyi Jiang
Manager
For Intertek China



**Intertek Testing Services Shenzhen Ltd.**
深圳天祥质量技术服务有限公司

West Side of 1/F and 3,4,5/F of Bldg. 1, 1-5/F of Bldg. 3, Yuanzheng Science and Technology Industrial Park, No.4012, Wuhe Ave. North, Bantian Street, Longgang District, Shenzhen
深圳市龙岗区坂田街道五和大道北 4012 号元征科技工业园 1 号楼 3、4、5 层及 1 楼西侧半层和 3 号楼整栋 1-5 层

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**www.intertek.com**
**www.intertek.com.cn**

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**Test Report** Number: SZHH01677022

Tests Conducted

## 1 PROJECT DESCRIPTION

NITRILE GLOVES sample was submitted for testing under standard ASTM D5511. This test method covers the determination of the degree and rate of anaerobic biodegradation of plastic materials in high-solids anaerobic conditions. The test materials are exposed to a methanogenic inoculum derived from anaerobic digesters operating only on pretreated household waste. The anaerobic decomposition takes place under high-solids (more than 30 % total solids) and static non-mixed conditions. This test method is designed to yield a percentage of conversion of carbon in the sample to carbon in the gaseous form under conditions found in high-solids anaerobic digesters, treating municipal solid waste.

## 2 INOCULUM COLLECTION AND CONDITIONING

The anaerobic digested sewage sludge (Figure 2) mixed with household waste. To make the sludge adapted and stabilized during a short post-fermentation at 53°C, the sludge was pre-incubated (one week) at 53°C. This means that the concentrated inoculum was not fed but allowed to post ferment the remains of previously added organics allowing large easily biodegradable particles were degraded during this period and reduce the background level of biogas from the inoculums itself.

Figure 2: Anaerobic microbial inoculum

## 3 INOCULUM PROPERTIES

A sample of the anaerobic digested sewage sludge was analyzed for pH, percent dry solids, and volatile solids, as well as, the amount of $CO_2$ and $CH_4$ evolution during the testing. Table 1 lists the results of this initial testing.

(to be continue)



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深圳市龙岗区坂田街道五和大道北 4012 号元征科技工业园 1 号楼 3、4、5 层及 1 楼西侧半层和 3 号楼整栋 1-5 层

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**www.intertek.com**
**www.intertek.com.cn**

## 4 METHODOLOGY

Test Required: ASTM D5511 Standard Test Method for Determining Anaerobic Biodegradation of Plastic Materials Under High-Solids Anaerobic-Digestion Conditions

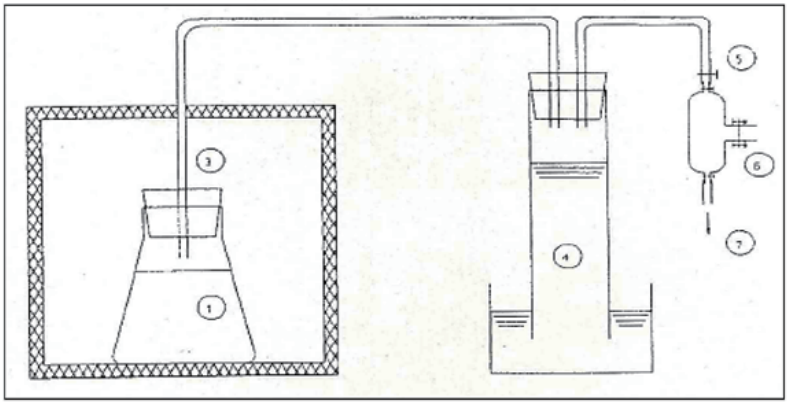
Inoculum Medium: Remove enough inoculum (approximately 15 kg) from the post-fermentation vessel and mix carefully and consistently by hand in order to obtain a homogeneous medium. Test three replicates each of a blank (inoculum only), Positive control (Reference material) (thin-layer chromatography cellulose), negative control (optional), and the test substance being evaluated.

Manually mix 1000 g wet weight (at least 20 % dry solids) of inoculum in a small container for a period of 2 to 3 min with 15 to 100 g of volatile solids of the test substance or the controls for each replicate. For the three blanks containing inoculum only, manually mix 1000 g of the same inoculum in a small container for a period of 2 to 3 min with the same intensity as was done for the other vessels containing test substance or controls. Determine the weight of the inoculum and test substance added to each individual Erlenmeyer flask accurately. Add the mixtures to a 2-L wide-mouth Erlenmeyer flask and gently spread and compact the material evenly in the flask to a uniform density.

After placing the Erlenmeyer flask in incubator, connect it with the gas collection device. Incubate the Erlenmeyer flasks in the dark or in diffused light at 52°C (62°C) for thermophilic conditions, The incubation time shall be run until no net gas production is noted for at least five days from both the Positive control (Reference material) and test substance reactors. Control the pH of the water used to measure biogas production to less than two by adding HCl.

## 5 ANAEROBIC DIGESTER SETUP FOR THE PLASTIC BIODEGRADATION

The biodegradation testing of sample was performed in the digester as shown in the (Figure-3).




1. Digester
2. Incubator
3. Gas outlet
4. Gas collector
5. Valve
6. Gas Sampling
7. Gas Discharge

Figure-3: Digester setup

(to be continue)



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## 6 RESULT

The most important biochemical characteristics of the inoculum such as pH, Volatile Fatty Acids, NH4+-N— and dry solids were studied.

Table 1: Results of Initial testing of the anaerobic digested sewage sludge

| Parameters | Requirement | Actual results |
|---|---|---|
| pH | 7.5 to 8.5 | 7.58 |
| Kjeldahl nitrogen | 0.5 to 2 g/kg wet weight | 1.44 |
| Dry Solids at 105 °C | >20% | 44.00 |
| Volatile Solids at 550 ° C | Below 1 g/kg wet weight | 0.78 |

The biogas volume in the gas sampling bag was measured (Table- 2). Presence of gas in the gas collector of Positive control (Reference material) indicated that the inoculum was viable and gas displacement was observed both in Positive control (Reference material) and Test Sample.
ASTM D 5511 states that for the test to be considered valid, the Positive control (Reference material) must achieve 70 % within 30 days with deviation less than 20% of the mean between the replicates.
Positive control (Reference material) showed 71.57% on 27$^{th}$ day with less than 20% of the mean difference between the replicates.
The gas displacement observed after 90 days is as shown in the table below.

Table-2: Biogas volume of the evolved gas during the biodegradation process at 90 days

| Biodegradation Test | Total Volume 90 days (mL) |
|---|---|
| Inoculum | 3490 |
| Positive control (Reference material) | 10160 |
| NITRILE GLOVES | 5490 |

Colonization of bacteria at some places were observed under the microscope (Fig-4). This shows the process of biodegradation has begun.

(to be continue)



**Intertek Testing Services Shenzhen Ltd.**
深圳天祥质量技术服务有限公司

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Total Quality. Assured.

**Test Report** Number: SZHH01677022

Tests Conducted

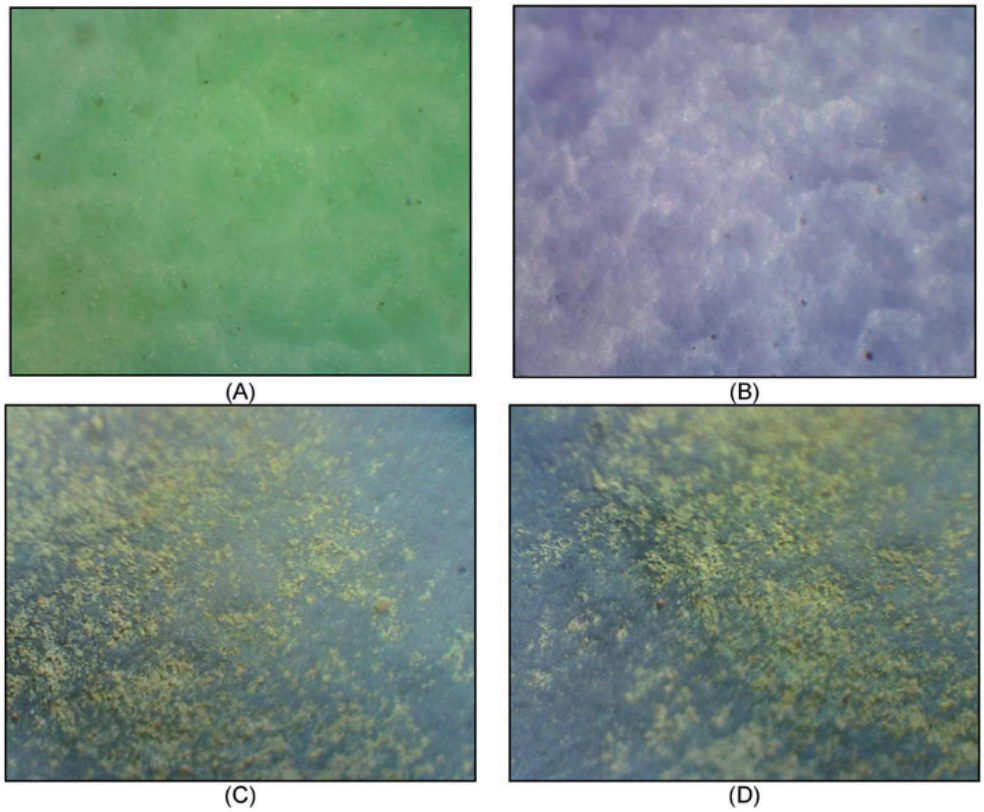


Figure 4: Microscopic image of Test samples Before and After 90 days Incubation Condition

A & B – Unexposed Test Sample NITRILE GLOVES to anaerobic biodegradation process
C & D – Exposed Test Sample NITRILE GLOVES to anaerobic biodegradation process

The percent biodegradation of Positive control (Reference material) and Test sample was calculated by the measured cumulative carbon dioxide and methane production from each flask after subtracting carbon dioxide evolution and methane evolution from the blank samples at the end of 90 days of testing. Calculations were based on Total Organic Carbon obtained of both Positive control (Reference material) and Test sample.

(to be continue)



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Table-3: Percentage biodegradability of Test sample with respect to Positive control (Reference material) Cellulose.

| Group | Inoculum control | Positive control (Reference material) | NITRILE GLOVES Sample |
|---|---|---|---|
| Weight | 1001 ml | 10.1255 g | 10.3572 g |
| Total volume (ml) | 3490.00 | 10160.00 | 5490.00 |
| % $CH_4$ | 13.60 | 45.00 | 24.30 |
| Volume of $CH_4$ (ml) | 474.64 | 4572.00 | 1334.07 |
| weight of $CH_4$ (g) | 0.3114 | 2.9992 | 0.8751 |
| % $CO_2$ | 16.70 | 46.60 | 27.20 |
| Volume of $CO_2$ (ml) | 582.83 | 4734.56 | 1493.28 |
| Weight of $CO_2$ (g) | 1.1540 | 9.3744 | 2.9567 |
| Total weight of carbon in grams | 0.5451 | 4.7805 | 1.4547 |
| Theoretical weight of carbon in grams (Ci) | - | 4.2598 | 6.9238 |
| Biodegradation | - | 0.9943 | 0.1314 |
| % Biodegradation | - | 99.43 | 13.14 |

Table 4: Percent weight loss of NITRILE GLOVES sample.

| | |
|---|---|
| Average Initial Weight (grams) | 10.3572 |
| Average Final Weight (grams) | 9.2745 |
| Percent Weight Loss (%) | 10.45 |

The Percent weight loss was calculated based on the initial weight and final weight of the test sample after the 90 days study.

Biodegradation of the samples determined based on conversion of carbon from the test material to carbon in the gaseous phase ($CH_4$ and $CO_2$) can be observed in graph 1 and graph 2a & 2b.

(to be continue)



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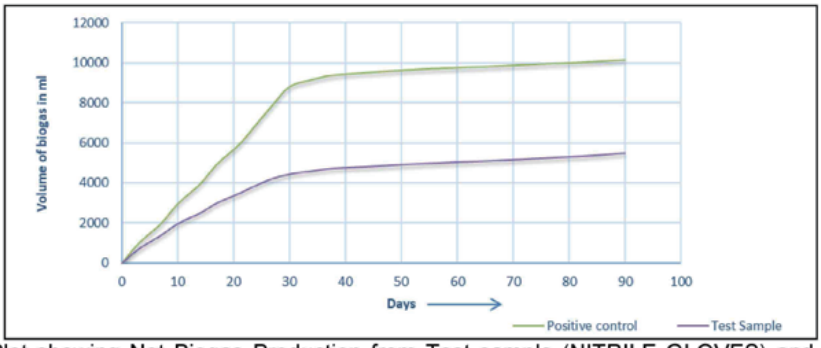
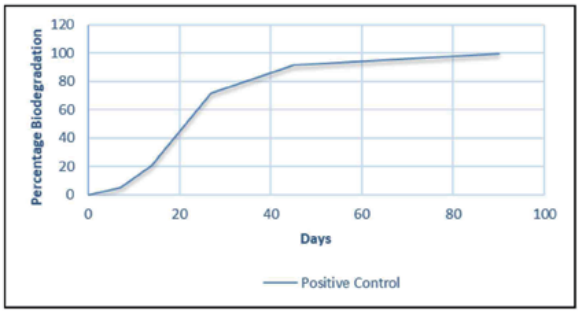



Graph-1: Plot showing Net Biogas Production from Test sample (NITRILE GLOVES) and Positive control (Reference material- Cellulose)




Graph-2a: The percent biodegradation of the Positive control (Reference material- Cellulose) determined based on conversion of carbon from cellulose to carbon in the gaseous phase ($CH_4$ and $CO_2$)

(to be continue)



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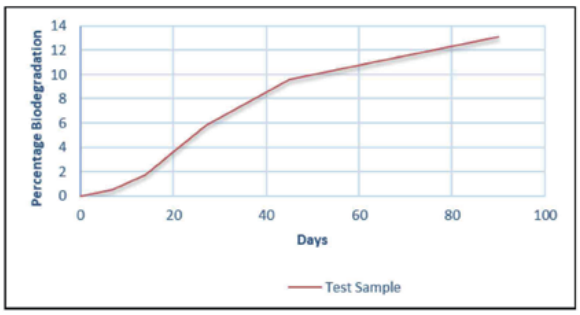


Graph-2b: The percent biodegradation of the Test sample (NITRILE GLOVES Sample) determined based on conversion of carbon from the Test material to carbon in the gaseous phase ($CH_4$ and $CO_2$)

7 CONCLUSION

Considering the cumulative gas production as observed in Table 2 & 3 and its analysis indicates that the process of biodegradation has occurred in NITRILE GLOVES Sample. After 90 days of incubation, the level of biodegradation for the Positive control (Reference material) was 99.43 % while the NITRILE GLOVES Sample showed 13.14 %.

**********

End of report





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