



CARBON
c o n n e c t

Methodology CO₂-Balance (Product Carbon Footprint): MED-COMFORT blue

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1 Methodology

1.1 Produktion

To calculate the product carbon footprint of these disposable gloves, the relevant input and emissions for the production of nitrile and labeled cardboard (for packaging) were carefully taken into consideration.

For the production and processing of nitrile, various chemicals are being used. The consumption of 7.5 MJ (2.08 kWh) of electricity per kilogram of nitrile is relevant for the accounting (product carbon footprint) of disposable gloves. According to the report „Key Energy Statistics 2017“ of the International Agency of Energy, the average power emission of Sri Lanka is 0.44kg CO₂/MJ. We assume that for the processing of the nitrile electrical power with the composition of the average Sri Lankese power mix was being used. Figure1 shows the air emissions caused by the production of nitrile. Chemical by-products are listed in the table. Since aside from CO₂ and phenol no other greenhouse gases are being emitted, the remaining emissions are being neglected hereafter.

Abbildung 1: Emissions from the production of 1 kg of nitrile

Ammonia	0.000487 kg
Carbon dioxide, fossil	0.317 kg
Chlorine	0.00152 kg
Chloroform	0.000196 kg
Nitrogen	0.019 kg
Nitrogen oxides	0.000466 kg
Phenol	0.000365 kg
Sulfur dioxide	0.00101 kg
Toluene	0.000317 kg
Water	0.35 m3
m-Xylene	0.000234 kg

The average amount of nitrile needed for the production of a box of disposable gloves is 607g, averaged over all sizes (XS, S, M, L, XL, XXL). Apart from the nitrile, the packaging also has to be produced. It is assumed here, that the packaging is being made from conventional container board, which has been labeled before. Compared to nitrile, only the input parameter is relevant in this case. The direct air emissions can be neglected in the production processing of cardboard, since in this chemical process no Greenhouse gases are being emitted. As an input parameter, the power requirement is also authoritative here. For the production of 1 kg of cardboard 2.3 MJ are needed. One pack of MED-COMFORT blue gloves requires 60 g carton.

The emissions from this production are shown in Table 2.

1.2 Transport

These disposable gloves are being produced in Avissawella (Sri Lanka). From that location, they are being transported to the capital Colombo (distance: 48kms) by truck. Afterwards, they are transported to Hamburg (sea distance: 12157 kms) in a container-ship for further shipment. From the North of Germany, they are transported to Baar, their final destination, by truck (distance: 917 kms). It is being assumed that both the trucks and the container ship do not make any stops, and bring the merchandise directly to the next intermediate destination. The following table (table 1) shows the emissions of the container ship and trucks used for the CO₂-balance (product carbon footprint). It is specified which greenhouse gas is emitted in which quantity, When one ton of merchandise is transported for one kilometer (ton.kilometers).¹

Tabelle 1: Emissions of trucks and container ship

	Unit	kg CO ₂	kg CH ₄	kg N ₂ O	kg CO ₂ -eq
Truck	ton.km	0.542	3E-05	0.004	0.546
Ship	ton.km	0.009	3E-6	7E-05	0.009

The emissions resulting from the transport are also listed in table 2.

1.3 Disposal

In order to organize the disposal of (disposable) gloves in the accounting, we assume that the water produced in the fabrication of nitrile (350 l) (see figure 1) must be disposed or cleaned.

The emissions from the disposal of MED-COMFORT blue are caused by the incineration in a Swiss waste incineration plant. It is taken into account that the energy released, for example, as district heat, will have a further use (and will thus be credited in your balance)

2 Balance

The following figure shows the occurring emissions of an average carton filled with 100 disposable gloves of MED-COMFORT blue. A total carton is responsible for just over 3 kg of CO₂-equivalents over its entire lifetime. 66.4 % of those emissions are formed due to the chemical production of nitrile, as the production of nitrile requires relatively big capacities of electricity.

Tabelle 2: Assessment of a box MED-COMFORT blue disposable gloves

Category	Subcategory	Emission [kg CO ₂ -eq]	Percentage [%]
Production	<i>Nitrile</i>	<i>2.14</i>	<i>66.4</i>
	<i>Cardboard</i>	<i>0.06</i>	<i>1.9</i>
Transport	<i>Ship</i>	<i>0.11</i>	<i>3.4</i>
	<i>Traffic</i>	<i>0.53</i>	<i>16.3</i>
Disposal	<i>Nitrile</i>	<i>0.30</i>	<i>9.4</i>
	<i>Water</i>	<i>0.08</i>	<i>2.6</i>
Total		3.23	100