

## IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

### Identification of the substance or mixture

Substance name: Nitric acid 60%  
Chemical name and formula: Nitric acid, HNO<sub>3</sub>  
CAS number: 7697-37-2  
EC number: 231-714-2  
Molecular Weight: 63.01 g/mol

### Relevant identified uses of the substance or mixture and uses advised against

#### Identified uses:

Manufacture of nitric acid.

Industrial uses: as intermediate, in formulation of mixtures, distribution, cleaning product, in metal/plastic surface treatment, as processing aids (reactive agent in synthesis), in surface treatment, regeneration of ion exchange resins, as laboratory agent.

Professional uses: Distribution, dilution or suspension of fertilizers, cleaning product, metal surface treatment, pH regulator, in laboratory chemicals, as surface etchant for concrete.

See complete list in the exposure scenario provided as an annex.

Common technical functions: Intermediate, pH-regulating agent, Cleaning product

Uses advises against: precursor use

Short title of exposure scenario 1	
Manufacturing and industrial use of nitric acid – Concentration <75%	
2. Description of activities and processes covered in the exposure scenario	
Sector of use (SU)	SU 3, SU4, SU 8, SU 9, SU 10, SU12, SU14, SU 15, SU 16
Product category (PC)	PC0, PC7, PC12, PC14, PC15, PC19, PC20, PC33, PC35, PC37
Process category (PROC)	<p>PROC 1: Use in closed process, no likelihood of exposure.</p> <p>PROC 2: Use in closed, continuous process with occasional controlled exposure.</p> <p>PROC 3: Use in closed batch process (synthesis or formulation).</p> <p>PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises.</p> <p>PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact).</p> <p>PROC 7: Industrial spraying.</p> <p>PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.</p> <p>PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.</p> <p>PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing).</p> <p>PROC 10: Roller application or brushing.</p> <p>PROC 13: Treatment of articles by dipping and pouring.</p> <p>PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletisation.</p> <p>PROC 15: Use as laboratory reagent.</p>
Article category (AC)	Not applicable
Environmental release category (ERC)	<p>ERC 1 Manufacture of substances</p> <p>ERC 2 Formulation of preparations</p> <p>ERC 4: Industrial use of processing aids in processes and products, not becoming part of articles.</p> <p>ERC 6a: Industrial use resulting in manufacture of another substance (use of intermediates).</p> <p>ERC 6b Industrial use of reactive processing aid</p> <p>ERC 6d: Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers.</p> <p>ERC 7 Industrial use of substances in closed systems</p>
3. Operational conditions	
3.1 Operational conditions related with frequency and quantities of use	
Duration of exposure at workplace:	8 hours/day
Frequency of exposure at workplace:	220 days/year for each worker
Annual amount used per site:	The daily and annual amount/emission per site is not considered to be the main determinant for environmental exposure.
3.2 Operational conditions related with substance/ product	
Physical state	Liquid
Concentration of substance in mixture	Aqueous solutions contain more than 25% nitric acid up to a maximum of 75% nitric acid.

<b>3.3 Other relevant operational conditions</b>	
Based on the information retrieved, the maximum duration considered for this exposure scenario is a working shift of above 4h/day. Concentration of nitric acid in industrial application range from 25 to 75% and worst case will be taken into account.	
<b>4. Risk Management Measures</b>	
<b>4.1 RMMs related to workers</b>	
Organisational measures	Workers in the identified risky process/areas should be trained a) to avoid to work without protection and b) to understand the corrosive properties and, especially, the respiratory inhalation effects of nitric acid and c) to follow the safer procedures instructed by the employer  The employer has also to ascertain that the required PPE is available and used according to instructions.
Technical measures	<ul style="list-style-type: none"> <li>• Use closed/ automated systems or covering of open containers (e.g. screens) to avoid irritating mists, sprayings and potential splashes. (Good practice)</li> <li>• Transport over pipes, technical barrel filling/emptying of barrel with automatic systems (suction pumps etc.) (Good practice)</li> <li>• Use of pliers, grip arms with long handles with manual use "to avoid direct contact and exposure by splashes (no working over one's head)" (Good practice)</li> <li>• Store in cool, dry, clean, well ventilate areas away from alkaline products and metals. Do not store under direct sun light. Do not pile up the containers. Do not store at temperatures close to freezing point. (Good practice).</li> <li>• Compatible materials: stainless steel 304L, stainless steel 316-L; glass</li> <li>• Local exhaust / general ventilation is not required but good practice</li> </ul>
Respiratory protection	Respiratory protection: respiratory protection is not required to usual works. In foggy-vaporous situations like spraying, use of a spreading over all facemask with a suitable inorganic acid filler. In case of spraying a mask with an Assigned Protection Factor (APF) = 20 as given in BS EN 529:2005 are recommended. For short time exposure masks, EN149 type FF P3, EN 14387 type B or Type E model P3, EN 1827 class FMP3 are recommended (Non exhaustive list). For longer time of exposure full masks or masks with an apparatus providing fresh air are recommended – Full mask EN 143, EN 14387, EN 12083 class P3 or class XP3, EN12941 class TH3, EN 12942 TM3, EN14593 or EN138. (Non exhaustive list)
Hand protection	Hand protection is required: use impervious chemical resistant protective gloves complying with EN 374 (required): material: butyl rubber, PVC, PTFE fluoro elastomer.
Eye protection	Wearing of eye/face protection is required. Chemical goggles EN166 or face protection shield EN 402 or equivalent are required.
Skin and body protection	Wearing of suitable acid resistant protective clothing and rubber boots is required.
Hygiene measures	Keep away from foodstuffs, drinks and tobacco. Wash hands before breaks and at end of work. Keep work clothes separate.
<b>4.2 RMMs related to the environment</b>	
Organisational measures	Procedural and/or control technologies are required to minimize emissions and the resulting exposure during cleaning and maintenance procedures.
Abatement measures related with wastewater	Nitric acid wastewater should be reused or discharged to the industrial wastewater and further neutralized if needed
Abatement measures waste air and solid waste	Nitric acid is not expected to be found in the solid waste or to reach the air compartment, due to its low vapour pressure and degradation in NOx.

4.3 Waste related measures		
Type of waste	Liquid waste. Packaging material	
Disposal technique	The neutralised liquid can be spilled in accordance to regulatory normative. The residue of the containers or the used container itself should be disposed in accordance with local requirements.	
Fraction released to environment during waste treatment	The pH of wastewater released from manufacturing sites should be between pH 6-9.	
5. Prediction of exposure resulting from the conditions described above and the substance properties.		
5.1. Human exposure		
Workers (oral)	No significant oral exposure due to good hygiene practice.	
Workers (inhalation) <i>DNEL = 1.3 mg/m<sup>3</sup></i>	Liquid - Calculated with MEASE	RCR
PROC 1	0.001 mg/m <sup>3</sup>	0.0008
PROC 2	0.001 mg/m <sup>3</sup>	0.0008
PROC 3	0.01 mg/m <sup>3</sup>	0.0077
PROC 4	0.05 mg/m <sup>3</sup>	0.0385
PROC 5	0.05 mg/m <sup>3</sup>	0.0385
PROC 8a	0.05 mg/m <sup>3</sup>	0.0385
PROC 8b	0.01 mg/m <sup>3</sup>	0.0077
PROC 9	0.01 mg/m <sup>3</sup>	0.0077
PROC 10	0.05 mg/m <sup>3</sup>	0.0385
PROC 13	0.01 mg/m <sup>3</sup>	0.0077
PROC 14	0.01 mg/m <sup>3</sup>	0.0077
PROC 15	0.01 mg/m <sup>3</sup>	0.0077
PROC 7 – With mask APF 20	0.05 mg/m <sup>3</sup>	0.0385
Workers (dermal)	As reported in the CLP Regulation No 1272/2008 Annex VI Table 3.1, nitric acid is corrosive above the 20% concentration limit. Therefore effective control measures are in place to prevent dermal exposure. Furthermore protective clothing and gloves are considered to be used consistently when handling corrosive substances. Production companies report the use of protective gloves and thus repeated daily dermal exposure to commercial product is considered negligible.	
5.2. Environmental exposure (qualitative assessment)		
Environmental release	The production of nitric acid can potentially result in aquatic emissions and locally increase the nitrate concentration while decreasing the pH in the aquatic environment. However, the pH of industrial effluents is normally measured frequently and can be neutralized easily.	
Waste water treatment plants (WWTP)	Not relevant. Nitric acid dissociates in H <sup>+</sup> and NO <sub>3</sub> <sup>-</sup> and will be neutralized before reaching WWTP.	
Aquatic pelagic compartment	Due to its high water solubility, nitric acid is mainly found in soil (migrating towards the groundwater table) and water compartments: there, nitric acid progressively dissociates affecting the pH of the receiving compartment. The higher the buffer capacity of the water is, the lower the effect on pH will be.	
Sediments	Not relevant. There will be no absorption on particulate matter or surfaces.	
Soil and groundwater	Not relevant. Infiltration, partial neutralization, dispersion, dilution.	

Atmospheric compartment	Nitric acid is highly soluble and in air will react into NO <sub>x</sub> . These NO <sub>x</sub> emissions in the troposphere are small compared to releases from combustion processes
Secondary poisoning	Bioaccumulation in organisms is not relevant for nitric acid.

<b>1. Short title of exposure scenario 2</b>	
Professional use of nitric acid – Concentration < 75%	
<b>2. Description of activities and processes covered in the exposure scenario</b>	
Sector of use (SU)	SU 1, SU 22
Product category (PC)	PC12, PC14, PC15, PC20, PC21, PC35
Process category (PROC)	<p>PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact).</p> <p>PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.</p> <p>PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.</p> <p>PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing).</p> <p>PROC 10: Roller application or brushing.</p> <p>PROC 11: Non industrial spraying.</p> <p>PROC 13: Treatment of articles by dipping and pouring.</p> <p>PROC 15: Use as laboratory reagent</p> <p>PROC 19: Hand-mixing with intimate contact and only PPE available.</p>
Article category (AC)	Not applicable
Environmental release category (ERC)	<p>ERC 8a (Wide dispersive indoor use of processing aids in open systems)</p> <p>ERC 8b (Wide dispersive indoor use of reactive substances in open systems)</p> <p>ERC 8e (Wide dispersive outdoor use of reactive substances in open systems)</p>
<b>3. Operational conditions</b>	
<b>3.1 Operational conditions related with frequency and quantities of use</b>	
Duration of exposure at workplace:	8 hours/day
Frequency of exposure at workplace:	220 days/year for each worker
Annual amount used per site:	The daily and annual amount/emission per site is not considered to be the main determinant for environmental exposure.
<b>3.2 Operational conditions related with substance/ product</b>	
Physical state	Liquid
Concentration of substance in mixture	Nitric acid is used during the production phase of various cleaning products, although often the amount in the end products is limited due to its reactivity. Nevertheless in case of this scenario worst case scenario was considered with products containing more than 25% nitric acid but always less than 75%.
<b>3.3 Other relevant operational conditions</b>	
The amount used per professional workers varies from activity to activity. The maximum duration >4 h/day was considered as worst case assumption.	

4. Risk Management Measures			
4.1 RMMs related to workers			
Organisational measures	Because nitric acid is corrosive, the risk management measures for human health should focus on the prevention of direct contact with the substance. Since automated, closed systems and local exhaust ventilation may be less feasible to implement for professional settings, product related design measures should be taken (low concentration for example) as well as good practices that prevent direct eye/skin contact with nitric acid and prevent formation of aerosols and splashes are more important along with the personal protective equipment measures.		
	<i>HNO<sub>3</sub> concentration in product &gt; 20%:</i>	<i>HNO<sub>3</sub> concentration in product between 5% and 20%:</i>	<i>HNO<sub>3</sub> concentration in product &lt; 5%</i>
Respiratory protection	Compulsory	Recommended	Good practice
Hand protection	Compulsory	Recommended	Good practice
Eye protection	Compulsory	Recommended	Good practice
Skin and body protection	Compulsory	Recommended	Good practice
Hygiene measures	Keep away from foodstuffs, drinks and tobacco. Wash hands before breaks and at end of work. Keep work clothes separate.		
4.2 RMMs related to the environment			
Organisational measures	Procedural and/or control technologies are required to minimise emissions and the resulting exposure during cleaning and maintenance procedures.		
Abatement measures related to wastewater	Different rules apply to professional users regarding control of their effluents. It is required that the flow of release to municipal wastewater or to surface water do not cause significant in pH changes. It is then dependant whether or not discharging is done to municipal wastewater equipped with sewage treatment plant or not.		
Abatement measures related to waste air	Nitric acid is not expected to be found in the solid waste or to reach the air compartment, due to its low vapour pressure and degradation in NO <sub>x</sub> . Therefore, no specific risk management measures for air emissions are provided.		
Abatement measures related to soil	For release to soil for fertilizer uses, the pH will be naturally neutralized by the medium before reaching the groundwater.		
4.3 Waste related measures			
Type of waste	Liquid waste – packaging material		
Disposal technique	The neutralised liquid can be spilled in accordance to applicable normative. The residue of the containers or the used container itself should be disposed in accordance with local requirements.		
5. Prediction of exposure resulting from the conditions described above and the substance properties.			
5.1. Human exposure			
Professionals (oral)	No significant oral exposure due to good hygiene practice.		
Professionals (dermal)	As reported in the CLP Regulation No 1272/2008 Annex VI Table 3.1, nitric acid is corrosive above the 20% concentration limit. Therefore effective control measures are in place to prevent dermal exposure. Furthermore protective clothing and gloves are considered to be used consistently when handling corrosive substances. Production companies report the use of protective gloves and thus repeated daily dermal exposure to commercial product is considered negligible.		
Professional (inhalation) <i>DNEL = 1.3 mg/m<sup>3</sup></i>	Calculated with MEASE		RCR

PROC 5,	0.1 mg/m <sup>3</sup>	0.08
PROC8a	0.05 mg/m <sup>3</sup>	0.04
PROC8b	0.05 mg/m <sup>3</sup>	0.04
PROC9	0.05 mg/m <sup>3</sup>	0.04
PROC10	0.05 mg/m <sup>3</sup>	0.04
PROC 13	0.05 mg/m <sup>3</sup>	0.04
PROC14	0.1 mg/m <sup>3</sup>	0.08
PROC15	0.01 mg/m <sup>3</sup>	0.01
PROC19	0.05 mg/m <sup>3</sup>	0.04
PROC 11 with mask APF40	0.5 mg/m <sup>3</sup>	0.38

#### 5.2. Environmental exposure (qualitative assessment)

Environmental release	The production of nitric acid can potentially result in aquatic emissions and locally increase the nitrate concentration while decreasing the pH in the aquatic environment. However, the pH of industrial effluents is normally measured frequently and can be neutralized easily.
Waste water treatment plants (WWTP)	Not relevant. Nitric acid dissociates in H <sup>+</sup> and NO <sub>3</sub> <sup>-</sup> and will be neutralized before reaching WWTP.
Aquatic pelagic compartment	Due to its high water solubility, nitric acid is mainly found in soil (migrating towards the groundwater table) and water compartments: there, nitric acid progressively dissociates affecting the pH of the receiving compartment. The higher the buffer capacity of the water is, the lower the effect on pH will be.
Sediments	Not relevant. There will be no absorption on particulate matter or surfaces.
Soil and groundwater	Not relevant. Infiltration, partial neutralization, dispersion, dilution.
Atmospheric compartment	Not relevant. Nitric acid release is negligible, due to its low vapour pressure and degradation in NO <sub>x</sub> .
Secondary poisoning	Bioaccumulation in organisms is not relevant for nitric acid.