

CHEMICAL SAFETY REPORT

Update 3: Submitted September 2021

Replaces 2nd Update (April 2016), 1st Update (May 2013) and original version (2010).

Substance Name: hexaammonium heptamolybdate (tetrahydrate)

EC Number: 234-722-4

CAS Number: 12027-67-7

Registrant's Identity: Joint CSR submitted by the Lead Registrant (Climax Molybdenum B.V.) on behalf of all members of the joint submission MOCONJS-HEPTAMOLY. Document prepared by the IMO A REACH Molybdenum Consortium (MoCon)

See also the [2014 OECD Highly Soluble Molybdenum Salts Mutual Acceptance of Data \(MAD\) dataset \(containing primarily sodium molybdate data used for read-across in many instances in this CSR\)](#), which is attached in IUCLID Section 13. The afore-mentioned MAD status data is:

- 1) likewise contained in the relevant individual sections within this CSR.
- 2) also downloadable from the OECD website at:

http://webnet.oecd.org/HPV/UI/SIDS_Details.aspx?id=5c88d62f-4401-4cad-b521-521a4bd710f3

Several supporting documents/reports are to be considered together with the CSR. They are referenced in the CSR, and are attached in the technical registration dossier in IUCLID section 13.2:

- MoCon read-across concept/justification for human health hazards
 - MoCon read-across concept/justification for environmental hazards
 - Speciation of molybdenum compounds in water: UV spectra (in support of the above)
 - DNEL derivation report
 - Background document – Environmental Effects Assessments (*updated July 2021*)
 - Background document – Environmental Fate properties (*updated May 2021*)
 - Background document – Regional / ambient monitoring data (water, soil, sediment)
 - OECD SIDS Initial Assessment Profile (SIAP), containing the dataset with MAD status
 - List of assessors (list of professionals that contributed to the registration dossier).
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2. MANUFACTURE AND USES

Table 7. Quantities (in tonnes/year)

Year	Tonnages (tonnes per year)
-	For confidentiality reasons the data on manufactured or imported quantities per registrant are not provided in this joint CSR , but are instead provided by each individual registrant of this substance in their technical registration dossier (section 3.2 in IUCLID).

2.1. Manufacture

Table 8. Manufacture

	Manufacture
M-1	<p>Manufacture of ammonium heptamolybdate (by catalyst industry) <u>Further description of manufacturing process:</u></p> <p>This manufacture is specific to the catalyst industry as part of the catalyst production process.</p> <p>Contributing activity/technique for the environment :</p> <ul style="list-style-type: none"> - ERC1: Manufacture of the substance <p>Contributing activity/technique for the workers :</p> <ul style="list-style-type: none"> - PROC 1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions - PROC 2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions - PROC 3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment conditions - PROC 4: Chemical production where opportunity for exposure arises - PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities [EU REACH] - PROC 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - PROC 14: Tableting, compression, extrusion, pelletisation, granulation - PROC 26: Handling of solid inorganic substances at ambient temperature - PROC28: Manual maintenance (cleaning and repair) of machinery <p>Tonnage of substance for that use: tonnes/year Related assessment: use not assessed</p>
M-2	<p>Manufacture of ammonium heptamolybdate <u>Further description of manufacturing process:</u></p> <p>Process summary: Ammonium Heptamolybdate (AHM) is prepared by dissolving molybdenum trioxide (MoO₃) in ammonia and water followed by filtration to remove gangue elements. After filtration, AHM is crystallized out of the filtrate, dried and then packaged.</p> <p>Feed Stock Selection: AHM feed stocks can be any grade of molybdc oxide, such as roasted molybdc oxide (EINECS 289-178-0), or pure oxide calcined or sublimed (EINECS 215-204-7). The desired quality of the AHM will dictate feed stock selection.</p> <p>Process Description: AHM is produced in a batch process. The first step is dissolution of MoO₃ in ammonia and water in a dissolver tank at a controlled temperature at approximately 65°C. The chemical reaction is shown below:</p> $7 \text{ MoO}_3 + 7 \text{ H}_2\text{O} + 6 \text{ NH}_3 \rightarrow (\text{NH}_4)_6\text{Mo}_7\text{O}_{24} \cdot 4 \text{ H}_2\text{O}$

	<p>As shown in the reaction, the resulting AHM product is a hydrate containing four molecules of water per AHM molecule. Most of the undissolved material is removed via filtration with the undissolved material reporting as a filter cake and the filtered solution, i.e. the filtrate, reporting to the crystallizer.</p> <p>Crystallization of AHM is affected by cooling of the solution because the solubility threshold decreases with temperature. An AHM crystal-containing slurry is sent to a centrifuge for liquid / solid separation with the solids being AHM. The liquid removed from the slurry, i.e. the centrate, is recycled back to the dissolver. The AHM crystals from the centrifuge are dried in a dryer and stored. From the storage bin, AHM is packed into fibre board drums, and/or steel drums as per sales requirements.</p> <p>Contributing activity/technique for the environment : - ERC1: Manufacture of the substance</p> <p>Contributing activity/technique for the workers : - PROC 2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions - PROC 3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment conditions - PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities [EU REACH] - PROC 26: Handling of solid inorganic substances at ambient temperature - PROC28: Manual maintenance (cleaning and repair) of machinery</p> <p>Tonnage of substance for that use: tonnes/year Related assessment: use not assessed <u>Remarks:</u> Aware of only one EU site.</p>
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2.2. Identified uses

Table 9. Formulation

	Formulation
F-1	<p>Formulation of ammonium heptamolybdate as micronutrient into fertilizers/feed additives <u>Further description of the use:</u> Contributing activity/technique for the environment : - ERC2: Formulation into mixture</p> <p>Contributing activity/technique for the workers : - PROC 5: Mixing or blending in batch processes - PROC 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - PROC 26: Handling of solid inorganic substances at ambient temperature - PROC28: Manual maintenance (cleaning and repair) of machinery</p> <p>Product Category formulated: PC 12: Fertilisers; PC 0: Other: Feed additives Technical function of the substance: fertilisers (soil amendments); feed additives Tonnage of substance for that use: tonnes/year Substance supplied to that use: in a mixture <u>Remarks:</u> Molybdenum is an essential trace element for plants, animals, humans and most microbes. Related assessment: use not assessed</p>

F-2	<p>Formulation of ammonium heptamolybdate into plastics as smoke and flame suppressant</p> <p><u>Further description of the use:</u> Contributing activity/technique for the environment : - ERC3: Formulation into solid matrix</p> <p>Contributing activity/technique for the workers : - PROC 1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions - PROC 26: Handling of solid inorganic substances at ambient temperature - PROC28: Manual maintenance (cleaning and repair) of machinery</p> <p>Product Category formulated: PC 32: Polymer preparations and compounds Technical function of the substance: flame retardant Tonnage of substance for that use: tonnes/year Substance supplied to that use: in a mixture Related assessment: use not assessed</p>
F-3	<p>Formulation of ammonium heptamolybdate in the production of catalysts or catalyst precursors</p> <p><u>Further description of the use:</u> Contributing activity/technique for the environment : - ERC2: Formulation into mixture - ERC3: Formulation into solid matrix</p> <p>Contributing activity/technique for the workers : - PROC 1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions - PROC 2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions - PROC 3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment conditions - PROC 4: Chemical production where opportunity for exposure arises - PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities [EU REACH] - PROC 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - PROC 14: Tableting, compression, extrusion, pelletisation, granulation - PROC 26: Handling of solid inorganic substances at ambient temperature - PROC28: Manual maintenance (cleaning and repair) of machinery</p> <p>Product Category formulated: PC 20: Products such as ph-regulators, flocculants, precipitants, neutralisation agents; PC 0: Other: UCN P15500 Catalysts Technical function of the substance: catalyst Tonnage of substance for that use: tonnes/year Substance supplied to that use: as such; in a mixture Remarks: Information provided by European Catalyst Manufacturers Assn. Related assessment: use not assessed</p>
F-4	<p>Formulation of ammonium heptamolybdate for the production of ceramics</p> <p><u>Further description of the use:</u> Contributing activity/technique for the environment : - ERC2: Formulation into mixture</p> <p>Contributing activity/technique for the workers : - PROC 2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions - PROC 3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment conditions - PROC 4: Chemical production where opportunity for exposure arises - PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities [EU REACH]</p>

	<p>- PROC 26: Handling of solid inorganic substances at ambient temperature - PROC28: Manual maintenance (cleaning and repair) of machinery Technical function of the substance: pigment; UNC code: F05100-Pigments to glazing materials, enamels and glass. F05110 - Pigments to paint and printing inks. F05250 - Pigments pastes Tonnage of substance for that use: tonnes/year Substance supplied to that use: as such Related assessment: use not assessed</p>
F-5	<p>Formulation of ammonium heptamolybdate into surface treatment (passivation/anti-corrosion) products <u>Further description of the use:</u> Contributing activity/technique for the environment : - ERC2: Formulation into mixture Contributing activity/technique for the workers : - PROC 5: Mixing or blending in batch processes - PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities [EU REACH] - PROC 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - PROC 26: Handling of solid inorganic substances at ambient temperature - PROC28: Manual maintenance (cleaning and repair) of machinery Product Category formulated: PC 14: Metal surface treatment products Technical function of the substance: antiscaling agent; corrosion inhibitor Tonnage of substance for that use: tonnes/year Substance supplied to that use: as such Related assessment: use not assessed</p>
F-6	<p>Formulation of ammonium heptamolybdate into anti-corrosive processing aid products <u>Further description of the use:</u> Contributing activity/technique for the environment : - ERC2: Formulation into mixture Contributing activity/technique for the workers : - PROC 5: Mixing or blending in batch processes - PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities [EU REACH] - PROC 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - PROC 26: Handling of solid inorganic substances at ambient temperature - PROC28: Manual maintenance (cleaning and repair) of machinery Product Category formulated: PC 14: Metal surface treatment products Technical function of the substance: processing aid Tonnage of substance for that use: tonnes/year Substance supplied to that use: as such Related assessment: use not assessed</p>
F-7	<p>Formulation of ammonium heptamolybdate for use in respirator cartridges <u>Further description of the use:</u> Ammonium heptamolybdate is formulated into a mixture at concentrations of $\leq 7.0\%$ w/w. The mixture will be reformulated or re-packed at industrial sites and finally the mixture is filled into respirator cartridges. Contributing activity/technique for the environment : - ERC2: Formulation into mixture - ERC3: Formulation into solid matrix Contributing activity/technique for the workers : - PROC 5: Mixing or blending in batch processes - PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities [EU REACH]</p>

	<ul style="list-style-type: none"> - PROC 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - PROC 14: Tableting, compression, extrusion, pelletisation, granulation - PROC 15: Use as laboratory reagent - PROC 26: Handling of solid inorganic substances at ambient temperature - PROC28: Manual maintenance (cleaning and repair) of machinery <p>Product Category formulated: PC 2: Adsorbents Technical function of the substance: absorbent; adsorbent; catalyst; reducing agent Tonnage of substance for that use: tonnes/year Substance supplied to that use: as such; in a mixture Related assessment: use not assessed</p>
F-8	<p>Formulation of pre-formulations <u>Further description of the use:</u> Contributing activity/technique for the environment :</p> <ul style="list-style-type: none"> - ERC2: Formulation into mixture - ERC3: Formulation into solid matrix <p>Contributing activity/technique for the workers :</p> <ul style="list-style-type: none"> - PROC 3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment conditions - PROC 4: Chemical production where opportunity for exposure arises - PROC 5: Mixing or blending in batch processes - PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities [EU REACH] - PROC 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - PROC 26: Handling of solid inorganic substances at ambient temperature - PROC28: Manual maintenance (cleaning and repair) of machinery <p>Technical function of the substance: no technical function Tonnage of substance for that use: tonnes/year Substance supplied to that use: as such Related assessment: use not assessed</p>

Table 10. Uses at industrial sites

Uses at industrial sites	
IW-1	<p>Intermediate use of ammonium heptamolybdate in the manufacture of lighting materials <u>Further description of the use:</u> The substance is reduced to molybdenum metal for use as bulb components.</p> <p>Contributing activity/technique for the environment :</p> <ul style="list-style-type: none"> - ERC6a: Use of intermediate <p>Contributing activity/technique for the workers :</p> <ul style="list-style-type: none"> - PROC 1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions - PROC 3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment conditions - PROC 5: Mixing or blending in batch processes - PROC28: Manual maintenance (cleaning and repair) of machinery <p>Sector of end use: SU 16: Manufacture of computer, electronic and optical products, electrical equipment Technical function of the substance: intermediate (precursor) Tonnage of substance for that use: tonnes/year Substance supplied to that use: in a mixture Subsequent service life relevant for that use: no Related assessment: use not assessed</p>

<p>IW-2</p>	<p>Industrial use of ammonium heptamolybdate in catalyst production <u>Further description of the use:</u> Contributing activity/technique for the environment : - ERC4: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) - ERC6b: Use of reactive processing aid at industrial site (no inclusion into or onto article) Contributing activity/technique for the workers : - PROC 1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions - PROC 2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions - PROC 3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment conditions - PROC 4: Chemical production where opportunity for exposure arises - PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities [EU REACH] - PROC 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - PROC 14: Tableting, compression, extrusion, pelletisation, granulation - PROC 26: Handling of solid inorganic substances at ambient temperature - PROC28: Manual maintenance (cleaning and repair) of machinery Product Category used: PC 2: Adsorbents; PC 20: Products such as ph-regulators, flocculants, precipitants, neutralisation agents Sector of end use: SU 8: Manufacture of bulk, large scale chemicals (including petroleum products); SU 9: Manufacture of fine chemicals Technical function of the substance: catalyst Tonnage of substance for that use: tonnes/year Substance supplied to that use: in a mixture Subsequent service life relevant for that use: no Remarks: Information provided by European Catalyst Manufacturers Assn. Related assessment: use not assessed</p>
<p>IW-3</p>	<p>Intermediate use of ammonium heptamolybdate in the manufacture of catalyst <u>Further description of the use:</u> Contributing activity/technique for the environment : - ERC6a: Use of intermediate Contributing activity/technique for the workers : - PROC 1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions - PROC 2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions - PROC 3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment conditions - PROC 4: Chemical production where opportunity for exposure arises - PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities [EU REACH] - PROC 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - PROC 14: Tableting, compression, extrusion, pelletisation, granulation - PROC 26: Handling of solid inorganic substances at ambient temperature - PROC28: Manual maintenance (cleaning and repair) of machinery Product Category used: PC 2: Adsorbents; PC 20: Products such as ph-regulators, flocculants, precipitants, neutralisation agents Sector of end use: SU 8: Manufacture of bulk, large scale chemicals (including petroleum products); SU 9: Manufacture of fine chemicals Technical function of the substance: intermediate (precursor)</p>

	<p>Tonnage of substance for that use: tonnes/year Substance supplied to that use: in a mixture Subsequent service life relevant for that use: no Remarks:</p> <p>Information provided by European Catalyst Manufacturers Assn.</p> <p>Related assessment: use not assessed</p>
IW-4	<p>Intermediate use of ammonium heptamolybdate in the manufacture of metal alloy <u>Further description of the use:</u> Contributing activity/technique for the environment : - ERC6a: Use of intermediate Contributing activity/technique for the workers : - PROC 2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions - PROC 3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment conditions - PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting - PROC 26: Handling of solid inorganic substances at ambient temperature - PROC28: Manual maintenance (cleaning and repair) of machinery Product Category used: PC 7: Base metals and alloys Sector of end use: SU 14: Manufacture of basic metals, including alloys Technical function of the substance: intermediate (precursor) Tonnage of substance for that use: tonnes/year Substance supplied to that use: as such Subsequent service life relevant for that use: no Related assessment: use not assessed</p>
IW-5	<p>Intermediate use of ammonium heptamolybdate in the manufacture of sintered metal <u>Further description of the use:</u> Contributing activity/technique for the environment : - ERC6a: Use of intermediate Contributing activity/technique for the workers : - PROC 1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions - PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting - PROC 26: Handling of solid inorganic substances at ambient temperature - PROC 27a: Production of metal powders (hot processes) - PROC28: Manual maintenance (cleaning and repair) of machinery Product Category used: PC 7: Base metals and alloys Sector of end use: SU 15: Manufacture of fabricated metal products, except machinery and equipment Technical function of the substance: intermediate (precursor) Tonnage of substance for that use: tonnes/year Substance supplied to that use: as such Subsequent service life relevant for that use: no Related assessment: use not assessed</p>
IW-6	<p>Industrial use of ammonium heptamolybdate as detergent for metal surface treatment <u>Further description of the use:</u> Contributing activity/technique for the environment : - ERC4: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) Contributing activity/technique for the workers : - PROC 5: Mixing or blending in batch processes - PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated</p>

	<p>facilities [EU REACH]</p> <ul style="list-style-type: none"> - PROC 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - PROC 15: Use as laboratory reagent - PROC28: Manual maintenance (cleaning and repair) of machinery <p>Product Category used: PC 14: Metal surface treatment products; PC 20: Products such as ph-regulators, flocculants, precipitants, neutralisation agents; PC 21: Laboratory chemicals; PC 25: Metal working fluids; PC 38: Welding and soldering products, flux products</p> <p>Technical function of the substance: antiscaling agent; corrosion inhibitor</p> <p>Tonnage of substance for that use: tonnes/year Substance supplied to that use: in a mixture Subsequent service life relevant for that use: no Related assessment: use not assessed</p>
IW-7	<p>Intermediate use of ammonium heptamolybdate for the synthesis of molybdenum chelates <u>Further description of the use:</u> Contributing activity/technique for the environment : <ul style="list-style-type: none"> - ERC6a: Use of intermediate Contributing activity/technique for the workers : <ul style="list-style-type: none"> - PROC 4: Chemical production where opportunity for exposure arises - PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities [EU REACH] - PROC 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - PROC 26: Handling of solid inorganic substances at ambient temperature - PROC28: Manual maintenance (cleaning and repair) of machinery <p>Product Category used: PC 12: Fertilisers Sector of end use: SU 1: Agriculture, forestry and fishing Technical function of the substance: intermediate (precursor)</p> <p>Tonnage of substance for that use: tonnes/year Substance supplied to that use: as such; in a mixture Subsequent service life relevant for that use: no Related assessment: use not assessed</p> </p>
IW-8	<p>Industrial use of ammonium heptamolybdate in surface treatment (passivation/anti-corrosion) <u>Further description of the use:</u> Contributing activity/technique for the environment : <ul style="list-style-type: none"> - ERC5: Use at industrial site leading to inclusion into/onto article Contributing activity/technique for the workers : <ul style="list-style-type: none"> - PROC 2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions - PROC 7: Industrial spraying - PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities [EU REACH] - PROC 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - PROC 10: Roller application or brushing - PROC 13: Treatment of articles by dipping and pouring - PROC28: Manual maintenance (cleaning and repair) of machinery <p>Product Category used: PC 14: Metal surface treatment products; PC 15: Non-metal-surface treatment products Sector of end use: SU 12: Manufacture of plastics products, including compounding and conversion; SU 15: Manufacture of fabricated metal products, except machinery and equipment Technical function of the substance: antiscaling agent; corrosion inhibitor</p> <p>Tonnage of substance for that use: tonnes/year Substance supplied to that use: in a mixture Subsequent service life relevant for that use: yes Link to the subsequent service life: Service life of surface treated articles by consumers.COPY; Service life of surface treated articles in industrial settings.COPY; Service life of surface treated</p> </p>

	<p>articles in professional settings.COPY Related assessment: use not assessed</p>
IW-9	<p>Industrial use of ammonium heptamolybdate in an anti-corrosive processing aid <u>Further description of the use:</u> Contributing activity/technique for the environment : - ERC4: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) Contributing activity/technique for the workers : - PROC 1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions - PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities [EU REACH] - PROC 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - PROC28: Manual maintenance (cleaning and repair) of machinery Product Category used: PC 0: Other: Anti corrosive processing aid Technical function of the substance: processing aid Tonnage of substance for that use: tonnes/year Substance supplied to that use: in a mixture Subsequent service life relevant for that use: no Related assessment: use not assessed</p>
IW-10	<p>Industrial use of ammonium heptamolybdate in the production of respirator cartridges <u>Further description of the use:</u> Contributing activity/technique for the environment : - ERC4: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) Contributing activity/technique for the workers : - PROC 5: Mixing or blending in batch processes - PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities [EU REACH] - PROC 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - PROC 14: Tableting, compression, extrusion, pelletisation, granulation - PROC 15: Use as laboratory reagent - PROC 21: Low energy manipulation of substances bound in materials and/or articles - PROC28: Manual maintenance (cleaning and repair) of machinery Product Category used: PC 2: Adsorbents Technical function of the substance: adsorbent; adsorbent; catalyst; reducing agent Tonnage of substance for that use: tonnes/year Substance supplied to that use: in a mixture Subsequent service life relevant for that use: no Related assessment: use not assessed</p>
IW-11	<p>Industrial use of ammonium heptamolybdate in respirator cartridges <u>Further description of the use:</u> Contributing activity/technique for the environment : - ERC4: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) Contributing activity/technique for the workers : - PROC 21: Low energy manipulation of substances bound in materials and/or articles - PROC28: Manual maintenance (cleaning and repair) of machinery Product Category used: PC 2: Adsorbents Technical function of the substance: adsorbent; adsorbent; catalyst; reducing agent Tonnage of substance for that use: tonnes/year Substance supplied to that use: in a mixture Subsequent service life relevant for that use: no Related assessment: use not assessed</p>

<p>IW-12</p>	<p>Industrial use of ammonium heptamolybdate as smoke and flame suppressant in the plastic industry <u>Further description of the use:</u> Contributing activity/technique for the environment : - ERC5: Use at industrial site leading to inclusion into/onto article Contributing activity/technique for the workers : - PROC 3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment conditions - PROC 5: Mixing or blending in batch processes - PROC 14: Tableting, compression, extrusion, pelletisation, granulation - PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles - PROC 26: Handling of solid inorganic substances at ambient temperature - PROC28: Manual maintenance (cleaning and repair) of machinery Product Category used: PC 32: Polymer preparations and compounds Sector of end use: SU 12: Manufacture of plastics products, including compounding and conversion Technical function of the substance: flame retardant Tonnage of substance for that use: tonnes/year Substance supplied to that use: in a mixture Subsequent service life relevant for that use: yes Link to the subsequent service life: Service life of plastic articles in industrial settings.COPY; Service life of plastic articles in professional settings.COPY; Service life of plastic articles used by consumers.COPY Related assessment: use not assessed</p>
<p>IW-13</p>	<p>Intermediate use of ammonium heptamolybdate in the production of ceramics <u>Further description of the use:</u> Contributing activity/technique for the environment : - ERC6a: Use of intermediate Contributing activity/technique for the workers : - PROC 2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions - PROC 3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment conditions - PROC 4: Chemical production where opportunity for exposure arises - PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting - PROC 26: Handling of solid inorganic substances at ambient temperature - PROC28: Manual maintenance (cleaning and repair) of machinery Product Category used: PC 9b: Fillers, putties, plasters, modelling clay Sector of end use: SU 8: Manufacture of bulk, large scale chemicals (including petroleum products); SU 9: Manufacture of fine chemicals Technical function of the substance: intermediate (precursor) Tonnage of substance for that use: tonnes/year Substance supplied to that use: as such Subsequent service life relevant for that use: no Related assessment: use not assessed</p>

Table 11. Uses by professional workers

<p>Uses by professional workers</p>	
<p>PW-1</p>	<p>Professional use of ammonium heptamolybdate as micronutrient in fertilizers <u>Further description of the use:</u> During this use the following activities are considered: mixing, dilution, (un)loading and application</p>

	<p>of solid and liquid fertilizers onto/into soil, onto crop foliage or seeds in out/indoor conditions.</p> <p>Contributing activity/technique for the environment :</p> <ul style="list-style-type: none"> - ERC8b: Widespread use of reactive processing aid (no inclusion into or onto article, indoor) - ERC8e: Widespread use of reactive processing aid (no inclusion into or onto article, outdoor) <p>Contributing activity/technique for the workers :</p> <ul style="list-style-type: none"> - PROC 1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions - PROC 2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions - PROC 5: Mixing or blending in batch processes - PROC 8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities - PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities [EU REACH] - PROC 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - PROC 11: Non industrial spraying - PROC 13: Treatment of articles by dipping and pouring - PROC 15: Use as laboratory reagent - PROC 19: Hand-mixing with intimate contact and only PPE available. - PROC 26: Handling of solid inorganic substances at ambient temperature <p>Product Category used: PC 12: Fertilisers Sector of end use: SU 1: Agriculture, forestry and fishing Technical function of the substance: fertilisers (soil amendments) Tonnage of substance for that use: tonnes/year Subsequent service life relevant for that use: no Remarks:</p> <p>Molybdenum is an essential trace nutrient for plants, animals, humans and most microbes.</p> <p>Related assessment: use not assessed</p>
PW-2	<p>Professional use of ammonium heptamolybdate in respirator cartridges <u>Further description of the use:</u> Contributing activity/technique for the environment :</p> <ul style="list-style-type: none"> - ERC8a: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) <p>Contributing activity/technique for the workers :</p> <ul style="list-style-type: none"> - PROC 21: Low energy manipulation of substances bound in materials and/or articles <p>Product Category used: PC 2: Adsorbents Technical function of the substance: absorbent; adsorbent; catalyst; reducing agent Tonnage of substance for that use: tonnes/year Subsequent service life relevant for that use: no Related assessment: use not assessed</p>

Table 12. Consumer uses

Consumer uses	
C-1	<p>Consumer use of ammonium heptamolybdate as micronutrient in fertilizer <u>Further description of the use:</u> Contributing activity/technique for the environment:</p> <ul style="list-style-type: none"> - ERC8b: Widespread use of reactive processing aid (no inclusion into or onto article, indoor) - ERC8e: Widespread use of reactive processing aid (no inclusion into or onto article, outdoor)

	<p>Contributing activity/technique for consumers: - PC 12: Fertilisers Technical function of the substance: fertilisers (soil amendments) Tonnage of substance for that use: tonnes/year Subsequent service life relevant for that use: no Remarks:</p> <p>Best estimate of maximum concentration within consumer product is 0.2%. Molybdenum is an essential trace nutrient for plants, animals, humans and most microbes.</p> <p>Related assessment: use not assessed</p>
C-2	<p>Consumer use of ammonium heptamolybdate in respirator cartridges <u>Further description of the use:</u> Contributing activity/technique for the environment: - ERC8a: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) Contributing activity/technique for consumers: - PC 2: Adsorbents Technical function of the substance: absorbent; adsorbent; catalyst; reducing agent Tonnage of substance for that use: tonnes/year Subsequent service life relevant for that use: no Related assessment: use not assessed</p>

Table 13. Article service life

Article service life	
SL-1	<p>Service life of plastic articles in industrial settings <u>Further description of the use:</u> Article used by: workers Substance intended to be released from article: Article category related to subsequent service life (AC): AC 13: Plastic articles Contributing activity/technique for the environment: - ERC12a: Processing of articles at industrial sites with low release Contributing activity/technique for consumers: Contributing activity/technique for the workers: - PROC 21: Low energy manipulation of substances bound in materials and/or articles Technical function of the substance: flame retardant Tonnage of substance for that use: tonnes/year Related assessment: use not assessed</p>
SL-2	<p>Service life of plastic articles in professional settings <u>Further description of the use:</u> Article used by: workers Substance intended to be released from article: Article category related to subsequent service life (AC): AC 13: Plastic articles Contributing activity/technique for the environment: - ERC10a: Widespread use of articles with low release (outdoor) - ERC11a: Widespread use of articles with low release (indoor) Contributing activity/technique for consumers: Contributing activity/technique for the workers: - PROC 21: Low energy manipulation of substances bound in materials and/or articles Technical function of the substance: flame retardant Tonnage of substance for that use: tonnes/year Related assessment: use not assessed</p>
SL-3	<p>Service life of plastic articles by used consumers</p>

	<p><u>Further description of the use:</u> Article used by: consumers Substance intended to be released from article: Article category related to subsequent service life (AC): Contributing activity/technique for the environment: - ERC10a: Widespread use of articles with low release (outdoor) - ERC11a: Widespread use of articles with low release (indoor) Contributing activity/technique for consumers: - AC 13: Plastic articles Contributing activity/technique for the workers: Technical function of the substance: flame retardant Tonnage of substance for that use: tonnes/year Related assessment: use not assessed</p>
SL-4	<p>Service life of surface treated articles in industrial settings <u>Further description of the use:</u> Article used by: workers Substance intended to be released from article: Article category related to subsequent service life (AC): AC 7: Metal articles; AC 13: Plastic articles Contributing activity/technique for the environment: - ERC12a: Processing of articles at industrial sites with low release Contributing activity/technique for consumers: Contributing activity/technique for the workers: - PROC 21: Low energy manipulation of substances bound in materials and/or articles Technical function of the substance: antiscaling agent; corrosion inhibitor Tonnage of substance for that use: tonnes/year Related assessment: use not assessed</p>
SL-5	<p>Service life of surface treated articles in professional settings <u>Further description of the use:</u> Article used by: workers Substance intended to be released from article: Article category related to subsequent service life (AC): AC 7: Metal articles; AC 13: Plastic articles Contributing activity/technique for the environment: - ERC10a: Widespread use of articles with low release (outdoor) - ERC11a: Widespread use of articles with low release (indoor) Contributing activity/technique for consumers: Contributing activity/technique for the workers: - PROC 21: Low energy manipulation of substances bound in materials and/or articles Technical function of the substance: antiscaling agent; corrosion inhibitor Tonnage of substance for that use: tonnes/year Related assessment: use not assessed</p>
SL-6	<p>Service life of surface treated articles used by consumers <u>Further description of the use:</u> Article used by: consumers Substance intended to be released from article: Article category related to subsequent service life (AC): Contributing activity/technique for the environment: - ERC10a: Widespread use of articles with low release (outdoor) - ERC11a: Widespread use of articles with low release (indoor) Contributing activity/technique for consumers: - AC 7: Metal articles; AC 13: Plastic articles Contributing activity/technique for the workers: Technical function of the substance: antiscaling agent; corrosion inhibitor Tonnage of substance for that use: tonnes/year Related assessment: use not assessed</p>

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2.3. Uses advised against

Table 14. Uses at industrial sites advised against

	Uses at industrial sites advised against
IW-1	<p>REACH Restriction limiting the use of inorganic ammonium salts in cellulose insulation <u>Further description of the use:</u></p> <p>Annex XVII to Regulation (EC) No 1907/2006 (REACH), entry 65 restricts the use of inorganic ammonium salts in cellulose insulation. The use is permitted only if certain conditions are met, as follows (cited from REACH Annex XVII):</p> <p>Inorganic ammonium salts...</p> <p>“1. Shall not be placed on the market, or used, in cellulose insulation mixtures or cellulose insulation articles after 14 July 2018 unless the emission of ammonia from those mixtures or articles results in a concentration of less than 3 ppm by volume (2,12 mg/m³) under the test conditions specified in paragraph 4.</p> <p>A supplier of a cellulose insulation mixture containing inorganic ammonium salts shall inform the recipient or consumer of the maximum permissible loading rate of the cellulose insulation mixture, expressed in thickness and density.</p> <p>A downstream user of a cellulose insulation mixture containing inorganic ammonium salts shall ensure that the maximum permissible loading rate communicated by the supplier is not exceeded.</p> <p>2. By way of derogation, paragraph 1 shall not apply to placing on the market of cellulose insulation mixtures intended to be used solely for the production of cellulose insulation articles, or to the use of those mixtures in the production of cellulose insulation articles.</p> <p>3. In the case of a Member State that, on 14 July 2016, has national provisional measures in place that have been authorised by the Commission pursuant to Article 129(2)(a), the provisions of paragraphs 1 and 2 shall apply from that date.</p> <p>4. Compliance with the emission limit specified in the first subparagraph of paragraph 1 shall be demonstrated in accordance with Technical Specification CEN/TS 16516, adapted as follows:</p> <p>(a) the duration of the test shall be at least 14 days instead of 28 days;</p> <p>(b) the ammonia gas emission shall be measured at least once per day throughout the test;</p> <p>(c) the emission limit shall not be reached or exceeded in any measurement taken during the test;</p> <p>(d) the relative humidity shall be 90 % instead of 50 %;</p> <p>(e) an appropriate method to measure the ammonia gas emission shall be used;</p> <p>(f) the loading rate, expressed in thickness and density, shall be recorded during the sampling of the cellulose insulation mixtures or articles to be tested.”</p>