MATERIAL SAFETY DATA SHEET

Section 1. Chemical Product and Company Information

1.1 Product Identifier

Trade Name	Ammonium Sulfate
REACH Substance Name	Ammonium Sulphate
REACH Registration Number	Koeln: 01-2119455044-46-0077 INEOS Koeln GmbH, Werk Koeln, Alte Strasse 201, D-50769 Koeln, Germany Seal Sands: 01-2119455044-46-0084 0000 INEOS Nitriles (UK) Ltd, PO Box 62, Seal Sands, Middlesbrough. TS21TX, UK

1.2 Relevant Identified Uses of the Substance or Mixture and Uses Advised Against

Product Use:	Industrial and/or professional use (fertilizers, intermediates, laboratory, flame retardant, pH regulating agent, ingredient in pharmaceuticals, cosmetics, insecticides, herbicides and fungicides); Ingredient in consumer products.
Uses Advised Against:	None identified

1.3 Details of the Supplier of the Substance or Mixture

Manufacturer:	INEOS Commerical Services UK Limited Hawkslease Chapel Lane Lyndhurst S043 7FG United Kingdom +49 (0) 221 3555 2223 e-mail: nitrilesreach@ineos.com Website: http://www.ineosnitriles.com

1.4 Emergency Telephone Number

+44 1235239670 (Carechem24)

Section 2. Hazards Identification

2.1 Classification of the Substance or Mixture

CLP/GHS Classification (EC No 1272/2008):	Not classified as hazardous
EU Classification (67/548/EEC):	Not classified as dangerous

2.2 Label Elements — No Labeling Required

2.3 Other Hazards — None

Section 3. Composition / Information on Ingredients

3.1 Substances

Chemical Name	CAS Number / EINECS Number/ REACH Reg. Number	% (w/w)	EU Classification (67/548/EEC)	CLP/GHS Classification (1272/2008)
Ammonium Sulphate	7783-20-2/231-984-1 Seal Sands: 01-2119455044-46-0084 Koln: 01-2119455044-46-0077	100%	Not classified as dangerous	Not classified as hazardous

See Section 16 for full text of GHS and EU Classifications.

Section 4. First Aid Measures

4.1 Description of First Aid Measures

- Eye Contact: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.
- Skin Contact: Wash exposed skin with soap and water. Get medical attention if irritation develops.
- Inhalation: If inhaled, remove to fresh air. Get medical attention if symptoms appear.
- Ingestion: Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If potentially dangerous quantities of this material have been swallowed, call a physician immediately.

See Section 11 for more detailed information on health effects.

4.2 Most Important symptoms and effects, both acute and delayed:
May cause minor irritation to eyes, skin and respiratory tract. No significant health effects have been identified.

4.3 Indication of any immediate medical attention and special treatment needed:
No immediate treatment is anticipated to be required.

Section 5. Firefighting Measures

5.1 Extinguishing Media
In case of fire, use any extinguishing media that is suitable for the surrounding fire.

5.2 Special Hazards Arising from the Substance or Mixture
Unusual Fire and Explosion Hazards: This material is not combustible or explosive. Combustion Products: Thermal decomposition will yield ammonia, nitrogen and sulphur oxides.

5.3 Advice for Fire-Fighters
Fire-fighters should wear positive pressure self-contained breathing apparatus (SCBA) and full turnout gear.

Section 6: Accidental Release Measures

6.1 Personal Precautions, Protective Equipment and Emergency Procedures
Keep unnecessary personnel away. Use suitable protective equipment (section 8). Avoid breathing dust. Personal protection in case of a large spill, Tightly-fitting goggles Protective clothing, Dust respirator. Gloves. Suggested protective clothing might not be adequate. Consult a specialist before handling this product.

6.2 Environmental Precautions
Avoid release to the environment. Avoid contact of spilt material with soil and prevent runoff entering surface waterways.

6.3 Methods and Material for Containment and Cleaning Up
If emergency personnel are unavailable, contain spilt material. For small spills, add absorbent (soil may be used in the absence of other suitable materials), scoop up material and place in a sealable, liquid-proof container for disposal. For large spills, dyke spilt material or otherwise contain it to ensure runoff does not reach a waterway. Place spilt material in an appropriate container for disposal.

6.4 Reference to Other Sections
Refer to Section 8 for personal protective equipment, Section 13 for disposal information, and Section 15 for Release Reporting information, if applicable.

Section 7. Handling and Storage

7.1 Precautions for Safe Handling:
Keep container closed. Use only with adequate ventilation. Avoid breathing dust. Avoid contact with skin and eyes. Wash thoroughly after handling.

7.2 Conditions for Safe Storage, Including any Incompatibilities:
Keep container tightly closed and dry. Keep container in a cool, well-ventilated area. Store away from oxidizing and reducing materials.
Packaging Materials: Use original container.

7.3 Specific end use(s): Not applicable.

Section 8. Exposure Controls / Personal Protection

8.1 Control Parameters

Chemical Name	EU IOEL	UKOEL	Biological Limit Value
Ammonium Sulphate	None Established	None Established	None Established

8.1.2 Monitoring Procedure

8.1.4

DNEL (Derived No Effect Level) for Workers	DNEL for General Population
Long-term systemic effects Dermal 42.667 mg/kg bw/day Long-term systemic effects Inhalation 11.167 mg/m^3	Long-term systemic effects Dermal 12.8 mg/kg bw/day Long-term systemic effects Inhalation 1.667 mg/m^3 Long-term systemic effects Oral 6.4 mg/kg bw/day

8.2 Exposure Controls

Recommended Monitoring Procedures:
Personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

Appropriate Engineering Controls:
Use general or local exhaust ventilation to minimize exposure levels and maintain exposures below the DNEL.

Personal Protective Measurers

Eye/face Protection: Avoid contact with eyes. Tightly-fitting goggles

Skin Protection: Avoid contact with skin. Wear suitable protective clothing.

Hands: Wear gloves that cannot be penetrated by chemicals or oil. Nitrile gloves. (0,35mm)
Breakthrough time: 8 hours
The correct choice of protective gloves depends upon the chemicals being handled, the conditions of work and use, and the condition of the gloves (even the best chemically resistant glove will break down after repeated chemical exposures). Most gloves provide only a short time of protection before they must be discarded and replaced. Because specific work environments and material handling practices vary, safety procedures should be developed for each intended application. Gloves should therefore be chosen in consultation with the supplier/manufacturer and with a full assessment of the working conditions.

Respiratory Protection: None required. However, use of adequate ventilation is good industrial practice. If dust is generated and ventilation is inadequate, use respirator that will protect against dust/mist.

Other protection: None required

Hygiene Measures: Wash exposed skin after handling.

8.2.3 Environmental Exposure Controls:

PNEC (Predicted No Effect Concentration) for the Environment

PNEC Water	PNEC Sediment	PNEC Soil	PNEC Sewage Treatment Plant	PNEC oral (secondary poisoning)
0.312 mg/L (freshwater) 0.0312 mg/L (marine water) 0.53 mg/L (intermittent releases)	0.032 mg/kg	62.6 mg/kg	16.18 mg/L	None established Secondary poisoning unlikely

Section 9. Physical and Chemical Properties

9.1 Information on basic Physical and Chemical Properties

Appearance: Orthorhombic crystals or white granules
Odour Threshold: None
Melting/Freezing Point: >280 °C decomposes

Flash Point: Not applicable
Lower Flammability Limit: Not applicable
Upper Flammability Limit: Not applicable
Vapor Density(Air=1): Not applicable
Solubilities: Water: **767** g**/L 25°C**

Autoignition Temperature: Not applicable
Viscosity: Not applicable (solid)
Oxidizing Properties: None

Odor: Odourless

pH:5.7 (Acidic.) at **0.1%**
Boiling Point: Not applicable (decomposes before boiling)
Evaporation Rate: Not applicable
Vapor Pressure: 0.000000004053 @ 25°C

Relative Density: 1.77@ 25°C
Octanol/Water Partition Coefficient: Not applicable (inorganic substance)
Decomposition Temperature: 280 °C
Explosive Properties: None

9.2 Other Information: None available

Section 10. Stability and Reactivity

10.1 Reactivity: Not reactive under normal handling and storage.
10.2 Chemical Stability: Normally stable
10.3 Possibility of Hazardous Reactions: No hazardous reactions are known.
10.4 Conditions to Avoid: None known.
10.5 Incompatible Materials: Reactive or incompatible with the following materials: reducing materials. Slightly reactive or incompatible with the following materials: oxidizing materials.
10.6 Hazardous Decomposition Products: Decomposition products may include the following materials:: Ammonia., nitrogen oxides (NO, N02 etc.), sulphur oxides (S02, S03, etc.).

Section 11. Toxicological Information

11.1 Information on Toxicological Effects:

Acute toxicity:

Oral Toxicity	LD50 rat 4250 mg/kg
Dermal Toxicity	LD50 rat/mouse >2000 mg/kg
Inhalation Toxicity	LC50 rat >1000 mg/m3 8 hr.

Skin Irritation/Corrosivity: Non-irritating rabbits
Serious eye irritation/damage: Non-irritating rabbits
Respiratory Sensitization: Not sensitizing in human studies.
Skin Sensitization: No specific data available but GPMT was negative for a structural analogue ammonium chloride.

Mutagenicity: Not mutagenic. Ammonium sulfate was not mutagenic in bacteria (Ames test), yeasts, and mammalian cells (HPRT) with and without metabolic activation systems. It did not induce chromosomal aberrations in mammalian or human cell cultures. No in vivo genotoxicity tests are available. Based on the negative results from in vitro studies and the negative results in the bone marrow micronucleus test in vivo with ammonium chloride a mutagenic activity of ammonium sulfate in vivo is unlikely.

Carcinogenicity: No evidence of a carcinogenic potential was observed in a combined chronic toxicity/carcinogenicity study with rats following closely the requirements of OECD TG 453.

Reproductive Toxicity: There are no valid studies available on the effects of ammonium sulfate on fertility and development. Based on data from a similar ammonium compound (diammonium phosphate), which has been tested up to 1500 mg/kg bw in a screening study according to OECD TG 422 in rats it can be concluded that ammonium ions up to the dose tested have no negative effects on fertility. In a 13-week feeding study of ammonium sulfate with rats, no histological changes of testes were observed up to 1792 mg/kg bw. In a combined chronic oral / carcinogenicity study all gonads of the males and females were examined and no changes were observed. No data are available on the developmental toxicity of ammonium sulfate. In a gavage screening study performed according to OECD TG 422 with diammonium phosphate. Offspring was unaffected by parental exposure to diammonium phosphate. In a screening study, aqueous sodium sulfate was given by gavage to 28 time-pregnant ICR mice. No evidence of maternal toxicity or increased resorption rate was found. The chemical had no influence on pup survival, and no adverse developmental effects on external examination were observed.

STOT - single exposure: Clinical signs after oral exposure included staggering, prostration, apathy, and laboured and irregular breathing immediately after dosing at doses near to or exceeding the LD50 value. In humans,Inhalation exposure to 0.1 - 0.5 mg ammonium sulfate/m3 aerosol for two to four hours produced no pulmonary effects. At 1 mg ammonium sulfate/m3 very slight pulmonary effects in the form of a decrease in expiratory flow, in pulmonary flow resistance and dynamic lung compliance were found in healthy volunteers after acute exposure.

STOT - repeat exposure: Oral: The NOAEL of ammonium sulfate was 256 and 284 mg/kg bw/d in males and females, respectively. Absolute and relative kidney weights were increased at the high dose level for both sexes. Absolute spleen weights were decreased and relative liver weights were increased in high dose males. Inhalation: A 14-day inhalation study on rats exposed to 300 mg/m3, the only tested dose, did not report histopathological changes in the lower respiratory tract. As the respiratory tract is the target organ for inhalation exposure, the NOEL for toxicity to the lower respiratory tract is 300 mg/m3.

11.1.7 Routes of Exposure: Dermal, eye, inhalation and ingestion
Potential Health Effects:
Eye Contact Slightly irritating to the eyes.
Skin Contact Slightly irritating to the skin.
Inhalation: Irritating to respiratory system.
Ingestion: No significant health hazards identified.

11.1.8 Symptoms related to the physical, chemical and toxicological characteristics:
No adverse health effects are anticipated.

11.1.9 Delayed and immediate effects as well as chronic effects from short and long-term exposure:
No adverse health effects are anticipated.

11.1.10 Interactive effects: None known

Section 12. Ecological Information

12.1 Toxicity:

Acute Toxicity to Fish	96-hour LC50 53 mg/l Oncorhynchus mykiss 96-hour LC50 57.2 mg/L Prosopium williamsoni
Acute Toxicity to Aquatic Invertebrates	48-hour EC50 121.7 mg/L Ceriodaphnia acanthina 48-hour EC50 169 mg/L Daphnia magna
Chronic Toxicity to Fish	EC10 (30 d) 5.29 mg/L Lepomis macrochirus
Chronic Toxicity to Aquatic Invertebrates	EC10 (10 wk) 3.12 mg/L Hyalella azteca
Toxicity to Algae	EC50 (18 d) 2700 mg/L Chlorella vulgaris (algae) EC50 (5 d) 1605 mg/L Chlorella vulgaris (algae)

12.2 Persistence and degradability: Ammonium sulphate does not hydrolyze nor is there evidence for photodegradation. In aqueous solution, ammonium sulfate is completely dissociated into the ammonium ion (NH4+) and the sulfate anion (S04 2-). Due to the inorganic nature of the substance standard biodegradation testing systems are not applicable. In unsterilized soil, ammonium sulfate is mineralized fairly rapidly, and subsequently nitrified. Nitrification and de-nitrification processes also occur naturally in streams and rivers, as well as in many secondary sewage treatment processes.

12.3 Bioaccumulative Potential: Based on the high water solubility and the ionic nature, ammonium sulfate is not expected to adsorb or bioaccumulate to a significant extent. This is underlined by a low log Pow as measured for Ammonium sulphate (log Pow = -5.1)

12.4 Mobility in Soil: Based on the high water solubility a low geoaccumulation potential and high mobility in soil is to be expected. However, due to ion-ion interactions it is to be expected that mobility in soil is significantly reduced. Ammonium sulfate will not volatilize from soil.

12.5 Results of PVT and vPvB assessment: The PBT and vPvB criteria of Annex XIII to the Regulation do not apply to inorganic substances.

12.6 Other Adverse Effects: None known.

Section 13. Disposal Considerations

13.1 Waste Treatment Methods:

Dispose of in accordance with all applicable local and national regulations. Avoid contact of spilt material and runoff with soil and surface waterways. Consult an environmental professional to determine if local, regional or national regulations would classify spilled or contaminated materials as hazardous waste. Use only approved transporters, recyclers, treatment, storage or disposal facilities. Comply with all local, regional, and national laws pertaining to waste management.

Consult your local or regional authorities.

Section 14. Transport Information

	14.1 UN Number	14.2 UN Proper Shipping Name	14.3 Hazard Class(s)	14.4 Packing Group	14.5 Environmental Hazards
US DOT	None	Not Regulated	None	None	—
Canadian TDG	None	Not Regulated	None	None	—
EU ADR/RID	None	Not Regulated	None	None	—
IMDG	None	Not Regulated	None	None	—
IATA/ICAO	None	Not Regulated	None	None	-

14.6 Special Precautions for User: None required
14.7 Transport in Bulk According to Annex III MARPOL 73/78 and the IBC Code: Not Regulated

Section 15. Regulatory Information

15.1 Safety, Health and Environmental Regulations/Legislation Specific for the Substance or Mixture

International Inventories

AUSTRALIAN INVENTORY (AICS):	Listed
CANADA INVENTORY (DSL):	Listed
CHINA INVENTORY (IECS):	Listed
EU INVENTORY (EINECS/ELINCS):	Listed
JAPAN INVENTORY (ENCS):	Listed
KOREA INVENTORY (ECL):	Listed
PHILIPPINE INVENTORY (PICCS):	Listed
UNITED STATES (TSCA):	Listed

TA Luft: Not regulated
Classification of Substances Hazardous to Water (WGK): 1

Section 16. Other Information

All information contained in this Material Safety Data Sheet is accurate to the best of our knowledge and belief as at the date of issue. However, the Company makes no warranty or representation, express or implied, as to the accuracy or completeness of such information.

The provision of this Material Safety Data Sheet is not intended to obviate the need for all users to satisfy themselves that the product described is suitable for their individual purposes and that the safety precautions and environmental advice are adequate for their individual purposes and situation. Further, it is the user's obligation to use this product safely and to comply with all applicable laws and regulations concerning the use of this product.