GUIDANCE FOR THE PREPARATION OF SAFETY DATA SHEETS FOR FERTILIZER MATERIALS

| 1 Identification of the substance/preparation and of the company/undertaking |
| 2 Conforms to 1907/2006/EC |
| Safety Data Sheet |

| Hazardous ingredients | Other ingredients |
| Chemical name | Chemical name |
| EU index number (Annex 1) | Use of the substance/preparation |
| Company name | Company e-mail for SDS |
| Company address | Emergency telephone |
| Company telephone | First aid measures |
| General | Ingestion |
| Inhalation | Eye contact |
| Skin contact | Other |

Note to physician

EC no. means EINECS or ELINCS number.
CONTENT

1. INTRODUCTION 3
2. SCOPE 3
3. RELEVANT LEGISLATION 4
   3.1 EU based 4
   3.2 International Transport 5
   3.3 National 5
   3.4 REACH Regulation 6
   3.5 Classification 7
      3.5.1 Current system of classification 7
      3.5.2 GHS and its EU adaptation 7
4. HOW TO USE THIS GUIDANCE 8
5. INDIVIDUAL SECTIONS OF SAFETY DATA SHEETS 9
   5.1 General 9
   5.2 Sections of Safety Data Sheets 9
6. REFERENCES 23
7. ABBREVIATIONS 25

APPENDICES
APPENDIX 1 Provisional List of substances and preparations of model Safety Data Sheets 28
APPENDIX 2 Model EFMA Safety Data Sheet Format 29

Disclaimer
The information and guidance in this Booklet is given in good faith. The European Fertilizer Manufacturers’ Association (EFMA), its consultants, its member companies and their staff accept no liability for any incident, loss, damage or any other consequences arising from the use, misuse, practical application of or reliance on the information given in this document.

Users of this Booklet are advised to consult the relevant latest legislation, as changes in the regulations may have been made since its publication.
1. INTRODUCTION

In 1996 EFMA produced a guidance booklet on the preparation of Safety Data Sheets (SDSs) (Ref. 1) for the benefit of its members. Its purpose was to help the members of EFMA in the preparation of their own SDSs by describing the requirements of various sections in the relevant EC Directives, 67/548/EEC (Ref. 2) (see note below) and 1999/45/EC for preparations (Ref. 3), and by providing agreed versions of model Safety Data Sheets for several fertilizer materials. It was recognised that some of the materials covered were not legally required to have a SDS but they were included on the principle of good responsible care.

The above-mentioned Directives have been superseded by new, far-reaching legislation, Regulation (EC) No 1907/2006, widely known as REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals (Ref. 4). This Regulation now defines SDS requirements and also introduces new requirements. It has, therefore, become necessary to revise the 1996 EFMA guidance with a view to facilitating compliance with the current REACH legislation. An EFMA Task Force, set up for this purpose, has produced this new guidance. The previous guidance contained model SDSs for fertilizer materials; these are now given in a separate document (to be released later). The provisional list of substances and preparations thus to be covered is given in Appendix 1.

Note: The most recent and relevant consolidated version of Directive 67/548 is Directive 92/32/EC.

2. SCOPE

This guidance describes the requirements of REACH concerning the provision of SDSs, as practised in 2008.

It seeks to cover most of the requirements of sections 1 to 16 as defined in Annex II of Regulation (EC) 1907/2006 (REACH), which can be addressed at this stage. Under 91/155/EEC SDSs are required for substances placed on the market, manufactured or imported in quantities in excess of 10 tonnes/year and meeting the criteria for classification as dangerous. Under REACH they assume a more significant role than that required under 91/155/EEC.

REACH states that a chemical safety assessment (CSA) shall be performed and a chemical safety report (CSR) completed for all substances subject to registration in accordance with Article 14. A CSR records the results and conclusions of the CSA. A CSA may also be performed for preparations. The CSA process, according to Article 14, shall focus on the following steps:

a) human health hazard assessment;
b) physicochemical hazard assessment;
c) environmental hazard assessment;
d) persistent, bioaccumulative and toxic (PBT) and very persistent and very bioaccumulative (vPvB) assessment.

Annex I (General Provisions for assessing substances and preparing chemical safety reports) of the REACH Regulation offers some immediate guidance as to what is required. In addition, more detailed guidance is provided by the European Chemicals Agency (Ref. 5).

In the case of substances or preparations classified as dangerous, Exposure Scenarios and risk characterisation must also be included in the CSRs according to their specified and registered uses. The relevant Derived No Effect Level (DNEL) and Predicted No Effect Concentration (PNEC) for the substance or preparation will have to be derived and given for the Exposure Scenarios set out in the annex to the SDS. This guidance cannot at this stage cover these elements. When the full CSRs are prepared, this guidance will be revised accordingly.

3. RELEVANT LEGISLATION
Examples of the main ones are given below.

3.1 EU based
- Regional transport legislation.
- Dangerous Substances (re exposure limits).
- Restriction on marketing.
3.2 International Transport

- **ADN:** European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN). ECE/TRANS/190 – Complete set of two volumes Sales # E.06.VIII.2 – ISBN 92-1-139118-0 (Vol. I & II).
- **IATA DGR:** International Air Transport Association, Dangerous Goods Manual.

3.3 National

For example:

**Germany:**

**UK:**

**Spain:**
- Royal Decree 2016/2004, 11th of October, approval of Complementary Technical Instruction MIE APQ-08 “Storage of ammonium nitrate fertilizer with a high nitrogen content”.
- Royal Decree 888/2006, 21st of July, approval of Rules and Regulations for the storage of fertilizers based on ammonium nitrate, with a nitrogen content equal to or lower than 28% by mass.
France:
- SEVESO: Decret n°2005-989 du 10 aout 2005 modifiant la nomenclature des installations classées. Storage code for AN-based fertilizer is 1331 with 3 possible classes: 1331-I (SSD), 1331-II (Detonability) & 1331-III (not dangerous). For non-conforming materials the classification is 1332.

Netherlands:
- Opslag van vaste minerale anorganische meststoffen, (PGS7: Storage of solid mineral inorganic fertilizers).

3.4 REACH Regulation
This Regulation considers the provision of a SDS as the key element in the hazard and risk management communication from chemical substance suppliers and formulators to Downstream Users (DU).

The legal requirements as described below, are based on the current REACH legislation and may need further adaptation to comply with the Globally Harmonized System for the Classification and Labelling of Dangerous Chemicals (GHS) after its implementation.

The REACH Regulation stipulates, in article 31, the following requirements concerning the provision of SDSs:
- Where a substance or preparation meets the criteria for classification as dangerous in accordance with Directives 67/548/EEC or 1999/45/EC, the supplier of a substance or a preparation shall provide the recipient of the substance or preparation with a SDS compiled in accordance with Annex II of the REACH Regulation.
- Where a preparation does not meet the criteria for classification as dangerous in accordance with Articles 5, 6 and 7 of Directive 1999/45/EC, but contains in an individual concentration of $\geq 1\%$ by weight for non-gaseous preparations and $\geq 0.2\%$ by volume for gaseous preparations at least one substance posing health or environmental hazards, or one substance for which there are Community workplace exposure limits, the supplier shall provide the recipient at his request with a SDS compiled in accordance with Annex II of the REACH Regulation.
- The SDS shall be supplied in an official language of the Member State(s) where the substance or preparation is placed on the market, unless the Member State(s) concerned provide otherwise.
3.5 Classification

3.5.1 Current system of classification
The current system/regulation for Classification and Labelling in the EU involves an evaluation of the hazard of a substance or preparation in accordance with Directives 67/548/EEC (substances) and 1999/45/EC (preparations) and a communication of that hazard via the label. This evaluation must be made for any substance or preparation manufactured within or imported into the EU and placed on the EU market. This may result in the classification of the substance/preparation as dangerous for one or several end-points concerning physical-chemical properties, health or environmental effects.

The three relevant key legislative instruments are:
- Dangerous Substances Directive (67/548/EEC);
- Dangerous Preparations Directive (1999/45/EC);

3.5.2 GHS and its EU adaptation
The goal of the United Nations Globally Harmonized System (GHS, Ref. 6) is to identify the intrinsic hazards found in chemical substances and mixtures and to convey information about these hazards. The criteria for hazard classification are harmonised. Hazard statements, symbols and signal words have also been standardised and harmonised; these now form an integrated hazard communication system. The GHS provides a common approach for harmonised classification and hazard communication for different target audiences, such as consumers, workers, emergency responders and those involved in transport. Therefore, it includes a “building block” approach to enable countries to adopt the system having regard to the various target audiences in different legal areas.

The GHS uses the term “hazard classification” to indicate that only the intrinsic hazardous properties of substances or mixtures (preparations) are considered.

The adoption of the UN GHS into EU legislation has taken place in three steps: On 27th of June 2007, the European Commission adopted the “Proposal for a Regulation of the European Parliament and of the Council on Classification, Labelling and Packaging of Substances and Mixtures, and amending Directive 67/548/EEC and Regulation (EC) No 1907/2006” (COM(2007) 355 final, (Ref. 7). Its purpose was to align the EU system of classification, labelling and packaging of substances and mixtures to the GHS. The proposed Regulation also takes over provisions of the REACH Regulation regarding the notification of classifications, the establishment of a list of harmonised classifications and the creation of a classification and labelling inventory. On 3 September 2008 a large majority of the European Parliament supported a “compromise package” for a new Regulation to align existing EU legislation to the
GHS. Finally on 1 December 2008 agreement was reached by the Member States for the adoption and implementation of the above Regulation.

The new Classification, Labelling and Packaging (CLP) Regulation replaces the term ‘preparation’ with ‘mixture’ and the term ‘dangerous’ with ‘hazardous’.

The number of classified substances resulting from the application of the new system is estimated to be approximately the same as under the current system. However, due to changes in cut-off values and calculation methods, more preparations – now called mixtures – will probably be classified under the new system. The application of the new criteria will result in a different classification compared to the current one for some substances and mixtures.

Time Lines:

As a Regulation, GHS will become immediately enforceable as law in all Member States simultaneously 20 days after its publication at EU level.

After entry into force, the deadline for substance reclassification is proposed to be 1 December 2010 and for mixtures 1 June 2015. There will be a transitional period whereby the existing classification rules will still be applicable for substances and mixtures for a certain period of time after the introduction of the new law. EU transport legislation will incorporate relevant GHS criteria by 2007 and 2009, in line with the timetable for the adoption of the UNECE Model Regulation.

4. HOW TO USE THIS GUIDANCE

This guidance document attempts to describe and explain the sixteen sections, which are mandatory for inclusion in SDSs. It outlines what needs to be included in these sections, based on the information given in REACH, Annex II.

Companies would produce SDSs displaying their letterhead particulars on the front page if they were to adopt the full guidance and use the templates given here. If companies choose to write their own SDS it is hoped that the contents will be fairly identical; however, they will be free to use the model SDS as a basis with minor changes as deemed necessary e.g. for different countries the national regulations would be different, differences arising from different company policies or different test results for their specific products. EFMA is trying to avoid significantly different messages going out to customers for similar products with respect to health, safety and precautions.

In the guidance text, in order to distinguish between sections in the main body of the guidance from the sections which form part of the SDSs, the former are given as numbers only e.g. 3.4 and the latter as section followed by number e.g. section 7.

The link between the model EFMA SDS format given in Appendix 2 and the detailed text in this guidance is provided by means of:

i) The use of the same section numbers and titles
ii) Underlining (in the guidance text) of items and phrases within the sections which require responses in the right hand columns or require consideration in the model SDS e.g. CAS Number.

5. INDIVIDUAL SECTIONS OF SAFETY DATA SHEETS

5.1 General
A SDS should be compiled in accordance with REACH, Annex II, which specifies sixteen sections and their intended contents. These are explained below in 5.2. Each section should be completed as fully as possible with the relevant information and data. Where no information can be given, the item could be omitted or addressed by an appropriate comment such as

- not applicable e.g. flammability of ammonium sulphate and loose bulk density of liquid ammonia
- not available where the required data or information is not available.

A blank SDS in the form of an excel sheet has been prepared to facilitate EFMA members to give the relevant information for their products in the preparation of their SDS; this is given in Appendix 2.

There are a number of EFMA guidance documents, which can provide useful information for completing the SDS and are also suitable for listing in section 16 of the SDS. The main ones are given in References 8-17. Further useful information can also be accessed from EFMA’s web site and the Product Stewardship manual.

Give the following information at the top or at the end to clarify the status of the SDS:

- Date of previous issue
- Date of revision

5.2 Sections of Safety Data Sheets

Section 1: Identification of the substance/preparation and of the company/undertaking

Provide identification by way of a term identical to that on the label as set out in Annex VI to Directive 67/548/EEC e.g. commercial product name.

- Common Chemical Name
- Synonyms
- Chemical formula
EC Number means EINECS or ELINCS number and is applicable for substances only, not for preparations.

CAS Number: Chemical Abstracts Service registration number

If applicable, specify the relevant registration number e.g. according to REACH or national scheme. It is permitted to use other means of identification if available.

Use of the substance/preparation:

Indicate its use as far as is known. Where there are many possible uses only the most important need to be listed.

Examples of use descriptions would be:

• Use as solid fertilizers.
• Use in the production of liquid fertilizers.
• Industrial or technical uses e.g. production of N₂O, cooling mixtures, chemical intermediates.
• Non-fertilizer products do not have a designated name. For fertilizer products the designated name given in the EU Fertilizer Regulation 2003/2003 can be used.

Company/undertaking identification:

• Give the name, address and telephone number of the Company (the “person” responsible for placing the substance or preparation on the market within the EU, whether it is the manufacturer, importer or distributor).

Company e-mail for SDS:

• Give the e-mail address where issues concerning the SDS can be addressed.

Emergency telephone:

• Give the emergency telephone number of the Company and/or relevant official advisory body. Specify the time period this phone number is available e.g. 24 hours, 08:00-17:00.

Section 2: Hazards identification

Classification:

Give the classification of the substance or preparation which arises from the application of the classification rules in Directives 67/548/EEC or 1999/45/EC. If the product is not classified this should be stated e.g. not classified as hazardous material according to Directives 67/548/EEC or 1999/45/EC.

Physical and chemical hazards:

Indicate clearly and briefly the main physical and chemical hazards.
Health hazards and Environmental hazards:

- Describe the most important adverse human health (skin, eye, ingestion and inhalation routes) and environmental effects and symptoms relating to the uses and possible misuses that can reasonably be foreseen.
- If necessary, mention other hazards, such as dustiness, suffocation, freezing or environmental effects such as hazards to soil-dwelling organisms, etc., which do not result in classification but which may contribute to the overall hazards of the material.

Other:
If necessary, indicate here any other hazards not covered above.

Section 3: Composition/information on ingredients
Give information to enable the recipient to identify readily the hazards of the components of the preparation.

Hazardous ingredients
Indicate the classified dangerous/hazardous substances present in the preparation with
- Chemical name,
- Identification number (EINECS/ELINCS as per Directive 67/548/EEC or CAS),
- Concentration range in the preparation and
- Classification (symbol, letters and R phrases numbers, as per Articles 4 and 6 of Directive 67/548/EEC or from Annex I to Directive 67/548/EEC).

For a preparation classified as dangerous, indicate the following substances (name and the registration number, if available), together with their concentration or concentration range:
- Substances presenting a health or environmental hazard, if present in concentrations $\geq$ the lowest of the applicable concentrations (see Directive 67/548/EEC and Directive 1999/45/EC), and
- Substances (not already included) for which there are Community workplace exposure limits.

For a preparation not classified as dangerous, indicate the following substances (name and the registration number, if available), if they are present in an individual concentration of $\geq 1\%$ by weight for non-gaseous preparations and $\geq 0.2\%$ by volume for gaseous preparations:
- Substances (not already included) for which there are Community workplace exposure limits.
Other ingredients

A general description of the components and their concentrations can be helpful but it is not necessary to give the full composition (nature of the ingredients and their concentration).

If the identity of certain substances is to be kept confidential, describe their chemical nature in order to ensure safe handling, using the same name as that which is derived from the above procedures (ref: Article 15 of Directive 1999/45/EC or the footnote to point 3.3 of the REACH Annex II).

Section 4: First-aid measures

Describe the first-aid measures.

- **General**: Specify first whether immediate medical attention is required or advisable. Where applicable, specify the provision of special facilities at the workplace for specific and immediate treatment.

- **Subdivide the information according to the different routes of exposure**, i.e. *Inhalation, Ingestion, Skin contact* and *Eye contact*, under different subheadings. Include guidance on the necessary first-aid measures if given in any related Risk and Safety phrases.

- **The information on first-aid shall be brief and easy to understand by the victim, bystanders and first-aid personnel**, covering the symptoms and effects in brief; actions to take on the spot in the case of an accident and whether delayed effects can be expected after exposure.

- Include any specific *Note to physician*, where appropriate.

Section 5: Fire-fighting measures

Refer to the requirements for fighting a fire caused by the substance or preparation, or arising in its vicinity by indicating:

- **Suitable extinguishing media**: Suitable extinguishing media relevant to the scale of the fire.

- **Extinguishing media not be used** for safety reasons.

- **Specific hazards** arising from the substance or preparation itself under fire conditions.

- **Hazardous thermal decomposition and combustion products** and/or resulting gases, e.g. NO, from AN-based fertilisers.

- **Special fire fighting procedures** (if known) for fire-fighters. Include special warnings that may be triggered from Risk phrases e.g. R14 Reacts violently with water.

- **Special protective equipment for fire-fighters**: Include any special protective equipment (if known).
Section 6: Accidental release measures

Cover as appropriate:

- **Personal precautions**, such as:
  - Removal of ignition sources, provision for sufficient ventilation.
  - Respiratory protection, control of dust, prevention of skin and eye contact.

- **Environmental precautions**, such as:
  - Keeping away from drains, surface- and ground-water and soil, possible need to alert the neighbourhood.

- **Methods for cleaning up**:
  i) In the event of spilled or leaked material, consider both large (e.g. from trucks and large storage facilities) and small (e.g. from 25 kg bags, small tanks etc) spills.
  ii) Suggest suitable clean-up methods such as:
    - Use of absorbent material (e.g. sand, diatomaceous earth, acid binder, universal binder etc.), reduction of gases/fumes with water, dilution.
    - Consider the need for indications such as: “never use, neutralise with, e.g. do not use saw dust in the case of a spillage of AN.”

- **Remarks**
  Include any additional information not covered above.

Section 7: Handling and storage

Information in this **section** shall relate to the protection of health, safety and the environment. It should assist the employer/user in devising suitable working procedures and organisational measures according to Article 5 of Directive 98/24/EC.

**Handling**

- Specify precautions for safe handling e.g. avoid dust formation, avoid contamination of AN fertilizers with combustible materials, avoidance of pumping liquid products against a dead-end and provision of high temperature protection.

- Give advice on technical measures e.g.
  - To contain and ventilate (local and general) to prevent aerosol/dust generation and fire.
  - To protect the environment e.g. filters or scrubbers on exhaust gases, provision of a bunded area, measures for collection and disposal of spillages, etc.

- Specify requirements or rules relating to the substance or preparation (e.g. procedures or equipment which are prohibited or recommended) and, where appropriate, give a brief description.
• Specify any special requirements to prevent fire and explosion e.g. clean thoroughly any equipment handling AN-based fertilizers before undertaking hot work.

Storage
• Specify the conditions for safe storage such as: specific design for storage rooms or vessels (including retention walls and ventilation), incompatible materials, conditions of storage (temperature limits, provision of inert gas, detectors etc.), special electrical equipment and prevention of static electricity.
• Give advice, if relevant, on any limits on the quantity of the material which can be stored.
• Make reference to any national or local regulations concerning storage (e.g. PGS7 in the Netherlands and TRGS511 in Germany)
• Include storage precautions as arising from the S-phrases, handling and packaging.
• Advice on measures to preserve quality can be included here e.g. avoid exposure to direct sunlight.

For example, for storage of solid AN-based fertilizers:
• Locate away from the sources of heat or fire.
• Keep away from combustible and other incompatible materials.
• Ensure a high standard of housekeeping in the storage area.
• Any building used for the storage should be dry and well ventilated.

Specific use(s)
• Specify (detailed and operational) precautions for the safe handling of end products designed for specific use(s), referring to approved industry/sector guidance e.g. various precautions to take when injecting liquid ammonia into soil as a fertilizer.
• For more complex advice, for example, on engineering approaches preferably refer to external sources of information.

Packaging materials
• Indicate any special requirements such as the type of material to be used (or which must not be used) in the packaging/containers of the substance or preparation.
• Packaging requirements should guarantee that no accidental release might occur during transport. Reference could be made to the UN specification.

Section 8: Exposure controls/personal protection
Specify currently applicable specific control parameters including occupational exposure limit values and/or biological limit values as applicable for the Member State where the substance or preparation is placed on the market.
This information should be taken into account by the employer in carrying out an assessment of the risk to the health and safety of workers for the substance or preparation under Article 4 of Directive 98/24/EC, which requires the design of appropriate work processes, engineering measures and hygienic measures.

Exposure control means the full range of specific protection and prevention measures to be taken during use in order to minimise worker and environmental exposure. Note that exposure controls are related to S-phrases, triggered by the corresponding R-phrases. Exposure to dust should be considered and the appropriate exposure values should be included in the SDS.

Each ingredient listed in section 3 that has an occupational exposure value specified should be addressed.

Give particulars of the personal protection equipment (PPE) needed, information should complement that already given under section 7 (Handling).

Exposure limit values

• In the EU give those values used by regulatory bodies e.g.:
  – European OEL (binding or indicative) established on the basis of the European Scientific Committee for Occupational Exposure Limits (SCOEL).
  – The national OEL committees of the European Member States.
• Additional information from non EU authoritative bodies can be included as appropriate:
  – American Conference on Governmental Industrial Hygienists (ACGIH), setting so-called Threshold Limit Values (TLVs).
  – American Industrial Hygiene Association, setting Workplace Environmental Exposure Limits (WEELs).

Engineering measures

If not already addressed in section 7, describe the use of adequate equipment and materials, the application of collective protection measures at source, e.g. adequate ventilation to avoid excessive dust.

Hygienic measures

Where appropriate, indicate any additional skin protection measures and specific hygiene measures. Example for a standard sentence: “When handling the product do not eat, drink or smoke. Wash hands after handling and before eating, smoking and using the lavatory and at the end of the working period.”

Personal protection

Where needed, specify in detail which equipment will provide adequate and suitable protection. Take into account Council Directive 89/686/EEC and amendments (Ref. 18). Make reference to the appropriate CEN standards.
• **Respiratory system**
  For dangerous gases, vapours or dust, specify the type of protective equipment to be used, such as self-contained breathing apparatus, masks and filters.

• **Skin and body**
  State if it is necessary to protect a part of the body other than the hands and, if so, the type and quality of PPE required, e.g. apron, overall, boots, helmet and full protective suit.

• **Hands**
  Specify the type of gloves to use, including the type of material, the breakthrough time of the glove material with regard to the amount and duration of dermal exposure and, if necessary, indicate any additional hand protection measures.

• **Eyes**
  Specify the type of eye protection e.g. safety glasses, safety goggles, face shield.

**Environmental exposure controls**
Further information such as environmental exposure controls may be required in relation to the chemical safety report.

**Section 9: Physical and chemical properties**

• Provide all relevant information on the substance or preparation particularly the information listed below under “important health, safety and environmental information”.

• Preferably the data should be given using SI units.

• Methods for the determination of physico-chemical properties are given in the Council Regulation EC No.440/2008 (Part A). (Ref. 19) and the UN Test Manual (Ref. 20).

**General information**

• **Appearance.** Indicate the physical state (solids, liquid, gas) and the colour of the substance or preparation e.g. white solid prills or granules, clear liquid

• **Odour** (if perceptible, give a brief description of it e.g. ammonia has a pungent odour)

**Important health, safety and environmental information**

• **pH:** Indicate the pH of the substance or preparation as supplied, or of an aqueous solution; in the latter case, indicate the concentration

• **Boiling point or range**

• **Melting point or range**
• **Flash point**

• **Flammability**
  Where appropriate, give the lower and upper flammable/explosive limits. E.g. ammonia limits:

• **Explosive properties** (intrinsic properties of the product or its dust)
  Detonation resistance

• **Auto-ignition temperature**

• **Decomposition temperature** e.g. decomposition of urea, AN.

• **Minimum ignition energy**

• **Oxidising properties** e.g. according to UN transportation classification 0.1 test method

• **Critical temperature** (for gases)

• **Relative density** (mostly given for gases and relative to air)

• **Density**
  Material density: Mass per unit volume of the material included within the surface of the particles [EN 12944-2, EN 1236 & EN 1237] (Refs. 19, 21 and 22).

• **Loose bulk density**
  Mass per unit volume of a material after it has been tipped freely into a container under clearly specified conditions [EN 12944-2, EN 1236].

  Bulk density is expressed and measured in a number of different ways. Other main types are given below:
  – **Bulk density (tapped):**
    Mass per unit volume of a material tipped into a container and compacted under clearly specified conditions [EN 12944-2, EN 1237].
  – **Packing (also called loading) density:**
    Mass per unit volume of a material packed into a tube that is tapped intermittently causing compaction of the material in the tube. e.g. in the EU resistance to detonation test (Regulation EC 2003/2003).

• **Vapour pressure at 20°C**

• **Vapour density**

• **Evaporation rate** (relevant for ammonia and ammonia solution)

• **Partition coefficient (n-octanol/water)**

• **Viscosity**: kinematic or dynamic at specified temperature

• **Mean particle size**: $d_{50}$

• **Water solubility**
Other information

If of relevance, indicate other important safety parameters, such as, miscibility, fat solubility, conductivity and gas group.

- Miscibility
- Fat solubility
- Conductivity

Gas group: Of the fertilizer materials of interest, this item is relevant probably only for ammonia (Gas Group IIA). The gas/vapour group is used to determine the type of electrical explosion proof equipment to select in an ATEX designated atmosphere. (ATEX stands for Explosive Atmosphere). The ATEX Directives are mandatory. There are two EU ATEX Directives, one concerning equipment and protective systems for use in potentially explosive atmospheres (94/9/EC) and one concerning the safety and health of workers potentially at risk from exposure to explosive atmospheres (99/92/EC). The International Electrotechnical Commission (IEC) publishes safety standards governing the use of electrical and electronic equipment in gaseous atmospheres.

(The ability of an explosion flame to be propagated through a defined gap is determined in a standard apparatus. On the basis of the maximum permitted gap and minimum igniting current (current leading to ignition in a standard apparatus), gases and vapours are divided into three groups (II A, II B, II C; II C being the group with the smallest maximum permitted gap)

- Remarks: Include any special attributes.

Section 10: Stability and reactivity

Stability

It should be stated in this section that all fertilizer materials are stable under normal conditions of handling, storage and use (as recommended by the producer). However, describe here the possibility of hazardous reactions occurring under certain conditions of storage, handling and use and also if released into the environment.

Conditions to avoid

- List or describe briefly those conditions such as temperature, pressure, light, shock, etc., which may cause a dangerous reaction or harmful effect on the environment. These properties are related to the physical and chemical properties.
- Describe other potential dangers such as dust explosions and contamination with organic substances resulting in an increased risk of explosion and/or fire.

Materials to avoid

- List materials such as combustible materials, farm chemicals, acids, bases, oxidising agents or any other specific substances, which may cause a dangerous reaction and if possible give a brief description.
Hazardous decomposition products

- Give a list of the likely hazardous materials produced in dangerous amounts upon decomposition e.g. NO_x gases, ammonia etc. Decomposition due to fire should already be given in section 5.

Section 11: Toxicological information

Describe the various toxicological (health) effects, which can arise on coming into contact with the substance or preparation. These should include:

- Dangerous-to-health effects from exposure to the substance or preparation, based on, for example, test data and experience.
- Where appropriate, delayed, immediate and chronic effects from short- and long-term exposure.

Give information, when available, on the following groups of potential effects for the classified and other hazardous ingredients given in section 3, or the preparation:

- Toxicokinetics, metabolism and distribution, this should be addressed if relevant information is available, see OECD Guidelines 417 for further information.
- Acute effects (acute toxicity, irritation and corrosivity) e.g. adverse effects arising from the different routes of exposure (inhalation, ingestion, skin and eye contact) that may already be given in section 2.
- Sensitisation
- Chronic toxicity: long term effects such as irritation.
- CMR effects (Carcinogenity, Mutagenicity and Reproductive toxicity). All the relevant toxicity endpoints should be included and a statement on the CMR category 1 or 2 status of the substance or preparation.

For a number of substances, toxicological data are available from different sources. The data included in the model SDSs have been compiled from proprietary data owned by EFMA/TFI. Under REACH the above data should become available from the IUCLID 5 database.

- Remarks
  Add any other relevant information.

Section 12: Ecological information

Describe the most important characteristics, behaviour and environmental fate of the substance or ingredients of the preparation in air, water and/or soil. Where available, give relevant test data (e.g. LC50 fish ≤ 1 mg/l). For example, if the product is not expected to have an adverse environmental impact this can be stated or if it is likely to have an impact the nature of the impact should be given (e.g. excess nitrates can cause eutrophication).
Ensure that information relevant to the environment is provided under other sections of the SDS, especially advice for controlled release, accidental release measures, transport and disposal considerations under sections 6, 7, 13, 14 and 15.

The following issues should be addressed as relevant and where data is available. Data is expected to be available from the IUCLID 5 database.

**Ecotoxicity**

- List any relevant available data on aquatic toxicity, both acute and chronic for fish, crustaceans, algae and other aquatic plants (e.g. LC$_{50}$, EC$_{50}$, and IC$_{50}$).
- Where the substance or preparation has inhibitory effects on the activity of microorganisms, the possible impact on sewage treatment plants shall be mentioned.

**Mobility**

- Describe the potential of the substance or the appropriate constituents of a preparation, if released to the environment, to be transported to groundwater or far from the site of release.
- Relevant data might include:
  - Known or predicted distribution to environmental compartments,
  - Surface tension,
  - Absorption/desorption.
  - Refer to the physicochemical properties given in section 9.

**Persistence and degradability**

- Describe the potential of the substance or the appropriate constituents of a preparation to degrade in relevant environmental media, either through biodegradation or other processes such as oxidation, hydrolysis or photolysis. (It should be noted that some biodegradation tests may not be applicable for inorganic substances).
- Degradation half lives shall be quoted where available (Aquatic half-life).
- The potential of the substance or appropriate constituents of a preparation to degrade in sewage treatment plants shall also be mentioned.

**Bioaccumulative potential**

- If known, describe the potential of the substance or the appropriate constituents of a preparation to accumulate in biota and eventually to pass through the food chain, with reference to the octanol-water partition coefficient (Kow or LogPow) and bioconcentration factor (BCF).

**Results of PBT assessment**

- This assessment forms part of a CSR. Further guidance is given in Annex 13 of the REACH Regulation.
Other adverse effects

- Other information, if available, should be included for any other adverse effects on the environment, e.g. ozone depletion potential, photochemical ozone creation potential, endocrine disrupting potential and/or global warming potential.

Section 13: Disposal considerations

Methods of disposal and Package waste disposal

- Specify the appropriate methods of disposal of the substance/preparation and any contaminated packaging e.g., recycling, land filling, incineration etc.

- If the disposal of the substance or preparation (surplus or waste resulting from the foreseeable use) presents a danger, give a description of these residues and information on their safe handling. E.g. do not empty into drains or other water courses.

Note: Refer to any relevant Community provisions relating to waste. In their absence, it is useful to remind the user that national or regional provisions may be in force.

Section 14: Transport information

Specify any special precautions that a user needs to be aware of or needs to comply with in connection with transport or conveyance either within or outside his premises (nationally and internationally).

If a product is not subject to transport regulation this should be stated on the SDS, e.g. not classified as hazardous according to the relevant transport regulation (ADR, RID etc).

Provide information on the transport classification for each of the modal regulations for substances and/or preparations, where relevant:


This might include:

- UN number
- Proper shipping name
- Class
- Packing group
- Label
- Other applicable information (e.g., hazard identification number, Emergency schedules), marine pollutant, tunnel code).

Reference should be made to specific national transport regulations, if any (e.g. in the UK, The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2007, SI No. 1573, 2007).
Section 15: Regulatory information

- Give the health, safety and environmental information shown on the label according to Directives 67/548/EEC, 1999/45/EC and their amendments (arising from the classification of the substance or preparation):
  - The relevant Hazard symbol(s)
  - The appropriate R and S phrases written in full text
- Other Regulations: Other relevant information arising from the above Directives can be included. For example, mention the Community law and the national laws that implement these provisions and any other national measures that may be relevant e.g. Seveso Directive, REACH, Regulation (EC) 1907/2006, Restriction on Marketing and Use (76/769/EC), EU Fertilizer Regulation 2003/2003/EC etc.

Section 16: Other information

- Indicate any other information that the supplier assesses as being of importance for the health and safety of the user and for the protection of the environment, for example:
  - Recommended restrictions on use (i.e. non-statutory recommendations by supplier),
  - Further information (written references and/or technical contact point),
  - Sources of key data used to compile the data sheet.
- List of relevant Risk phrases. Write out the full text of any R phrases referred to under sections 2 and 3 above of the SDS.
- List relevant Symbols
- Training advice: if applicable give some guidance here.
- Date of the previous SDS
- Modifications in this version: For a revised SDS, indicate clearly the information, which has been added, deleted or revised (unless this has been indicated elsewhere e.g. text which has been modified since the previous version is marked with an asterisk).
- References: Main sources of data used in the SDS.

Disclaimer

It is usual to have a disclaimer clause at the end of the SDS e.g.

The information in this Safety Data Sheet is given in good faith and belief in its accuracy based on our knowledge of the substance/preparation concerned at the date of publication. It does not imply the acceptance of any legal liability or responsibility whatsoever by <the Company> for the consequences of its use or misuse in any particular circumstances.
6. REFERENCES


7. ABBREVIATIONS

ADR  European Agreement concerning the International Carriage of Dangerous Goods by Road (in French: Accord européen relatif au transport international des marchandises Dangereuses par Route)
AN   Ammonium Nitrate
BC   Bulk Cargo
BCF  Bioconcentration factor
CAN  Calcium Ammonium Nitrate
CAS  Chemical Abstracts Service
CEN  Comité Européen de Normalisation (European Committee for Standardisation)
CLP  Classification, Labelling and Packaging
CMR  Carcinogenity, mutagenicity and toxicity for reproduction
CSA  Chemical Safety Assessment
CSR  Chemical Safety Report
DAP  Di-Ammonium Phosphate
DNEL Derived No Effect Level
d$_{50}$ Mean particle size
DU   Downstreams Users
EC   European Community
EC$_{50}$ Effective Concentration (Median) for 50% of the response under test
ECC  European Economic Community
EFMA European Fertilizer Manufacturers' Association
EINECS European Inventory of Existing Chemical Substances
ELINCS European List of Notified Chemical Substances
ES   Exposure Scenario
GHS  Globally Harmonized System of Classification and Labelling of Chemicals
IATA International Air Transport Association
ICAO International Civil Aviation Organisation
IC$_{50}$ Concentration of a drug that is required for 50% inhibition in vitro
IMDG  International Maritime Dangerous Goods (Code)
IMSBC  International Maritime Solid Bulk Cargoes
IUCLID  International Uniform Chemical Information Database
Kow  Octanol-water partition coefficient
LC₅₀  Lethal Concentration (Median) for 50% of the population under test
LD₅₀  Lethal Dose for 50% the population under test
NOₓ  Oxides of Nitrogen
NPK  Compound Fertilizer containing the nutrients Nitrogen, Phosphorus and Potassium
OECD  Organisation for Economic Cooperation & Development
OEL  Occupational Exposure Limit
OJ  Official Journal (of the European Community)
PBT  Persistent Bioaccumulable and Toxic
PNEC  Predicted No Effect Concentration
PPE  Personal Protection Equipment
PVC  Poly Vinyl Chloride
REACH  Registration, Evaluation, Authorisation and Restriction of Chemicals
RID  Regulations Concerning the International Carriage of Dangerous Goods by Rail (in French: Règlement concernant le transport International ferroviaire des marchandises Dangereuses)
R phrase  Risk phrase
SCOEL  (European) Scientific Committee for Occupational Exposure Limits
SDS  Safety Data Sheet
S phrase  Safety phrase
TFI  The Fertilizer Institute
UN  United Nations
UNECE  United Nations Economic Commission for Europe
WEEL  Workplace Environmental Exposure Limit
APPENDICES

APPENDIX 1  Provisional List of substances and preparations of model Safety Data Sheets 28
APPENDIX 2  Model EFMA Safety Data Sheet Format 29
APPENDIX 1: PROVISIONAL LIST OF SUBSTANCES AND PREPARATIONS OF MODEL SAFETY DATA SHEETS

Ammonia anhydrous
Ammonia solution
Ammonium nitrate fertilizer
Ammonium nitrate solution
Ammonium nitrate sulphate
Ammonium sulphate
Calcium Ammonium Nitrate (CAN)
Di-ammonium phosphate
Magnesium nitrate
Mono-ammonium phosphate
Nitric acid
Nitric acid, ammonium calcium salt also called Calcium nitrate double salt
NPK: AN-based
NPK: Urea-based
Phosphoric acid
Potassium nitrate
Potassium sulphate
Sodium nitrate
Single superphosphate (SSP)
Triple superphosphate (TSP)
Urea
# APPENDIX 2: MODEL EFMA SAFETY DATA SHEET FORMAT

## Safety Data Sheet

Conforms to 1907/2006/EC

## Product name

### 1 Identification of the substance/preparation and of the company/undertaking
- Commercial product name
- Common chemical name
- Synonyms
- Chemical formula
- EU index number (Annex 1)
- EC No
- CAS No.
- REACH or National Product Registration No.
- Use of the substance/preparation
- Company name
- Company address
- Company telephone
- Company e-mail for SDS
- Emergency telephone

### 2 Hazards identification
- Classification
- Physical and chemical hazards
- Health hazards
- Environmental hazards
- Other

### 3 Composition/information on ingredients
- Hazardous ingredients
  - Chemical name
  - CAS no.
  - EC no.
  - % (w/w)
  - Classification
- Other ingredients
  - Chemical name
  - CAS no.
  - EC no.
  - % (w/w)

**EC no. means EINECS or ELINCS number.**

### 4 First aid measures
- General
- Inhalation
- Ingestion
- Skin contact
- Eye contact
- Note to physician
<table>
<thead>
<tr>
<th>5 Fire-fighting measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suitable extinguishing media</td>
</tr>
<tr>
<td>Extinguishing media not to be used</td>
</tr>
<tr>
<td>Specific hazards</td>
</tr>
<tr>
<td>Hazardous thermal decomposition and combustion products</td>
</tr>
<tr>
<td>Special fire fighting procedures</td>
</tr>
<tr>
<td>Special protective equipment for fire-fighters</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6 Accidental release measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal precautions</td>
</tr>
<tr>
<td>Environmental precautions</td>
</tr>
<tr>
<td>Methods for cleaning up</td>
</tr>
<tr>
<td>Remarks</td>
</tr>
</tbody>
</table>

Note: see section 8 for personal protective equipment and section 13 for waste disposal.

<table>
<thead>
<tr>
<th>7 Handling and storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handling</td>
</tr>
<tr>
<td>Storage</td>
</tr>
<tr>
<td>Specific use(s)</td>
</tr>
<tr>
<td>Packaging materials</td>
</tr>
</tbody>
</table>

Note: See section 10 for stability and reactivity.

<table>
<thead>
<tr>
<th>8 Exposure controls / Personal protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposure limit values</td>
</tr>
<tr>
<td>Engineering measures</td>
</tr>
<tr>
<td>Hygienic measures</td>
</tr>
<tr>
<td>Personal protection</td>
</tr>
<tr>
<td>Respiratory system</td>
</tr>
<tr>
<td>Skin and body</td>
</tr>
<tr>
<td>Hands</td>
</tr>
<tr>
<td>Eyes</td>
</tr>
<tr>
<td>Environmental exposure controls</td>
</tr>
</tbody>
</table>

Advice on personal protective equipment is applicable for high exposure levels.
Select proper personal protection based on a risk.

<table>
<thead>
<tr>
<th>9 Physical and chemical properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
</tr>
<tr>
<td>Odour</td>
</tr>
<tr>
<td>pH</td>
</tr>
<tr>
<td>Boiling point or range</td>
</tr>
<tr>
<td>Melting point or range</td>
</tr>
<tr>
<td>Flash point</td>
</tr>
<tr>
<td>Flammability</td>
</tr>
<tr>
<td>Explosive properties</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
</tr>
<tr>
<td>Decomposition temperature</td>
</tr>
<tr>
<td>Minimum ignition energy</td>
</tr>
<tr>
<td>Oxidising properties</td>
</tr>
<tr>
<td>Critical temperature</td>
</tr>
<tr>
<td>Relative density</td>
</tr>
<tr>
<td>Density</td>
</tr>
<tr>
<td>Loose bulk density</td>
</tr>
<tr>
<td>Vapour pressure at 20°C</td>
</tr>
<tr>
<td>Stability and reactivity</td>
</tr>
<tr>
<td>-------------------------</td>
</tr>
<tr>
<td>Stability</td>
</tr>
<tr>
<td>Conditions to avoid</td>
</tr>
<tr>
<td>Materials to avoid</td>
</tr>
<tr>
<td>Hazardous decomposition products</td>
</tr>
<tr>
<td>In case of fire: see section 5.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Toxicological information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toxicokinetics, metabolism and distribution</td>
</tr>
<tr>
<td>Acute effects</td>
</tr>
<tr>
<td>Sensitisation</td>
</tr>
<tr>
<td>Chronic toxicity</td>
</tr>
<tr>
<td>Carcinogenicity</td>
</tr>
<tr>
<td>Mutagenicity</td>
</tr>
<tr>
<td>Reproductive toxicity</td>
</tr>
<tr>
<td>Remarks</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ecological Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecotoxicity</td>
</tr>
<tr>
<td>Mobility</td>
</tr>
<tr>
<td>Persistence and degradability</td>
</tr>
<tr>
<td>Bioaccumulative potential</td>
</tr>
<tr>
<td>Results of PBT assessment</td>
</tr>
<tr>
<td>Other adverse effects</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ingredient name</th>
<th>Test</th>
<th>Species</th>
<th>Route</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vapour density</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaporation rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partition coefficient (n-octanol/water)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viscosity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean particle size</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water solubility</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miscibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fat solubility</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conductivity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remarks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ingredient name</th>
<th>Test</th>
<th>Aquatic half-life</th>
<th>Photolysis</th>
<th>Biodegradability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stability</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conditions to avoid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Materials to avoid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hazardous decomposition products</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In case of fire: see section 5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ingredient name</th>
<th>Kow or LogPow</th>
<th>Bioconcentration factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conditions to avoid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Materials to avoid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hazardous decomposition products</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In case of fire: see section 5.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Disposal considerations

<table>
<thead>
<tr>
<th>Method of disposal</th>
<th>Package waste disposal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Note: see section 7 for safe handling and storage</td>
</tr>
</tbody>
</table>

### Transport information

<table>
<thead>
<tr>
<th>UN Number</th>
<th>Proper shipping name</th>
<th>Class</th>
<th>Packing group</th>
<th>Label</th>
<th>Other applicable information</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADR/RID</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADN/ADNR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMDG</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICAO/IATA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Regulatory Information

<table>
<thead>
<tr>
<th>Hazard symbol</th>
<th>R and S phrases</th>
<th>Other regulations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Other information

<table>
<thead>
<tr>
<th>The information refers to sections 2 and 3</th>
<th>Risk phrases</th>
<th>Symbols</th>
<th>Training advice</th>
<th>Date of the previous SDS</th>
<th>Modifications in this version</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Disclaimer

The information refers to sections 2 and 3