1 IDENTIFICATION OF THE PRODUCT AND OF THE COMPANY

Important Note: As a solid, manufactured article, exposure to hazardous ingredients is not expected with normal use. This battery is an article and as such, is not subject to the OSHA Hazard Communication Standard requirement. The information contained in this Material Safety Data Sheet contains valuable information critical to the safe handling and proper use of the product. This MSDS should be retained and available for employees and other users of this product.

Product identifier

Product name: Lithium ion battery - NCA - LiNiCoAlO2 - Lithium Nickel Cobalt Aluminium Oxide

Details of the supplier of the safety data sheet

Company name: Cegasa Energia, S.L.U.

Address: C/Marie Curie, 1 · 01510 · Miñano Mayor (Alava) · España

Tel: (+34) 945 313 738

e-mail: info@cegasa.com

Remark:

The information and recommendations set forth are made in good faith and believed to be accurate as of the date of preparation. CEGASA ENERGY S.L.U. makes no warranty, expressed or implied, with respect to this information and disclaims all liabilities from reliance on it.

2 HAZARDS IDENTIFICATION

Hazards identification: Class 9, miscellaneous. The batteries have passed the test items of UN Model Regulations, Manual of Test and Criteria Section UN 38.3.

Route(s) of Entry: There is no hazard when the measures for handling and storage are followed.

Signs and Symptoms of Exposure: In case of cell damage, possible release of dangerous substances and a flammable gas mixture.

OSHA Hazard Communication: This material is not considered hazardous by the OSHA Hazard Communication Standard 29CFR 1910.1200.

Carcinogenicity (NTP): Not listed

Carcinogenicity (IARC): Not listed

Carcinogenicity (OSHA): Not listed

Special hazards for human health and environment: There is no hazard when the measures for handling and storage are followed. In case of cell damage, possible release of dangerous substances and a flammable gas mixture.

3 COMPOSITION/INFORMATION ON INGREDIENTS

The battery is manufactured with Lithium ion cells - NCA - LiNiCoAlO2 - Lithium Nickel Cobalt Aluminium Oxide.

Hazardous components

CAS-No.	Chemical name	Quantity
1307-96-6	Cobalt oxide	< 30 %
1313-13-9	Manganese dioxide	< 30 %
1313-99-1	Nickel oxide	< 30 %
7440-44-0	Carbon	< 30 %
Electrolyte (*)		< 20 %

24937-79-9	Polyvinylidene fluoride (PVdF)	< 10 %
7429-90-5	Aluminium foil	2 - 10 %
7440-50-8	Copper foil	2 - 10 %
Aluminium and inert materials		5 - 10 %

Further Information

For information purposes: (*) Main ingredients: Lithium hexafluorophosphate, organic carbonates

Because of the cell structure the dangerous ingredients will not be available if used properly.

During charge process a lithium graphite intercalation phase is formed.

Mercury content: Hg < 0.1mg/kg

Cadmium content: Cd < 1mg/kg

Lead content: Pb< 10mg/kg

4 FIRST AID MEASURES

General information: The following first aid measures are required only in case of exposure to interior battery components after damage of the external battery casing. Undamaged, closed cells do not represent a danger to the health.

After inhalation: Ensure of fresh air. Consult a physician.

After contact with skin: In case of contact with skin wash off immediately with plenty of water. Consult a physician.

After contact with eyes: Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Seek medical treatment by eye specialist.

After ingestion: Drink plenty of water. Call a physician immediately.

5 FIREFIGHTING MEASURES

Suitable extinguishing media

Cold water and dry powder in large amount are applicable. Use metal fire extinction powder or dry sand if only few cells are involved.

Special hazards arising from the chemical

May form hydrofluoric acid if electrolyte comes into contact with water. In case of fire, the formation of the following flue gases cannot be excluded: Hydrogen fluoride (HF), Carbon monoxide and carbon dioxide.

Protective equipment and precautions for firefighters

Wear self-contained breathing apparatus and protective suit.

Additional information

If possible, remove cell(s) from fire fighting area. If heated above 125℃, cell(s) can explode/vent. Cell is not flammable but internal organic material will burn if the cell is incinerated.

6 ACCIDENTAL RELEASE MEASURES

Personal precautions

Use personal protective clothing. Avoid contact with skin, eyes and clothing. Avoid breathing fume and gas.

Environmental precautions

Do not discharge into the drains/surface waters/groundwater.

Methods for cleaning up/taking up

Take up mechanically and send for disposal.

7 HANDLING AND STORAGE

Handling

Advice on safe handling

Avoid short circuiting the cell. Avoid mechanical damage of the cell. Do not open or disassemble.

Advice on protection against fire and explosion

Keep away from open flames, hot surfaces and sources of ignition.

Storage

Requirements for storage rooms and vessels

Storage at room temperature (approx. 20℃) at approx. 20~60% of the nominal capacity (OCV approx. 3.6 - 3.9 V/cell).

Keep in closed original container.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredient	Risk Codes	Safety Description	Hazard	Exposure Controls/Personal Protection
Cobalt oxide	R22;R43; R50/53	S24;S37;S60;S61	Xn(Harmful) N (Dangerous for the environment)	0.1 mg/m3 (TWA)
Manganese (VI) oxide	R20/22	S25	Xn(Harmful)	Airborne Exposure Limits: - OSHA Permissible Exposure Limit (PEL): 5 mg/m3 Ceiling for manganese compounds as Mn - ACGIH Threshold Limit Value (TLV): 0.2 mg/m3 (TWA) for manganese, elemental and inorganic compounds as Mn
Nickel oxide	R43,R49, R53	S45,S53,S61	T(Toxic)	Airborne Exposure Limits: For Nickel, Metal and Insoluble Compounds, as Ni - OSHA Permissible Exposure Limits (PEL) - 1 mg/m3 (TWA). For Nickel, Elemental / Metal - ACGIH Threshold Limit Value (TLV) - 1.5 mg/m3 (TWA), A5 - Not suspected as a human carcinogen. For Nickel, Insoluble Compounds, as Ni: - ACGIH Threshold Limit Value (TLV) - 0.2 mg/m3 (TWA), A1 - Confirmed human carcinogen
Carbon	R36/37/38, R36/37 R20, R10	S22;S24/25	F(Highly Flammable) Xn(Harmful) Xi(Irritant)	Airborne Exposure Limits: - OSHA Permissible Exposure Limits (PELs): activated carbon (graphite, synthetic): Total particulate = 15 mg/m3
luminium foil	R17,R15, R36/38, R10,R67, R65,R62, R51/53, R48/20, R38,R11,	S7/8,S43,S26,S62, S61, S36/37, S33,S29,S16,S9	F(Highly Flammable) Xn(Harmful) Xi(Irritant)	Airborne Exposure Limits: - OSHA Permissible Exposure Limit (PEL): 15 mg/m3 (TWA) total dust and 5 mg/m3 (TWA) repairable fraction for Aluminum metal as Al - ACGIH Threshold Limit Value (TLV): 10 mg/m3 (TWA) Aluminum metal dusts
Copper foil	R11 R36 R37 R38	S5,S26,S16,S61, S36/37	F(Highly Flammable) N(Dangerous for the environment) Xn(Harmful) Xi(Irritant)	Copper Dust and Mists, as Cu: - OSHA Permissible Exposure Limit (PEL) - 1 mg/m3 (TWA) - ACGIH Threshold Limit Value (TLV) - 1 mg/m3 (TWA) Copper Fume: - OSHA Permissible Exposure Limit (PEL) - 0.1 mg/m3 (TWA) - ACGIH Threshold Limit - ACGIH Threshold Limit Value (TLV) - 0.2 mg/m3 (TWA)

Polyvinyliden e fluoride (PVdF)		S22;S24/25		

Additional advice on limit values
During normal charging and discharging there is no release of product.

Occupational exposure controls
No specific precautions necessary.

Protective and hygiene measures
When using do not eat, drink or smoke. Wash hands before breaks and after work.

Respiratory protection
No specific precautions necessary.

Hand protection
No specific precautions necessary.

Eye protection
No specific precautions necessary.

Skin protection
No specific precautions necessary.

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form: Solid
Color: Various
Odor: Odourless

Important health, safety and environmental information

Test method	
pHValue:	n.a.
Flash point:	n.a
Lower explosion limits:	n.a.
Vapour pressure:	n.a.
Density:	n.a.
Water solubility:	Insoluble
Ignition temperature:	n.a.

10 STABILITY AND REACTIVITY

Stability
Stable

Conditions to avoid
Keep away from open flames, hot surfaces and sources of ignition. Do not puncture, crush or incinerate.

Materials to avoid
No materials to be especially mentioned.

Hazardous decomposition products
In case of open cells, there is the possibility of hydrofluoric acid and carbon monoxide release.

Possibility of Hazardous Reactions
Will not occurs

Additional information
No decomposition if stored and applied as directed.

11 TOXICOLOGICAL INFORMATION

Empirical data on effects on humans

If appropriately handled and if in accordance with the general hygienic rules, no damages to health have become known.

12 ECOLOGICAL INFORMATION

Further information

Ecological injuries are not known or expected under normal use. Do not flush into surface water or sanitary sewer system.

13 DISPOSAL CONSIDERATIONS

Appropriate Method of Disposal of Substance

Lithium batteries are best disposed of as a non-hazardous waste when fully or mostly discharged. Contact a licensed professional waste disposal service to dispose of large quantities materials.

14 TRANSPORT INFORMATION

The battery has passed the test items of UN Model Regulations, Manual of Test and Criteria Section UN 38.3

United Nations

- UN 3480
- Class 9
- Proper Shopping name: LITHIUM ION BATTERIES

International Conventions

ADR/RID – Transportation by Road/Rail

- UN 3480
- Class 9
- Proper name: LITHIUM ION BATTERIES

IMDG – Sea Transportation

- UN 3480
- Class 9
- Proper Shopping name: LITHIUM ION BATTERIES
- Packing instructions P903
- Emergency Schedule F-A, S-I
- Marine pullulant: NO

IATA – AIR Transportation

- UN 3480
- Class 9
- Proper Shopping name: LITHIUM ION BATTERIES
- Packing instructions 965

Other: In USA Code of Federal Regulation, 49+ CFR Ch.1 §173-185

- UN 3480
- Class 9
- Proper Shopping name: LITHIUM ION BATTERIES

15 REGULATORY INFORMATION

The transport of rechargeable Lithium-ion batteries are regulated by the United Nations as detailed in the “Model Regulations on the Transport of Dangerous Goods”.

16 OTHER INFORMATION

This information has been complied from sources considered to be dependable and is, to the best of our knowledge and belief, accurate and reliable as of the date complied. However, no representation, warranty (ether expressed or implied) or guarantee is made to the accuracy, reliability or completeness of the information contained herein.

This information related to the specific materials designated and may nor be valid for such material used in combination with any other materials or in any process. It is the user's responsibility to safety himself as to the suitability and completeness of this information for his particular use.

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