SAFETY DATA SHEET

EM-6432

Section 1. Identification

A. Product name : EM-6432

Product description : Metal Catalyst

B. Relevant identified uses of the substance or mixture and uses advised against

Identified uses : catalyst

Uses advised against : This product is not recommended for any industrial, professional or consumer use other than the Identified Uses above.

C. Supplier's details : EXXONMOBIL Chemical Korea
22F Seoul Square Bldg., 416
HanGang Daero
Jung-GuSeoul 04637 Republic of Korea

24 Hour Emergency Telephone : 080-880-0454/ +1 703-741-5970 (CHEMTREC)

Supplier General Contact : +82 2 750 8716

:

SDS Internet Address www.sds.exxonmobil.com

Section 2. Hazards identification

A. Hazard classification : SKIN SENSITISATION - Category 1
CARCINOGENICITY - Category 1A
SPECIFIC TARGET ORGAN TOXICITY - REPEATED EXPOSURE - Category 2
This product is classified in accordance with the Industrial Safety and Health Act and the Chemical Control Act.

B. GHS label elements, including precautionary statements

Symbol :

Signal word : Danger

Hazard statements : H317 - May cause an allergic skin reaction.
H350 - May cause cancer.
H373 - May cause damage to organs through prolonged or repeated exposure. (respiratory tract)

Precautionary statements

Prevention : P201 - Obtain special instructions before use.
P202 - Do not handle until all safety precautions have been read and understood.
P260 - Do not breathe dust.
P272 - Contaminated work clothing should not be allowed out of the workplace.
P280 - Wear protective gloves, protective clothing and eye or face protection.

Response : P302 + P352 - IF ON SKIN: Wash with plenty of water.
P308 + P313 - IF exposed or concerned: Get medical advice or attention.
P321 - Specific treatment (see the label).
P333 + P313 - If skin irritation or rash occurs: Get medical advice/attention.
P362 + P364 - Take off contaminated clothing and wash it before reuse.

Storage : P405 - Store locked up.

Section 2. Hazards identification

Disposal : P501 - Dispose of contents and container in accordance with all local, regional, national and international regulations.

C. Other hazards which do not result in classification : May form explosible dust-air mixture if small particles are generated during further processing, handling, or by other means.

Nota : This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Ingredient name	Common name	Identifiers	%
tungsten oxide	-	CAS: KE-35023	≥5 - ≤30
aluminum oxide, non fibrous	-	CAS: KE-01012	≥1 - ≤50
nickel monoxide	-	CAS: KE-25858 +	≥1 - ≤5

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First-aid measures

Description of necessary first aid measures

A. Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

B. Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Continue to rinse for at least 10 minutes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Get medical attention. Wash with plenty of soap and water. In the event of any complaints or symptoms, avoid further exposure.

C. Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

D. Ingestion : Wash out mouth with water. Remove dentures if any. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Indication of immediate medical attention and special treatment needed, if necessary

E. Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Section 4. First-aid measures

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : May cause an allergic skin reaction.

Ingestion : No known significant effects or critical hazards.

Over-exposure signs/symptoms

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : Adverse symptoms may include the following:
irritation
redness

Ingestion : No specific data.

See toxicological information (Section 11)

Section 5. Firefighting measures

A. Extinguishing media

Suitable extinguishing media : Use dry chemical, CO_2, water spray (fog) or foam.

Unsuitable extinguishing media : Do not use water jet.

B. Specific hazards arising from the chemical : Adsorption of water will generate heat and possibly steam; closed containers may get very hot and build up pressure. If contact with water occurs, large quantities of heat and steam may be generated. Avoid contact with eyes. Avoid contact with skin. Avoid conditions which create dust. Avoid inhalation of dust.

Hazardous combustion products : Metal Oxides, tetracarbonylnickel

C. Special protective actions for fire-fighters : Use standard firefighting procedures and consider the hazards of other involved materials. Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. Assure an extended cooling down period to prevent re-ignition. Prevent run-off from fire control or dilution from entering streams, sewers or drinking water supply. No action shall be taken involving any personal risk or without suitable training.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations.

A. Personal precautions, protective equipment and emergency procedures

Section 6. Accidental release measures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Put on appropriate personal protective equipment. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

B. Environmental precautions : Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

C. Methods and material for containment and cleaning up

Small spill : Move containers from spill area. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Place spilled material in a designated, labeled waste container. Dispose of via a licensed waste disposal contractor.

Large spill : Move containers from spill area. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Dispose of via a licensed waste disposal contractor. Material will sink. Seek advice of a specialist No immediate action required. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

Section 7. Handling and storage

A. Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not ingest. If during normal use the material presents a respiratory hazard, use only with adequate ventilation or wear appropriate respirator. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Static Accumulator : This material is a static accumulator.

B. Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

A. Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
zeolite	**ACGIH TLV (United States, 1/2024) [Aluminum, metal and insoluble compounds]** TWA 8 hours: 1 mg/m³. Form: Respirable fraction.
tungsten oxide	**ISHA Article 42 (Republic of Korea, 1/2020) [Tungsten metal and Insoluble compounds]** STEL 15 minutes: 10 mg/m³. Form: Respirable fraction. TWA 8 hours: 5 mg/m³. Form: Respirable fraction. **ACGIH TLV (United States, 1/2024) [Tungsten and compounds]** TWA 8 hours: 3 mg/m³ (as W). Form: Respirable.
aluminum oxide, non fibrous	**ISHA Article 42 (Republic of Korea, 1/2020)** TWA 8 hours: 10 mg/m³. **ACGIH TLV (United States, 1/2024) [Aluminum, metal and insoluble compounds]** TWA 8 hours: 1 mg/m³. Form: Respirable fraction.
nickel monoxide	**ISHA Article 42 (Republic of Korea, 1/2020) [Nickel (Insoluble inorganic compounds)]** TWA 8 hours: 0.2 mg/m³ (as Ni). Form: Inhalable fraction. **ACGIH TLV (United States, 1/2024) [Nickel, insoluble inorganic compounds]** TWA 8 hours: 0.2 mg/m³ (as Ni). Form: Inhalable fraction.

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

B. Appropriate engineering controls : If user operations generate dust, fumes, gas, vapour or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

C. Personal protective equipment

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Eye protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields. If operating conditions cause high dust concentrations to be produced, use dust goggles.

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated. < 1 hour (breakthrough time): Nitrile, minimum 0.38 mm thickness or comparable protective barrier material

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Section 8. Exposure controls/personal protection

Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Section 9. Physical and chemical properties and safety characteristics

Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

The conditions of measurement of all properties are at standard temperature and pressure unless otherwise indicated.

A. Appearance

Physical state : Solid. [pellet]

Colour : Green

B. Odour : Odourless

C. Odour threshold : Not available.

D. pH : Not applicable.

E. Melting/freezing point : Not available.

F. Boiling point or initial boiling point and boiling range : Not available.

G. Flash point : Not applicable.

H. Evaporation rate : Not available.

I. Flammability : Ignitable

J. Lower and upper explosion limit/ flammability limit : Not applicable.

K. Vapour pressure : Not available.

L. Solubility in water : Negligible

M. Relative vapour density : Not applicable.

N. Relative density : 1.2

Bulk density : 0.5 g/cm³

Density : Not available.

O. Partition coefficient: n-octanol/water : Not applicable.

P. Auto-ignition temperature : Not applicable.

Q. Decomposition temperature : Not available.

R. Viscosity : Not applicable.

S. Molecular weight : Not available.

Particle characteristics

Median particle size : Not available.

Section 10. Stability and reactivity

A. Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

B. Conditions to avoid : Moisture., High dust concentrations., High energy sources of ignition.

C. Incompatible materials : Strong Acids, Strong Bases, carbon monoxide, water, oxygen

D. Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

A. Information on likely routes of exposure : Not available.

B. Health hazards

Acute toxicity

Conclusion/Summary

Inhalation : Minimally Toxic. No end point data for material. Based on assessment of the components.

Dermal : Minimally Toxic. No end point data for material. Based on assessment of the components.

Oral : Minimally Toxic. No end point data for material. Based on assessment of the components.

Irritation/Corrosion

Conclusion/Summary

Skin : Negligible irritation to skin at ambient temperatures. No end point data for material. Based on assessment of the components.

Eyes : May cause mild, short-lasting discomfort to eyes. No end point data for material. Based on assessment of the components.

Respiratory : Negligible hazard at ambient/normal handling temperatures. No end point data for material.

Respiratory or skin sensitization

Conclusion/Summary

Skin : May cause allergic skin reaction. No end point data for material. Based on assessment of the components.

Respiratory : Not expected to be a respiratory sensitizer. No end point data for material.

Mutagenicity

Conclusion/Summary : Not expected to be a germ cell mutagen. No end point data for material. Based on assessment of the components.

Carcinogenicity

Conclusion/Summary : May cause cancer. No end point data for material. Based on assessment of the components.

Classification

Product/ingredient name	IARC
aluminum oxide, non fibrous	-
nickel monoxide	1

Reproductive toxicity

Conclusion/Summary : Not expected to be a reproductive toxicant. No end point data for material. Based on assessment of the components.

Specific target organ toxicity (single exposure)

Section 11. Toxicological information

Conclusion/Summary : Not expected to cause organ damage from a single exposure. No end point data for material.

Specific target organ toxicity (repeated exposure)

Product/ingredient name	Category	Target organs
EM-6432	Category 2	respiratory tract

Conclusion/Summary : May cause damage to organs through prolonged or repeated exposure. No end point data for material. Based on assessment of the components.

Aspiration hazard

Conclusion/Summary : Not expected to be an aspiration hazard. Based on physico-chemical properties of the material. No end point data for material.

Other information

Contains : NICKEL COMPOUNDS: Nickel causes sensitization by skin contact. Studies indicate that some forms of nickel are carcinogenic to humans.

Section 12. Ecological information

The information given is based on data for the material, components of the material, or for similar materials, through the application of bridging principals.

A. Ecotoxicity

Not available.

Conclusion/Summary

Acute toxicity : Not expected to be harmful to aquatic organisms.

Chronic toxicity : Not expected to demonstrate chronic toxicity to aquatic organisms

B. Persistence and degradability

Biodegradability : Material -- Expected to be persistent.

C. Bioaccumulative potential

Conclusion/Summary : Material -- Potential to bioaccumulate is low.

D. Mobility in soil

Mobility : Material -- Can float on water, but will sink when saturated.

E. Other adverse effects

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

A. Disposal methods : The generation of waste should be avoided or minimised wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible.

Section 13. Disposal considerations

B. Disposal precautions : Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

Section 14. Transport information

	ADR	IMDG	IATA
A. UN number	Not regulated.	Not regulated.	Not regulated.
B. UN proper shipping name	-	-	-
C. Transport hazard class(es)	-	-	-
	-	-	-
E. Environmental hazards	No.	No.	No.

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to IMO instruments : Not applicable.

Section 15. Regulatory information

A. Regulation according to ISHA

ISHA article 117 (Harmful substances prohibited from manufacture) : None of the components are listed.

ISHA article 118 (Harmful substances requiring permission) : None of the components are listed.

Article 2 of Youth Protection Act on Substances Hazardous to Youth : Not applicable.

Exposure Limits of Chemical Substances and Physical Factors

The following components have an OEL:
zeolite
tungsten oxide
aluminum oxide, non fibrous
nickel monoxide

Section 15. Regulatory information

ISHA Enforcement Regs Annex 19 (Exposure standards established for harmful factors) : The following components are listed: Nickel and its insoluble inorganic compounds

ISHA Enforcement Regs Annex 21 (Harmful factors subject to Work Environment Measurement) : The following components are listed: tungsten and its compounds, nickel and its inorganic compounds

ISHA Enforcement Regs Annex 22 (Harmful Factors Subject to Special Health Check-up) : The following components are listed: Tungsten and its compounds, Nickel and its inorganic compounds

Standard of Industrial Safety and Health Annex 12 (Hazardous substances subject to control) : The following components are listed: tungsten and its compounds, aluminum and its compounds, nickel and its inorganic insoluble compounds and nickel carbonyl

B. Regulation according to Chemicals Control Act

Article 11 (TRI) : The following components are listed: Aluminium and its compounds, Nickel and its compounds

Article 18 Prohibited (K-Reach Article 27) : None of the components are listed.

Article 19 Subject to authorization (K-Reach Article 25) : None of the components are listed.

Article 20 Toxic Chemicals (K-Reach Article 20) : Toxic

Article 20 Restricted (K-Reach Article 27) : None of the components are listed.

Article 39 (Accident Precaution Chemicals) : The following components are listed: nickel oxide

Existing Chemical Substances Subject to Registration : The following components are listed: Nickel monoxide

C. Dangerous Materials Safety Management Act : Not available.

D. Wastes regulation : Dispose of contents and container in accordance with all local, regional, national and international regulations.

E. Regulation according to other foreign laws

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Section 15. Regulatory information

Not listed.

Inventory list

Australia inventory (AIIC)	:	All components are listed or exempted.
Canada inventory (DSL-NDSL)	:	All components are listed or exempted.
China inventory (IECSC)	:	All components are listed or exempted.
Japan inventory (CSCL)	:	All components are listed or exempted.
Japan inventory (Industrial Safety and Health Act)	:	All components are listed or exempted.
New Zealand Inventory of Chemicals (NZIoC)	:	All components are listed or exempted.
Philippines inventory (PICCS)	:	All components are listed or exempted.
Korea inventory (KECI)	:	All components are listed or exempted.
Taiwan Chemical Substances Inventory (TCSI)	:	All components are listed or exempted.
United States inventory (TSCA 8b)	:	All components are active or exempted.

Section 16. Other information

A. References : - Registry of Toxic Effects of Chemical Substances
- United States Environmental Protection Agency ECOTOX

B. Date of issue/Date of revision : 7/25/2024

Date of previous issue : 5 June 2024

C. Version : 2.01

D. Other

Indicates information that has changed from previously issued version.

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
N/A = Not available
SGG = Segregation Group
UN = United Nations

Product code : 1163736_13560321

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