

Safety Data Sheet

Material Name: ELECTRIC DOUBLE LAYER CAPACITOR

SDS ID: 00233410

*** Section 1 - PRODUCT AND COMPANY IDENTIFICATION***

Manufacturer Information

LS Mtron
555, Hogye-dong
Dongan-gu, Anyang-si
Gyeonggi-do
Korea, 431-831

EMERGENCY TELEPHONE NUMBER:
82-31-428-4714

FAX NUMBER: 82-31-601-8058

Material Name: ELECTRIC DOUBLE LAYER CAPACITOR

Trade Names/Synonyms

ULTRACAPACITOR; SUPERCAPACITOR

Product Use

Energy storage device that is positioned between conventional electrolytic capacitor and rechargeable batteries.
Similar use with secondary cell.

*** Section 2 - HAZARDS IDENTIFICATION***

EMERGENCY OVERVIEW

Physical Form: solid

Major Health Hazards: This product is considered to be nonhazardous, however the following effects may occur as a result of damage to the product: harmful on contact with the skin, respiratory tract irritation, eye irritation, blood damage

POTENTIAL HEALTH EFFECTS

Inhalation

Short Term: This product is considered to be nonhazardous, however the following effects may occur as a result of damage to the product: irritation, weight loss, weakness, difficulty breathing, changes in blood pressure, nausea, vomiting, stomach pain, loss of voice, chest pain, irregular heartbeat, headache, drowsiness, dizziness, disorientation, loss of coordination, lung congestion, lung damage, convulsions, unconsciousness

Long Term: This product is considered to be nonhazardous, however the following effects may occur as a result of damage to the product: irritation, changes in blood pressure, nausea, vomiting, stomach pain, loss of appetite, loss of voice, chest pain, difficulty breathing, irregular heartbeat, headache, drowsiness, dizziness, disorientation, loss of coordination, kidney damage, convulsions, unconsciousness

Skin

Short Term: This product is considered to be nonhazardous, however the following effects may occur as a result of damage to the product: irritation, absorption may occur, changes in blood pressure, nausea, vomiting, stomach pain, loss of voice, chest pain, difficulty breathing, irregular heartbeat, headache, drowsiness, dizziness, disorientation, loss of coordination, convulsions, unconsciousness

Long Term: This product is considered to be nonhazardous, however the following effects may occur as a result of damage to the product: irritation

Eye

Short Term: This product is considered to be nonhazardous, however the following effects may occur as a result of damage to the product: irritation

Long Term: This product is considered to be nonhazardous, however the following effects may occur as a result of damage to the product: irritation

Ingestion

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Short Term: This product is considered to be nonhazardous, however the following effects may occur as a result of damage to the product:., gastrointestinal irritation, changes in blood pressure, nausea, vomiting, stomach pain, loss of voice, chest pain, difficulty breathing, irregular heartbeat, headache, drowsiness, dizziness, disorientation, loss of coordination, convulsions, unconsciousness, reproductive effects

Long Term: no information on significant adverse effects

*** Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS***

CAS #	Component / EC#	Percent
Not Available	NON-HAZARDOUS SUBSTANCE	40 - 60
Not Available	PROPRIETARY COMPONENT B	1 - 60
Not Available	PROPRIETARY COMPONENT A	1 - 60
7440-44-0	CARBON, ACTIVATED	20 - 30
7429-90-5	ALUMINUM	10 - 20

Component Related Regulatory Information

This product may be regulated, have exposure limits or other information identified as the following: Graphite, synthetic, Aluminium compounds, Aluminum, welding fumes.

*** Section 4 - FIRST AID MEASURES***

Inhalation

If adverse effects occur, remove to uncontaminated area. Get medical attention.

Skin

Wash exposed skin with soap and water.

Eyes

Flush eyes with plenty of water.

Ingestion

If a large amount is swallowed, get medical attention.

*** Section 5 - FIRE FIGHTING MEASURES***

See Section 9 for Flammability Properties

NFPA Ratings: Health: 1 Fire: 0 Reactivity: 0

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

Flammable Properties

Negligible fire hazard.

Extinguishing Media

Use extinguishing agents appropriate for surrounding fire.

Fire Fighting Measures

Move container from fire area if it can be done without risk. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas.

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*** Section 6 - ACCIDENTAL RELEASE MEASURES***

Occupational spill/release

Small spills of the liquid component: Collect spilled material in appropriate container for disposal. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

*** Section 7 - HANDLING AND STORAGE***

Storage Procedures

Store and handle in accordance with all current regulations and standards. See original container for storage recommendations. Keep separated from incompatible substances.

*** Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION***

Component Exposure Limits

CARBON, ACTIVATED (7440-44-0)

OSHA: 15 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction, related to Graphite, synthetic)

OSHA (Vacated): 10 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction, related to Graphite, synthetic)

ALUMINUM (7429-90-5)

ACGIH: 1 mg/m3 TWA (respirable fraction)

NIOSH: 10 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable dust)

OSHA: 15 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)

OSHA (Vacated): 15 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)

Component Biological Limit Values

There are not biological limit values for any of this product's components.

Ventilation

Based on available information, additional ventilation is not required. Ensure compliance with applicable exposure limits.

PERSONAL PROTECTIVE EQUIPMENT

Eyes/Face

Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Protective Clothing

Protective clothing is not required under normal conditions.

Glove Recommendations

Protective gloves are not required under normal conditions.

Respiratory Protection

No respirator is required under normal conditions of use.

Under conditions of frequent use or heavy exposure, respiratory protection may be needed.

*** Section 9 - PHYSICAL AND CHEMICAL PROPERTIES***

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Physical State:	Solid	Appearance:	Not available
Physical Form:	solid	Odor:	Not Available
Odor Threshold:	Not available	pH:	Not available
Melting/Freezing Point:	Not available	Boiling Point:	Not available
Decomposition:	Not available	Evaporation Rate:	Not available
LEL:	Not available	UEL:	Not available
Vapor Pressure:	Not available	Vapor Density (air = 1):	Not available
Density:	Not available	Spec. Gravity (water = 1):	Not available
Water Solubility:	Not available	Log KOW:	Not available
Coeff. Water/Oil Dist:	Not available	Viscosity:	Not available
Volatility:	Not available		

*** Section 10 - STABILITY AND REACTIVITY***

Chemical Stability

Stable at normal temperatures and pressure.

Conditions to Avoid

Protect from physical damage and heat. Avoid heat, flames, sparks and other sources of ignition.

Materials to Avoid

acids, bases, combustible materials, halocarbons, halogens, metal carbide, metal oxides, metal salts, metals, oxidizing materials, peroxides, reducing agents

Decomposition Products

cyanides, hydrogen fluoride, oxides of aluminum, oxides of boron, oxides of carbon, oxides of nitrogen

Possibility of Hazardous Reactions

Will not polymerize.

*** Section 11 - TOXICOLOGICAL INFORMATION***

Component Analysis - LD50/LC50

The components of this material have been reviewed in various sources and the following selected endpoints are published:

CARBON, ACTIVATED (7440-44-0)

Oral LD50 Rat >10000 mg/kg

RTECS Acute Toxicity (selected)

The components of this material have been reviewed and RTECS publishes no data as of the date on this document.

Component Carcinogenicity

ALUMINUM (7429-90-5)

ACGIH: A4 - Not Classifiable as a Human Carcinogen

RTECS Irritation

The components of this material have been reviewed and RTECS publishes no data as of the date on this document.

Aluminum itself has not been evaluated by IARC. However, aluminum production has been evaluated as IARC Group 1 (Human Sufficient Evidence). There is sufficient evidence that certain exposures occurring during aluminum production cause cancer.

Medical Conditions Aggravated by Exposure

central nervous system disorders, Alzheimer's disease, heart or cardiovascular disorders, kidney disorders, respiratory disorders, liver disorders, skin disorders and allergies

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RTECS Reproductive Effects

The components of this material have been reviewed, and RTECS publishes the following endpoints:

CARBON, ACTIVATED (7440-44-0)

167 mg/kg Subcutaneous Rat TDLo (pregnant 8 day(s))

ALUMINUM (7429-90-5)

1260 mg/kg Oral Mouse TDLo (Multigeneration); 67.5 mg/kg Unreported Rabbit TDLo (pregnant 2-27 day(s))
Elevated aluminum levels have been associated with Alzheimer's disease, neurofibrillary degeneration, and anemia.

HEALTH EFFECTS

Inhalation - Acute Exposure

PROPRIETARY COMPONENT B: May cause irritation. CARBON, ACTIVATED: Inhalation of dust may cause irritation. METAL FUME FEVER: Metal fume fever, an influenza-like illness, may occur due to the inhalation of freshly formed metal oxide particles sized below 1.5 microns and usually between 0.02-0.05 microns. Symptoms may be delayed 4-12 hours and begin with a sudden onset of thirst, and a sweet, metallic or foul taste in the mouth. Other symptoms may include upper respiratory tract irritation accompanied by coughing and a dryness of the mucous membranes, lassitude and a generalized feeling of malaise. Fever, chills, muscular pain, mild to severe headache, nausea, occasional vomiting, exaggerated mental activity, profuse sweating, excessive urination, diarrhea and prostration may also occur. Tolerance to fumes develops rapidly, but is quickly lost. All symptoms usually subside within 24-36 hours. PROPRIETARY COMPONENT A: Inhalation of 500 ppm for a short duration may cause irritation of the nose and throat. Humans exposed to 160 ppm for 4 hours experienced delayed symptoms of slight flushing of the face and slight bronchial tightness. A burning sensation, wheezing and laryngitis may also occur. Exposure to high concentrations may cause delayed coughing with bloody sputum, nausea, vomiting of blood or bile-like substance, chest or abdominal pain, headache, dizziness, dyspnea or tachypnea, low blood pressure, rapid pulse, shock, respiratory depression, weakness, paralysis, confusion, delirium, convulsions, unconsciousness, coma, and death due to central nervous system depression. Exposure of pregnant hamsters to 5000 to 8000 ppm on the 8th day of gestation resulted in fetal axial skeletal disorders and maternal toxicity and mortality.

Inhalation - Chronic Exposure

PROPRIETARY COMPONENT B: No data available. CARBON, ACTIVATED: Repeated or prolonged exposure may cause irritation, weight loss, weakness, pulmonary edema, decreased pulmonary function, and eventual lung damage. METAL FUME FEVER: There is no form of chronic metal fume fever, however, repeated bouts with symptoms as described above are quite common. Resistance to the condition develops after a few days of exposure, but is quickly lost in 1 or 2 days. PROPRIETARY COMPONENT A: Workers exposed 2 days to vapors containing 30-40% exhibited effects as described in acute inhalation. Other symptoms may include anorexia, profuse sweating, hypersalivation, rigidity of the neck, urinary frequency, low urine output, and albuminuria. Autopsies revealed generalized vascular congestion. Repeated exposure of animals to vapors caused pulmonary inflammation, liver and blood changes, cerebral hemorrhage, focal emphysema, and proliferation of alveolar septa.

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Inhalation - Other Toxicity Information

ALUMINUM, METALLIC, POWDER: May cause irritation with coughing and shortness of breath. Exposure to freshly formed fumes of aluminum may result in metal fume fever. See information on metal fume fever. Prolonged or repeated exposure to large concentrations of fine dust may cause emphysema, bronchial asthma and pulmonary fibrosis characterized by coughing, sputum production, weakness, anorexia, basal crackles, dyspnea, pneumothorax, and cardiac failure. Radiographic and pathological changes in the lungs may occur. The lung disease may be rapidly progressive, irreversible, and fatal. Bacterial infection may cause progression of the lung disease. A few rare cases of encephalopathy have been reported from occupational exposure; symptoms included mental deterioration and seizures. In sensitive individuals, aluminum may exacerbate asthma. Epidemiological studies of aluminum production have reported increased incidences of lung, bladder, and other cancers among exposed workers. However, the causative agents for these cancers have not been determined.

Skin Contact - Acute Exposure

PROPRIETARY COMPONENT B: May cause irritation. CARBON, ACTIVATED: May cause irritation. ALUMINUM, METALLIC, POWDER: May cause irritation by abrasion. PROPRIETARY COMPONENT A: Contact may cause irritation. Skin absorption may occur resulting in systemic toxicity as detailed in acute inhalation.

Skin Contact - Chronic Exposure

PROPRIETARY COMPONENT B: No data available. CARBON, ACTIVATED: Repeated or prolonged contact may cause mechanical irritation. ALUMINUM, METALLIC, POWDER: May cause dermatitis with itching. Rarely, sensitization reactions have been reported. Vascular changes in the skin and congestive numbness of the fingers have been reported from occupational exposure. PROPRIETARY COMPONENT A: Repeated or prolonged exposure may cause dermatitis.

Eye Contact - Acute Exposure

PROPRIETARY COMPONENT B: May cause irritation. CARBON, ACTIVATED: Contact with dust may cause irritation. ALUMINUM, METALLIC, POWDER: May cause irritation due to abrasion and corneal necrosis. Intraocular aluminum deposits in human eyes have been well tolerated for several years without injurious effect, except occasionally slight depigmentation of adjacent iris. A low-grade uveal inflammation with posterior synechias, partial atrophy of the iris, and small opacities in the lenses and pigmentation of the fundus was reported in rabbits from intraocular deposits. PROPRIETARY COMPONENT A: Vapors and liquid may cause irritation and tearing. Application of a drop to rabbit eyes cause superficial reversible damage; graded 5 on a scale of 1 to 10 after 24 hours.

Eye Contact - Chronic Exposure

PROPRIETARY COMPONENT B: Repeated or prolonged exposure to irritants may cause conjunctivitis. CARBON, ACTIVATED: Repeated or prolonged contact may cause irritation. ALUMINUM, METALLIC, POWDER: Capillary changes in the conjunctiva were observed in workers of one aluminum plant. PROPRIETARY COMPONENT A: Repeated or prolonged exposure to irritants may cause conjunctivitis.

Ingestion - Acute Exposure

PROPRIETARY COMPONENT B: No data available. CARBON, ACTIVATED: Ingestion of large amounts may cause gastrointestinal irritation with nausea, vomiting, and stomach pain. ALUMINUM, METALLIC, POWDER: Large doses may cause gastrointestinal irritation, vomiting and diarrhea. Aluminum is poorly absorbed and may decrease absorption of other substances. Neurotoxic effects may occur in persons with impaired kidney function or chronic renal failure. PROPRIETARY COMPONENT A: Ingestion of sufficient amounts may cause systemic toxicity as detailed in acute inhalation. Acute oral doses to rats produced labored breathing, ataxia, cyanosis, and coma. Reproductive effects have been reported in animals.

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Ingestion - Chronic Exposure

PROPRIETARY COMPONENT B: No data available. CARBON, ACTIVATED: No data available. ALUMINUM, METALLIC, POWDER: Animals with a diet of 340 ppm showed decreased growth in 2nd and 3rd generations. PROPRIETARY COMPONENT A: Oral administration of 275 mg/kg to hamsters on days 6-19 of gestation caused some maternal deaths, reduced body weight in dams, early absorptions, and postimplantation losses.

*** Section 12 - ECOLOGICAL INFORMATION***

Component Analysis - Aquatic Toxicity

No LOLI ecotoxicity data are available for this product's components.

*** Section 13 - DISPOSAL CONSIDERATIONS***

Disposal Methods

Dispose in accordance with all applicable regulations.

Component Waste Numbers

The U.S. EPA has not published waste numbers for this product's components.

*** Section 14 - TRANSPORT INFORMATION***

US DOT Information

No Classification assigned.

TDG Information

No Classification assigned.

ADR Information

No Classification assigned.

ADR Tunnel Code Restrictions

This list contains tunnel restriction codes for those substances and/or chemically related entries which are found in chapter 3.2 of the ADR regulations.

CARBON, ACTIVATED (7440-44-0)

D/E [UN1361] (PG II); E [UN1361] (PG III); E [UN1362]

ALUMINUM (7429-90-5)

D/E [UN1396] (PG II); E [UN1309]; E [UN1396] (PG III)

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RID Information

No Classification assigned.

IATA Information

No Classification assigned.

ICAO Information

No Classification assigned.

IMDG Information

No Classification assigned.

* * * Section 15 - REGULATORY INFORMATION * * *

U.S. Federal Regulations

This material contains one or more of the following chemicals required to be identified under SARA Sections 302/304 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), and/or require an OSHA process safety plan.

ALUMINUM (7429-90-5)

SARA 313: 1.0 % de minimis concentration (dust or fume only)

SARA Section 311/312 (40 CFR 370 Subparts B and C)

Acute Health: No Chronic Health: No Fire: No Pressure: No Reactive: No

U.S. State Regulations

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS #	CA	MA	MN	NJ	PA	RI
CARBON, ACTIVATED (¹related to: Graphite, synthetic)	7440-44-0	No	No	No	No	Yes¹	Yes
ALUMINUM	7429-90-5	Yes	Yes	Yes	Yes	Yes	Yes

Not regulated under California Proposition 65

Component Analysis - Inventory

Component	CAS #	US	MITI	KOREA
CARBON, ACTIVATED	7440-44-0	Yes	No	Yes
ALUMINUM	7429-90-5	Yes	No	Yes

U.S. Inventory (TSCA)

All the components of this substance are listed on or are exempt from the inventory.

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*** Section 16 - OTHER INFORMATION***

Key / Legend

ACGIH - American Conference of Governmental Industrial Hygienists; ADR - European Road Transport; AU - Australia; BOD - Biochemical Oxygen Demand; C - Celsius; CA - Canada; CAS - Chemical Abstracts Service; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CN - China; CPR - Controlled Products Regulations; DFG - Deutsche Forschungsgemeinschaft; DOT - Department of Transportation; DSL - Domestic Substances List; EEC - European Economic Community; EINECS - European Inventory of Existing Commercial Chemical Substances; EPA - Environmental Protection Agency; EU - European Union; F - Fahrenheit; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; ICAO - International Civil Aviation Organization; IDL - Ingredient Disclosure List; IDLH - Immediately Dangerous to Life and Health; IMDG - International Maritime Dangerous Goods; JP - Japan; Kow - Octanol/water partition coefficient; KR - Korea; LEL - Lower Explosive Limit; LOLI - List Of Lists™ - ChemADVISOR's Regulatory Database; MAK - Maximum Concentration Value in the Workplace; MEL - Maximum Exposure Limits; NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health; NJTSR - New Jersey Trade Secret Registry; NTP - National Toxicology Program; NZ - New Zealand; OSHA - Occupational Safety and Health Administration; PH - Philippines; RCRA - Resource Conservation and Recovery Act; RID - European Rail Transport; RTECS - Registry of Toxic Effects of Chemical Substances®; SARA - Superfund Amendments and Reauthorization Act; STEL - Short-term Exposure Limit; TDG - Transportation of Dangerous Goods; TSCA - Toxic Substances Control Act; TWA - Time Weighted Average; UEL - Upper Explosive Limit; US - United States

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