

Material Safety Data Sheet (MSDS)

1. PRODUCT IDENTIFICATION

Product series	: CXHP,CXP,CHV,CHQ,CHW,CHP,CHT,CSP,CZP,CHM,CHMV,CMZ
Product Identifier	: Super Capacitor, Ultracapacitor
Synonyms	: Electrical double-layer Capacitor
Manufacturer	: Taiwan Zhifengwei Technology Co., Ltd.
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2. HAZARDS IDENTIFICATION

※ This product is a solid article consisting of an opaque plastic and metal sealed case, which is filled with an electrolyte solution that has been almost completely adsorbed and or absorbed by the activated carbon layers. If the contents of these EDLCs remain sealed in the outer shell and they are kept uncharged, persons handling these products will avoid most of the risks associated with hazardous components of the electrolyte. As such, precautions should be taken to avoid rupture or overheating the sealed metal containers.

Disposal Hazards	: Solid waste will be produced when discarded, and it is not easy to decompose in the natural state.
Environmental Hazards	: E-waste produced during disposal will pollute the environment and must be recycled.
Physical and Chemical Hazards	: The electrolyte contained in it will burn at high temperature (fire).
Special Hazard	: When the supercapacitor is used under high temperature, overvoltage, overcurrent, reverse voltage, etc., the explosion-proof valve of the capacitor will open, and high-temperature gas and liquid will splash out, which will burn the eyes and skin, and irritate the respiratory tract.
The main symptoms	: Weakness, weakness, pale complexion, nausea, vomiting, abdominal pain, diarrhea, chest tightness, and chest pain; in severe cases, respiratory and circulatory system disorders, shallow, slow and irregular breathing, decreased blood pressure, thin and slow pulse, decreased body temperature, and paroxysmal convulsions ,coma.

3. COMPOSITION AND INGREDIENTS

Chemical Name	CAS#	Content (%wt)	Classification for components (EC/1272/2008)
Activated Carbon	7440-44-0	5~30%	Not available
Aluminum	7429-90-5	30~70%	T; R48/23-25
Cellulose	9004-34-6	1~5%	Not available
5-Azoniaspiro-[4,4]-nonane-tetrafluoroborate (SBP-BF4)	129211-47-8	3~15%	Not available
Acetonitrile (ACN)	27522	10~25%	F, Xn; R11, R20/21/22, R36
Other substances	Not available	2~10%	Not available

4. FIRST AID INFORMATION

Skin Exposure	:	Remove contaminated clothing, wash skin thoroughly with soap and water. If you feel unwell and symptoms worsen, seek medical attention.
Eye Exposure	:	If electrolyte comes into contact with eyes, rinse carefully with water for several minutes. If wearing contact lenses, remove them at your convenience and continue flushing. If eye irritation persists, seek medical attention. Seek medical attention immediately if the capacitor pins come into contact with eyes and cause accidental injury.
Inhalation	:	When the main body is damaged, a small amount of liquid will flow out and a slight irritating smell will be produced. When inhaled, leave the scene quickly, transfer the patient to a place with fresh air, and keep the respiratory tract unobstructed. If you feel unwell, seek medical attention immediately.
Ingestion	:	Mouth should be rinsed out and seek medical attention immediately.
Electric Shock	:	For the victim who is shocked by electric equipment, the rescuer can only contact the victim after removing the victim from the relevant equipment with insulating tools. If the shock causes respiratory arrest, perform cardiopulmonary resuscitation (CPA) immediately and contact a medical institution at the same time. If the victim's heart stops, qualified personnel should immediately administer CPR and use an automatic electrical shock device (AED)

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media	:	Alcohol-resistant foam, dry powder, carbon dioxide, sand and other fire extinguishing materials; water (only for cooling and when the product is not charged).
Unsuitable extinguishing media	:	No data.
Fire Instructions and Special Hazards	:	The capacitor contains a small amount of electrolyte and is adsorbed in activated carbon, and there is almost no free electrolyte. Under normal storage, use, and transportation conditions, the capacitor burns. However, if it is heated continuously for a long time, the sealed capacitor casing will explode and may cause the device to burn, and the internal materials will undergo thermal decomposition to produce toxic gases (such as nitrogen oxides, carbon dioxide, hydrocyanic acid, hydrogen fluoride and other fluorides, borides, etc.).
Special protection and equipment for firefighters	:	Self-contained air breathing apparatus, protective gloves, fire suits, etc., goggles and wear when necessary. Wear chemical protective clothing. Fight fire from a safe distance or from a protected location. Unnecessary personnel must be in a safe location. Keep away from sources of ignition and extinguish fire with fire extinguishing facilities. If fire occurs in adjacent area, move containers to a safe place immediately.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Avoid heat, flame and other sources of ignition. Personnel must wear appropriate protective equipment (such as self-contained positive pressure respirators and anti-virus clothing), avoid direct contact with liquid and gas emitted from the capacitor, and avoid contact with eyes and skin or inhalation. Keep unrelated people away from the scene, isolate the dangerous area and prohibit personnel from entering.
Environmental precautions	:	The leakage of liquid from inside the capacitor should be prevented; the leakage should not be discharged directly into rivers and sewers.
Clean-up methods and materials	:	Absorb the leaked liquid with sand or other non-combustible materials, collect it in a suitable container, and hand it over to a manufacturer qualified for hazardous waste disposal. Clean up the ground exposed to the spill with detergent and water.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling:

- (1) Before use, the polarity of the capacitor should be confirmed, reverse polarity use will lead to performance degradation.
- (2) When using, do not touch the terminals of the capacitor to prevent electric shock.
- (3) In the process of electrification, do not use conductors to short-circuit the positive and negative terminals of the capacitor.
- (4) During the electrification process, do not use conductive aqueous solution such as acid or alkali to cause a short circuit.
- (5) Use at rated temperature.
- (6) Do not expose to ozone, ultraviolet rays and radiation;
- (7) The precautionary measures in this MSDS and the special instructions for use of the product provided by the manufacturer should be followed.

7.2 Storage conditions and use environment:

Capacitors should be stored in a dry and well-ventilated environment with a temperature of 5°C~35°C and a humidity below 75%, avoiding direct sunlight. Keep away from water, acid, alkali and harmful gas.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Occupational Exposure limits:

Chemical Name	OSHA	ACGIH	Biological exposure index
Activated Carbon	TWA=5mg/m3(resp)	Not available	Not available
Aluminum	TWA=15mg/m3(Total), TWA=5mg/m3(resp)	Not available	Not available
Cellulose	TWA=15mg/m3(Total), TWA=5mg/m3(resp)	TWA=10mg/m3	Not available
SBP-BF4	Not available	Not available	Not available
Acetonitrile	TWA=20ppm	TWA=20ppm	Not available
Other substances	Not available	Not available	Not available

8.2 Facility Measures: Use machines or local exhaust ventilation where possible.

8.3 Protective Equipment:

- (1) Respiratory protective equipment: Wear a gas mask.
- (2) Hand protective equipment: Wear anti-corrosion protective gloves.
- (3) Eye protection equipment: Wear goggle-type protective glasses.
- (4) Skin and body protective equipment: Wear protective clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

State of matter:	Solid	Vapor Pressure:	No data
Color:	Multiple colour	Vapor Density:	No data
Odor:	Tasteless	Specific gravity (density):	No data
PH value:	No data	Solubility:	Insoluble in water
Melting point/freezing point:	No data	Partition coefficient: n-octanol/water:	No data
Initial boiling point and boiling range:	No data	Decomposition temperature:	No data
Flash point:	No data	Other data:	—
Upper/lower flammability or explosion limits:	No data		

10. STABILITY AND REACTIVITY

Stability	:	Stable at normal temperature and pressure
Possibility of a hazardous reaction	:	Under improper use conditions, the explosion-proof valve of the capacitor may open, and a small amount of pungent odor and toxic gas will be released, which will cause discomfort when inhaled, and the leakage is flammable.
Conditions to avoid	:	Avoid contact with water/heat/sparks/open flames/acids and alkalis.
Incompatible material	:	Combustible, volatile.
Hazardous decomposition products	:	When the capacitor ruptures due to overheating, overvoltage, or impact, the internal materials may decompose, producing corrosive, pungent odor, and toxic gases.

11. TOXICOLOGICAL INFORMATION

Acute toxicity	Activated carbon:	Oral administration: Rat ld50 > 2,000 mg/kg
		Leather: No data
		Inhalation: No data
	Aluminum:	Oral: Rat ld50 > 15,900 mg/kg (fumed alumina; extrapolated)
		Leather: No data
		Inhalation: Rat lc50 > 0.888 mg/l/4hr (analytical)
	Cellulose:	Oral: Rat ld50 > 5,000 mg/kg
		Dermis: Rabbit ld50 > 2,000 mg/kg
		Inhalation: Rat lc50 > 5,800 mg/m ³ /4hr
	SBP-BF4:	Oral: Rat ld50 = 300-500 mg/kg
		Leather: No data
		Inhalation: No data
Acetonitrile:	Oral: Rat ld50 =300 mg/kg	
	Dermis: Rat ld50 =2080 mg/kg	
	Inhalation: Rat ld50 =6.02 mg/l/4hr	
Skin corrosion/irritation	Activated carbon:	No data
	Aluminum:	No data
	Cellulose:	No data
	SBP-BF4:	Non-irritating to rabbits
	Acetonitrile:	Negative test results in rabbits
Serious eye damage/eye irritation	Activated carbon:	No data
	Aluminum:	No data
	Cellulose:	No data
	SBP-BF4:	No data
	Acetonitrile:	According to the test results on rabbits: Strong irritant
Respiratory sensitization	Activated carbon:	No data
	Aluminum:	No data
	Cellulose:	No data
	SBP-BF4:	No data
	Acetonitrile:	No data
Skin sensitization	Activated carbon:	No data
	Aluminum:	No data
	Cellulose:	No data
	SBP-BF4:	No data
	Acetonitrile:	No data
Germ cell mutagenicity	Activated carbon:	No data
	Aluminum:	No data
	Cellulose:	No data
	SBP-BF4:	The Ames test was negative. Chromosomal aberration tests were negative.
	Acetonitrile:	The result of somatic cell mutagenicity test in vivo in animals is positive
Carcinogenicity	Activated carbon:	No data
	Aluminum:	No data
	Cellulose:	No data
	SBP-BF4:	No data
	Acetonitrile:	No data
Reproductive toxicity	Activated carbon:	No data
	Aluminum:	No data
	Cellulose:	No data
	SBP-BF4:	No data
	Acetonitrile:	No data
Aspiration hazard	Activated carbon:	Dust hazard
	Aluminum:	Dust hazard
	Cellulose:	Dust hazard
	SBP-BF4:	No data
	Acetonitrile:	No data

12. ECOLOGICAL INFORMATION

12.1 Hazard to the aquatic environment

Fish	: Activated carbon: 96hr-LC50 (zebrafish) > 100 mg/L Aluminum: 96hr-LC50 (minnow) > 218.64 mg/L SBP-BF4: LC50 (rainbow trout, 96h) >100 mg/L Acetonitrile: LC50 (orange-red killifish, 96h) >100 mg/L
Invertebrates	: Activated carbon: 48hr-EC50 (Magna flea) > 100 mg/L SBP-BF4: EC50 (Daphnia magna, 48h) 120 mg/L Acetonitrile: 48hr-LC50 (Magna flea) = 3600 mg/L
Seaweed	: Activated carbon: 72hr-EC50 (freshwater algae) > 100 mg/L SBP-BF4: EC50 (seaweed growth inhibition test) >100 mg/L Acetonitrile: 72hr-EC50 (Thalassiosira pseudonana) = 3560 mg/L

12.2 Persistence and degradability

SBP-BF4: Difficult to degrade.
Acetonitrile: Low persistence.

12.3 Habitual accumulation

SBP-BF4: low cumulative
Acetonitrile: No data available.

13. DISPOSAL CONSIDERATIONS

13.1 When the supercapacitor is discarded, it should be disposed of by a waste disposal company approved by the local government, or it should be treated according to the EIAJ-2364 standard.

13.2 If the supercapacitor does not break the seal, there is a danger of explosion if burned.

13.3 The outer casing of the supercapacitor must be burned at high temperature, if it is burned at low temperature, chlorides will be produced.

14. TRANSPORT INFORMATION

UN Classification	: UN3499, <10Wh, Non-Hazardous Goods, (Not subjected to US DOT or IATA regulations)
Invertebrates	: —
Packaging	: It can be packed in carton or plastic box, and it should not be damaged by strong machinery to avoid deformation of the capacitor.
Special precautions	: Verify that containers are not broken or leaking. Do not collapse or drop container. Care must be taken during loading and unloading not to damage the container and to ensure that the collapse of the cargo pile is prevented. Avoid direct radiation.

15. REGULATORY INFORMATION

Acetonitrile	
EU Classification	: According to EC/1272/2008 Symbols: F, Xn
Hazard statements, including risk phrases	: R11: Highly flammable. R20/21/22: Harmful by inhalation, in contact with skin and if swallowed. R36: Irritating to eyes.
Security phrase	: S16: Keep away from ignition sources at all times - no smoking. S36/37/39: Wear suitable protective clothing, gloves, goggles and face shield.

16. OTHER INFORMATION**16.1 Documentation Information**

File Name:	Supercapacitor Material Safety Data Sheet (MSDS)
File No:	MSDS-CDA-V03
Revision:	V03
Revision Date:	2023.08.05
Prepared Department:	Super Capacitor Division, R&D

16.2 Abbreviations and acronyms:

CAS# = Chemical Abstracts Service number
OSHA = European Agency for Safety and Health at work
ACGIH = American Conference of Government Industrial Hygienists

16.3 Key literature reference and sources for data:

1. Standard EIAJ-2364
2. Standard EIAJ RCR-2367
3. Emergency Response Guidebook 2008

16.4 About mention contents:

The information contained herein is based on data available to us, which we believe to be correct. However, Taiwan Zhifengwei Technology Co., Ltd. does not make any express or implied guarantees for the accuracy of these data or the consequences of using these data. Taiwan Zhifengwei Technology Co., Ltd. will not bear any responsibility for the damage caused by the use of the products described in this article.