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In the event of a chemical related emergency contact CHEMTREC
immediately!

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Section 1: Company Identification

Manufacturer:

Valence Technology, Inc.

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Preparation Date

08/09/01

Revision Date

01/29/09

Section 2: Product Summary and Detail

2.1 Product Detail

Product Name (Generic)	Lithium-ion Battery Packs, Lithium-ion Cells
Commercial Names	U-Charge Batteries: U1-12RT, U1-12RTL, U1-12XP, U24-12RT, U24-12XP, U27-12RT, U27-12XP, UEV-12XP IFR18650C
Nominal Voltage	12V, 19V, 3.2V
Nominal Capacity	40Ah, 65Ah, 100Ah, 130Ah, 1.35Ah
Chemical System	Lithium-iron Phosphate / Carbon
Designed for Recharge	Yes
Packing Requirements	Packing Group II
UN Number	UN3480 (UN3090 for US Ground Shipments)

2.2 Composition and Ingredient Information

Chemical Name	CAS #	Exposure Limits	Percent of Content
Lithium Iron Magnesium Phosphate ¹ .	349632-76-4	0.19 mg/kg/h (TWA) 10.50 mg/m ³ (OEL)	20-35%
Carbon Black ¹ .	1333-86-4	3.5 mg/m ³ (TWA) 3.5 mg/m ³ (OEL)	1-5%
Graphite	7782-42-5	None Listed	5-15%
Lithium hexafluorophosphate in mixed carbonate solvents	Mixture	None Listed	5-15%

Notes:

1. Some components present in the battery are registered on EPA's Toxic Substance Control Act (TSCA) Inventory List. TLV – Threshold Limit Value; TWA – Time Weighted Average; OEL – Occupational Exposure Limit



The battery should not be opened or burned or otherwise exposed to fire or high heat. Do not disassemble, open, crush, puncture, incinerate, short across the terminals or install with incorrect polarity. The batteries are incompatible with water, moisture, oxidizing agents, reducing agents, acids and bases. Exposure to the ingredients contained within or their discharge/combustion products could be harmful under some circumstances. The materials in this section may only represent any hazard if the integrity of the battery is compromised or if the battery is physically or electrically abused.

This battery is an article pursuant to 29 CFR 1910.1200 and, as such, is not subject to the OSHA hazard communication standard requirement.

2.3 Physical and Chemical Properties

Physical State	Solid
Vapor Pressure (MMHg@ 20 DEG. C)	Not Applicable
Appearance	Battery, Battery Pack
Vapor Density (Air = 1)	Not Applicable
pH	Not Applicable
Solubility in Water	Insoluble
Relative Density (Water = 1)	Not Available
Water/Oil Distribution Coefficient	Not Applicable
Boiling Point	Not Applicable
Odor Type	Odorless
Melting Point	Not Applicable
Odor Threshold	Not Applicable
Viscosity	Not Applicable
Evaporation Rate (n-Butyl Acetate = 1)	Not Applicable
Oxidizing Properties	Not Applicable
Auto Ignition Temperature (DEG. C)	Not Applicable
Flash Point and Method (DEG. C)	Not Applicable
Flammability Limits (%)	Not Applicable

Section 3: Exposure Controls and personal Protection

3.1 Engineering Controls

Use local exhaust ventilation or other engineering controls to control sources of dust, mist, fume and vapor.

3.2 Personal Protection

Not required during normal handling. Where protective clothing when handling an open, or leaking battery.

3.3 Respiratory Protection

Not required during normal handling. Where concentration may exceed OSHA/ACGIH permissible limits, use approved respiratory protection.

3.4 Protective Gloves

Not required under normal conditions. Wear nitrile gloves if handling an open or leaking battery they are more chemically resistant than latex gloves. Neoprene or natural rubber gloves can be used if nitrile gloves are not available.

3.5 Eye Protection

Not required under normal conditions. Wear safety glasses or side shields if handling an open or leaking battery.

3.6 Other Protective Equipment/Work Practices

Handle with care. Do not short positive and negative terminals. Do not eat, drink or smoke in work areas. Maintain good housekeeping practices in the work area to promote safety.

Section 4: Health Hazards Identification

Class of division is 9. This product is safe under normal use. The battery should not be opened or burned. Exposure to the ingredients contained within and/or their combustion products could be harmful.

These chemicals are contained in a sealed enclosure. Risk of exposure occurs only if the battery is mechanically, thermally or electrically abused to the point of compromising the enclosure. If this occurs, exposure to the battery electrolyte solution within can occur by inhalation, ingestion, eye contact and skin contact.

In the event of exposure to the battery contents the following potential health effects could occur.

- **Acute effects** - Vapor or mist is irritation to the eyes, mucous membranes and Respiratory tract. Can cause eye and skin irritation. Exposure can cause nausea, dizziness and headache. The electrolyte solution contained within the battery would be corrosive and can cause burns.
- **Chronic effects** - Overexposure may cause reproductive disorder(s) based on tests with laboratory animals. Target organs affected could be kidneys, central nervous system, eyes, and male reproductive system.

Section 5: First Aid Measures

5.1 Inhalation

Inhalation of material from a sealed battery is not an expected route of exposure. Vapors or mists from a compromised battery may cause respiratory irritation. If contents of an opened battery are inhaled, remove source of contamination and move victim to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration and obtain medical attention.

5.2 Eye Contact

Only contact with the contents of an opened battery can cause severe irritation or burns to the eye. If eye contact with contents of an open battery occurs, immediately flush the contaminated eye(s) with copious amounts of water (or normal saline) for at least 15 minutes.

Assure adequate flushing of the eyes by separating the eyelids with finger and thumb. If irritation or pain persists, seek medical attention.

5.3 Skin Contact

Contact between the skin and battery will not cause harm. Contact with the contents of an opened battery, mainly the electrolyte solution can cause severe irritation or burns to the skin. Immediately flush thoroughly with soap, or mild detergent and copious amounts of water until no evidence of substance remains (typically 15-20 minutes). Remove and wash contaminated clothing promptly. If irritation or pain persists, seek medical attention.

5.4 Ingestion

Swallowing of a sealed battery is not an expected route of exposure. In the event that swallowing of materials from a compromised battery occurs, serious chemical burns of the mouth, esophagus, and gastrointestinal tract can occur. If swallowed, wash out mouth with water provided person is conscious. Quickly transport victim to an emergency care facility.

Section 6: Fire Fighting Measures

6.1 Flammable Properties

In the event that this battery has been ruptured, the electrolyte solution contained within the battery **WILL BE** flammable. Like any sealed container, battery cells may rupture when exposed to excessive heat and could result in the release of flammable or corrosive materials.

6.2 Extinguishing Media

Use water, carbon dioxide, dry chemical or appropriate foam to extinguish fire.

6.3 Special Fire Fighting Procedures

Fires involving lithium batteries can be controlled with water. When water is used, however, hydrogen gas may evolve. In a confined space, hydrogen gas can form an explosive mixture. In this situation, smothering agents are recommended to extinguish the fire. Ruptured cells may emit irritating and/or toxic fumes under fire conditions.

6.4 Protective Equipment and Precautions for Firefighters

Wear NIOSH/MSHA approved self-contained breathing apparatus (SCBA) and protective clothing when fighting chemical fires.

Section 7: Accidental Release Measures

7.1 Personal Precautions

Restrict access to contaminated area until completion of clean-up. **DO NOT** touch the spilled material. Wear suitable protective clothing, nitrile gloves, eye/face protection and respirator with filters for dust particles.

7.2 Environmental Precautions

DO NOT let product enter drainage system, surface and/or ground-water and soil. Do not flush down sewers or waterways. Consult federal, state or local authorities for disposal procedures.

7.3 Methods for Containment

Stop the spill if safe to do so. Contain the spilled liquid with dry sand, earth or approved spill absorber. Clean up spills immediately.

7.4 Methods for Clean Up

1. Wear full protective clothing to prevent direct contact with the skin as well as nitrile gloves and eye protection and respiratory protection when dealing with spilled battery material.
2. Soak up the spilled material with inert absorbent material such as dry sand or earth or a commercial absorbing agent to avoid dispersing dust into the air or use a wet-down procedure or a heap-vacuum.
3. Collect all absorbent material and dispose of per section 8.
4. Once the area is clear of absorbent material be sure to wash the surface with plenty of water and detergent. Do not let the contaminated water enter the sewer or drain system.
5. Consult federal, state or local authorities for disposal procedures. Depending on quantity, location and status of user, materials may be considered a hazardous waste product.

Section 8: Disposal Considerations

8.1 Waste Disposal Method

Battery recycling is encouraged. Do not dump into any sewers, on the ground or into any body of water. Store material for disposal as indicated in Section 7 handling and storage. Dispose of in accordance with local, state and federal laws and regulations.



NOTE: All hazardous waste containing material from Valence Batteries or Cells should be disposed of in a licensed facility.

Section 9: Handling and Storage

9.1 Handling

Do not open, disassemble, crush or burn battery. Do not expose battery to extreme heat or fire. Wear suitable protective clothing, nitrile gloves, eye/face protection and respirator for dust.

9.2 Storage

When not being used, store battery in cool, dry, and well-ventilated area. Avoid storing in or near excessive heat. Elevated temperatures can result in shortened battery life. Keep out of reach of children.

- **Room Ventilation:** Cool, dry and well-ventilated area
- **Special Precautions:** Do not store near sources of ignition due to carbon black
- **Recommended Temperature:** Room temperature, not to exceed 75°C. Temperatures exceeding 60°C could reduce shelf life and service life.
- **Humidity, Light and other Environmental Factors:** Room parameters
- **Other Storage Precautions:** Keep containers properly labeled. Do not allow battery terminals to be shorted.
- **Damaged Batteries:** Do not store damaged or compromised batteries. Dispose of damaged batteries per section 8 as soon as possible.

Section 10: Transport Information

When transporting or moving the battery within your installation, please follow the guidelines below.

- Avoid heavy vibration during transportation.
- Avoid throwing, rolling and excessive stacking during loading and transportation.
- Make sure that all cables and external connectors are disconnected and removed from the battery prior to moving it.

If the product needs to be shipped to a different location or sent back to Valence Technology, Inc for any reason, please follow the guidelines below carefully.

1. Disconnect all cables, both power and communications from the batteries.
2. Pack the batteries in “dangerous goods” certified boxes and packaging materials as specified by the Department of Transportation (DOT). The packaging must protect the contents from reasonable handling damage and prevent short circuits from taking place
3. The package should be prepared for shipment and shipping documents should be signed by an individual who is certified to handle and prepare products that have been designated as “Dangerous Goods” for shipment.
4. For international air and ocean shipments, ship under regulations UN3480, Class 9 - “Dangerous Goods”. For United States ground shipments, use UN3090, Class 9 – “Dangerous Goods”.

Section 11: Stability and Reactivity

Valence batteries are stable under normal usage.

11.1 Conditions to Avoid

Avoid exposing the battery to fire or high temperature. Do not disassemble, open, crush, puncture, incinerate, short across the terminals or install with incorrect polarity. Avoid

mechanical or electrical abuse. The batteries are incompatible with water, moisture, oxidizing agents, reducing agents, acids and bases.

11.2 Incompatible Materials

Organic solvents.

11.3 Hazardous Decomposition Products

This material may release toxic fumes if burned or exposed to fire and release hydrogen fluoride, carbon monoxide, carbon dioxide and phosphorous oxide fumes.

11.4 Hazardous Polymerization

Will not occur.

Section 12: Toxicological Information

Not applicable under normal conditions of use. Chemicals within the battery have organic carbonates (electrolyte) vapors and are categorized as corrosive, flammable and irritants.

12.1 Irritation

Risk of irritation occurs only if the battery is mechanically, thermally or electrically abused to the point of compromising the enclosure. If this occurs, irritation to the skin, eyes and respiratory tract may occur.

12.2 Skin Sensitization

No information is available at this time.

12.3 Neurological Effects

No information is available at this time.

12.4 Teratogenicity

No information is available at this time.

12.5 Reproductive Toxicity

No information is available at this time.

12.6 Mutagenicity (Genetic Effects)

No information is available at this time.

12.7 Toxicological Synergistic Materials

No information is available at this time.

Section 13: Ecological Information

Not applicable to this material / product.

Section 14: Regulatory Information

USA: This MSDS meets or exceeds the OSHA requirements.

Canada: This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

International: This MSDS conforms to the European Union (EU), the International Standards Organization (ISO), and the International Labour Organization (ILO) and as documented in American National Standards Institute (ANSI) Standard Z400.1-1993.

Section 15: Other Information

The information in the Material Safety Data Sheet meets the requirements of the United States Occupational Safety and Health Act and the regulations promulgated thereunder (29 CFR 1910.1200 et. seq.). Valence Technology neither represents nor warrants that the format and content contained in this document complies with the laws of any other country except the United States of America.

Read all precautionary information. This document is intended only as a guide to the appropriate precautionary handling of this product by a person trained in, or supervised by a person trained in, chemical handling. Exposure to chemicals present in this product may have serious adverse health effects. Valence Technology cannot warn of all the potential dangers of use or interaction with other chemicals or materials. The user is responsible for determining the precautions and dangers of this product for his or her particular application.

The information provided in this MSDS is provided in good faith and, to the best of our knowledge, the information provided in this MSDS document is correct. We do not assume any

liability for consequences of the use of this information since it may be applied under conditions beyond our control or knowledge.

As newly documented general safety information becomes available, Valence Technology will periodically revise this Material Safety Data Sheet. If you have any questions, or require an updated MSDS, please call Valence Technology (512) 527-2900 for assistance. You can also visit us on the web at www.valence.com.

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