NREL
NATIONAL RENEWABLE ENERGY LABORATORY

Safety Hazards of Batteries

Battery technology is at the heart of much of our technological revolution. One of the most prevalent rechargeable batteries in use today is the Lithium-ion battery. Cell phones, laptop computers, GPS systems, IPods, and even cars are now using Lithium-ion rechargeable battery technology. In fact, you probably have a Lithium-ion battery in your pocket or purse right now!

Although Lithium-ion batteries are very common, there are some inherent dangers when using **ANY** battery. Lithium cells are like any other technology – if they are abused and not used for their intended purposes, catastrophic results may occur, such as: first, second, and third degree burns, respiratory problems, fires, explosions, and even death. Please handle the Lithium-ion batteries with care and respect.

User Safety Precautions

- **Short-circuiting: When the battery is not in use, you MUST disconnect the battery from the battery connector. When the battery is connected to the battery connector, do NOT leave it unattended. If the two wires with the alligator clips can touch, the battery will quickly heat up. *Short-circuiting will damage the battery and generate heat that can cause burns.***
- Do not leave the battery in the charger once it is fully charged. The battery charger will flash on and off with a red indicator light every 20 seconds when the battery is fully charged.
- Disassembly: Never disassemble a battery, as the materials inside may be toxic and may damage skin and clothes.
- Throwing batteries into a fire or water: Disposing of a battery in fire can cause the battery to rupture. Also avoid placing batteries in water, as this may cause the battery to fail.
- Soldering: Never solder anything directly to a battery. This can destroy the safety features of the battery by damaging the safety vent inside the cap. Permanent connections to an energy cell may be made by spot welding solder tags to the terminals. A soldered connection can subsequently be made to the tag.
- Charging: Never charge with an unspecified charger or specified charger that has been modified. This can cause breakdown of the battery, swelling, or rupturing.
- Never attempt to charge a battery which has been physically damaged.

- Overcharging at high currents and reverse charging: Never reverse charge or overcharge with high currents (i.e. higher than rated). Doing so causes rapid gas generation and increased gas pressure, thus causing batteries to swell or rupture.

- Charging: Do not leave the battery in the charger once it is fully charged.

- Installation in equipment with airtight battery compartments: Always avoid designing airtight battery compartments. In some cases, gases, such as oxygen or hydrogen, may be given off. This creates the danger of the batteries bursting or rupturing in the presence of a source of ignition (sparks generated by a motor switch, etc.).

- Use of batteries for other purposes: Do not use a battery in an appliance or purpose for which it was not intended. Differences in specifications can damage the battery or appliance.

- Using old and new batteries together: Avoid using old and new batteries together. Also avoid mixing batteries using differing cell chemistries such as ordinary dry-cell batteries, Ni-Cd, NiMH batteries or with another manufacturer's batteries. Differences in various characteristic values can cause damage to the batteries or the product.

Safety Procedures

- If the foil packaging on the battery does break, vent the room and leave immediately.

- If a fire starts, call the fire department immediately. The only extinguisher that will work on a Lithium-ion Battery fire is a Class D Fire Extinguisher or Dry Sand or Dry Table Salt.

Disposal of Batteries

Lithium ion batteries are found in many electronics like laptops, digital cameras, power tools and cordless phones. These batteries are very popular because they can be recharged and because of their ability to supply power for long periods of time.

However, even lithium ion batteries reach a point where they can no longer hold a charge and need to be disposed of. When this time comes, it is important to know how to recycle the battery, and not simply put it in a trash can. Read the information found at the following link to determine your state's recycling policy:
http://www.call2recycle.org/recycling-laws.php?c=1&d=322&e=619&w=9908&r=Y

There are many reasons to recycle these batteries rather than throw them away where they may end up in a regular landfill. One of which is because they enter the solid waste stream and can contaminate soil and water. Please check with your school on its policy of recycling of batteries.