## LITHIUM BATTERY CALCULATIONS

### How to Calculate Watt Hours

**Packing Instructions: 965, 966, 967**

To conform to Section II requirements:
- MAX Lithium per cell 20Wh
- MAX Lithium per battery 100Wh

Batteries and cells above these limits must conform to Section I requirements, ship as Class 9.

The calculation used to determine watt hours is:

\[
\text{Volts} \times \text{ampere hour (Ah)} = \text{watt hours}
\]

Example, if the battery you wish to ship is rated at 11.1 volts and 4,400 mAh per cell:

- 4,400 mAh is 4,400 milliamperes. Since most batteries have a low ampere hour ratings, they are rated in milliamperes per hour (mAh), one thousandth of an ampere hour (Ah).
- Since a milliamperere hour is one thousandth of an ampere hour, divide 4,400 mAh by 1000 to get ampere hours (Ah).
  \[4,400 \text{ mAh} ÷ 1000 = 4.4 \text{ Ampere hours}\]

To determine the watt hours in this battery, multiply 11.1 volts by 4.4 ampere hours:

\[11.1 \text{ V} \times 4.4 \text{ Ah} = 48.8 \text{ Wh}\]

### How to Calculate Lithium Content

**Packing Instructions: 968, 969, 970**

If you do not have enough information to determine the lithium content of a battery, the following formulas will assist you:

To conform to Section II requirements:
- Max 1g per cell
- 2g max per battery

Batteries and cells above these limits must conform to Section I requirements, ship as Class 9.

The calculation used to determine lithium content is:

- Many batteries are not rated in Ampere hours (Ah), they are rated in milliamperere hours (mAh). Milliamperere hours are one thousandth of an ampere hour. To determine the Ah, divide the mAh by 1000.
- It requires about 0.3 grams of lithium metal to produce 1 Ampere hour of power.

Example, if the battery you wish to ship is rated at 2,500 mAh per cell and contains 6 cells:

- Divide 2,500 mAh by 1,000 to get the rating in Ampere hours:
  \[2,500 \text{ mAh} ÷ 1000 = 2.5 \text{ Ah}\]
- Multiply the Ah by 0.3 gm to determine the amount of Lithium in each cell:
  \[2.5 \times 0.3 \text{ gm} = 0.75 \text{ grams of lithium in each cell}\]
- Multiply the amount of lithium in each cell by the number of cells in each battery:
  \[0.75 \text{ grams/cell} \times 6 = 4.5 \text{ grams of lithium in the battery}\]

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