



BATTERY (LITHIUM or SODIUM) CALCULATIONS

How to Calculate Watt Hours

Packing Instructions: 965, 966, 967, 976

To conform to Section II requirements:

- MAX Lithium/Sodium per cell 20Wh
- MAX Lithium/Sodium 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:

$$\text{Volts x ampere hour (Ah) = watt hours}$$

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 milliampere hours. 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 milliampere hour is one thousandth of an ampere hour, divide 4,400 mAh by 1000 to get ampere hours (Ah).

$$4,400 \text{ mAh} \div 1000 = 4.4 \text{ Ampere hours}$$

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/Sodium Content

Packing Instructions: 968, 969, 970, 977, 978

If you do not have enough information to determine the lithium/sodium 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/sodium content is:

$$\text{Ah per cell x 0.3 gm x number of cells}$$

- Many batteries are not rated in *Ampere hours (Ah)*, they are rated in *milliampere hours (mAh)*. Milliampere hours are one thousandth of an ampere hour. To determine the Ah, divide the mAh by 1,000.
- 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:

$$2,500 \text{ mAh} \div 1,000 = 2.5 \text{ Ah}$$

- 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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