Lithium ion battery minimum voltage

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I understand that the first line means, that the battery will always give 3.7V (at least in theory) at its output terminal. Also the battery will last for 1 hour if the mobile circuitry draw 1000mA.

The second line means that under no circumstances I should increase the input charging voltage beyond 4.2V, else it might damage the battery.

Is my understanding correct? If I am correct I would like to know for this battery what is the minimum required voltage for charging?

Technically the minimum amount of voltage for charging will be anything above the current state of charge. But that"s probably not the answer you"re looking for, from Lithium-ion battery on Wikipedia:

Lithium-ion is charged at approximately 4.2 ? 0.05 V/cell except for "military long life" that uses 3.92 V to extend battery life. Most protection circuits cut off if voltage greater than 4.3 V or temperature greater than 90 ?C is reached. Below 2.50 V/cell the battery protection circuit may render the battery unchargeable with regular charging equipment. Most battery circuits stop at 2.7-3.0 V/cell.

So to achieve a full state of charge you"d normally want to aim at 4.2V. In practice charging Li-Ion safely and efficiently does involve quite a few steps so you may want to look at a dedicated charger chip. You"d need to check the datasheets for any that look of interest but many will operate properly with a supply voltage only a little above 4.2V.

To safely charge a lithium ion battery, you need to follow the correct charging procedure, which involves a constant-current phase followed by a constant-voltage phase. If you just use a constant-voltage source, you"ll end up charging the battery faster than it"s designed to cope with.

For instance, here"s a datasheet for one particular model of li-ion battery. To fully charge the battery, you need to eventually get it up to 4.2V. But if you just apply a 4.2V across it when it"s completely discharged, you"ll be putting 4.2V-2.75V=1.45V across a 130mOhm impedance. That means the charging current will be on the order of 10 amps, which is much higher than the battery is rated for. It"s specified with a maximum charging rate of "1C" or enough current to fully charge the battery in one hour, which in this case is 1.1A.

You need to actively limit the charging current by reducing the voltage, until the battery is sufficiently charged to self-limit. If you can"t find a datasheet for the exact model of battery that you"re using, you should err on the side of caution and charge it very slowly. Lithium-ion batteries are prone to catching fire or exploding if abused.

This is not an area I have much experience in, but I guess it depends on the internal resistance of the battery.

You could try to apply a small charging voltage to the battery, as small as you like, and then measure how much current flows into the battery. If current is flowing into the battery, it should be charging (minus some current which is wasted as heat in the charging process).

The current you can charge the battery with will depend on how charged the battery already is. I.e. if the battery is fully discharged, you can probably charge it with a very small voltage, but if it is almost fully charged, you will need a larger voltage. My intuition tells me that you will have to apply at least 3.7V if you want to charge the battery fully.

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