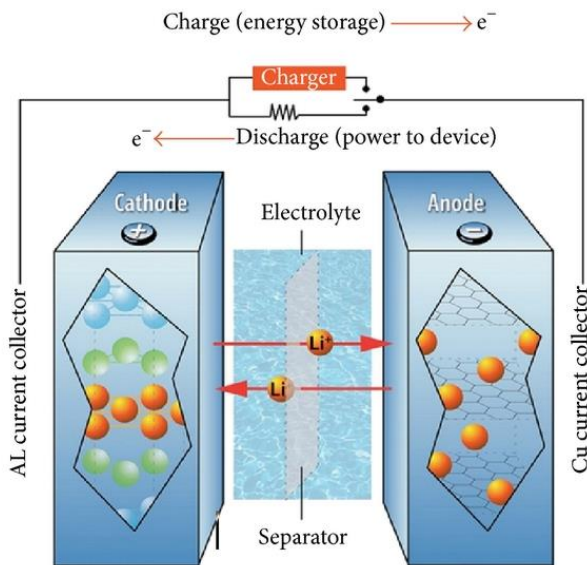


Abstract

Most phones in the modern-day use lithium ions batteries. In these batteries lithium ions move through an electrolyte. The ions will move between a negative electrode and the positive electrode over the discharge and charge cycles. Internal resistances changes inside of the battery at different temperatures. This causes a change to the efficiency of the battery and its charge rate. It is important to note that lithium ion batteries should be charged at temperature between 0°C to 45°C . Charging at below 0°C can cause permanent plating of the lithium. Batteries with lithium plating are more prone to failing if they are exposed to stressful conditions such as vibration. Charging above 45°C can decrease longevity. Gas generation at high temperatures creates swelling and damage in the battery cells.



Introduction

Cellphones are extremely common in the modern world. They are used for everything from waking us up to keeping us entertained.

Cellphones, however, must be powered.

People are always keen to have their phones at the highest battery life possible. In our

busy world, efficiency is a must. By finding the optimal temperature range to charge phones we can decrease the amount of time it takes a phone to charge. The experiment will focus on testing easily achieved temperatures that can be replicated by the common consumer. 1°C is the

temperature of a refrigerator. 20°C is room temperature. 37°C is the temperature of the human body.

Objectives

The objective of this experiment is to determine the best easily achieved temperature to charge a phone.

Materials

Cell Phone (LG Stylo 4)

Portable Charger

Procedure

The experiment will be conducted by charging the phone at 1°C, 20°C, 37°C. The charge of the battery will be recorded at the beginning of each test should be no more than 50% charged. The phone is set on a timer for 20 minutes at which time an alarm sounds and the phone is immediately disconnected from the charger. Once disconnected, the battery charge will be immediately recorded.

Results

Temperature	Test #1 Start	Test #1 End	Test #2 Start	Test #2 End	Test #3 Start	Test #3 End
1°C	23%	37%	37%	49%	21%	33%
20°C	33%	49%	5%	22%	22%	39%
37°C	15%	28%	25%	31%	31%	42%

Analysis

In the experiment it was found that the most ideal temperature and being at times more than 20% more efficient. This means that the ideal temperature to charge your phone at is room temperature. Some error that could come into play would be the smaller sample size as well as fluctuating battery life starting points. However, it is clear that room temperature would be both the most efficient and the easiest to reach.

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