Day 2 Discussion questions

Unit Question:Why do cell phone batteries sometimes overheat?

NAME: _____

PERIOD: _____ DATE: _____

Suggested Class Discussion Questions

Instead of verbatim responses, students should be allowed to grapple with these ideas. Accept answers that hover around the responses below. Ask additional questions to lead students to these responses, if possible.

a) Why is lithium considered to be the “beating heart” of these batteries?

b) How does the structure of the lithium atom contribute to its reactivity?

c) What happens to lithium ions during the charging process of a lithium-ion battery? Outline the steps involved as a class.

d) How do the processes occurring in a lithium-ion battery during charging and discharging illustrate the principles of redox reactions?

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Suggested Class Discussion Questions (answers key for reference)

e) Why is lithium considered to be the “beating heart” of these batteries?

Lithium is reactive, lightweight, and common, allowing it to effectively share electrons and store energy in batteries.

f) How does the structure of the lithium atom contribute to its reactivity?

The structure of lithium, with its outer electron further away from the protons, makes it more reactive compared to other elements like helium.

g) What happens to lithium ions during the charging process of a lithium-ion battery? Outline the steps involved as a class.

During charging, lithium ions are liberated from the cathode, travel through the electrolyte solution, and move towards the anode. A solvation shell surrounds lithium ions in the electrolyte solution, allowing them to move freely while maintaining charge balance.

h) How do the processes occurring in a lithium-ion battery during charging and discharging illustrate the principles of redox reactions?

In a lithium-ion battery, during charging, lithium ions are oxidized at the anode (losing electrons) and reduced at the cathode (gaining electrons). When discharging, the reverse occurs: lithium atoms at the anode release electrons (oxidation), and the nickel oxide at the cathode accepts those electrons (reduction), illustrating the redox principles.

What students should know at this junction:

a) Students should recognize that the potato is able to conduct electricity because it is a conduit, much like the solvent in the battery. It allows the ion to flow from the cathode to the anode

b) Batteries (see the potato battery lab) need three components to effectively complete its cycle. Two electrodes (one of which has a stronger desire for electrons) and one electrolyte. To stamp this knowledge throughout the lesson (salt water and fruit lab), ask students to identify these components in their setup.

c) A chemical reaction called oxidation-reduction reaction is taking place in this battery system. Students should be able to identify and outline this event.

d) For batteries to function effectively, there are primarily two processes, both involving oxidation-reduction (redox) reactions. One process is the generation of an electric current from a chemical reaction, and the other is the use of an electric current to produce a chemical reaction.