THE FARADAY INSTITUTION FutureCat

NEXT GENERATION LI-ION CATHODE MATERIALS

"Build a Battery" CLASSROOM CARD GAME - TEACHER'S DOCUMENT

This is a GCSE resource on electrochemistry. It builds on the GCSE specification with further information on electrochemical cells, batteries and materials. The resource covers aspects of electrochemistry, materials science and careers within the battery sector.

The educational resource is created by FutureCat, which is part of the Faraday Institution research community. The Faraday Institution is an independent institute for research into electrochemical energy storage.
For more information, you can visit the groups websites.
The Faraday Institution : https://www.faraday.ac.uk/
FutureCat: https://futurecat.ac.uk/

OVERVIEW OF RESOURCE CONTENTS

This is an educational card game that can be used with the whole class to support the learning of electrochemistry and include enrichment knowledge about battery technology and careers linked to batteries. Along with the game, there are two presentations.

Classroom Presentation

This is a presentation that covers chemical cells, batteries and the build a battery game for This presentation includes:

Introduction to Chemical Cells
Cathode and Reduction
Anode and Oxidation
Redox Reaction
Batteries and Chemical Cells
Introduction to the Build a Battery card game.
- Cards explained.
- Battery characteristics explained.
- Rounds.

Slide 2 - Introduction to the parts of a chemical cell.
Slide 3 - Cathode and reduction.
Slide 4 - Anode and oxidation.
Slide 5 - image of electron and ion flow in a chemical cell
Slide 6 - redox reaction definition
Slide 7- battery compared to a chemical cell, highlighting the similar components to both, so GCSE student can see the link visually
Slide 8 - Visual of the battery discharging, electrons powering a tablet
Slides 9 to 14 - introduction to the game and the types of battery building cards
Slides 15 to 19- introduction to the battery characteristics on the playing cards. It explains capacity, cyclability, sustainability, safety and cost.
Slide 20 - making the batteries with the playing cards.

Slide 21 - how to win. Teams will compete to make the best battery for a certain characteristic. If you have application cards you can use these, hand them out to students and they have the opportunity to try and fulfill the application card and then go through the rounds, while students win application cards till there are no more. Alternatively, the teacher can present an application card at the start, and go through rounds while student groups try to win application cards.
Slides 23 to 26 - listed a variety of different rounds for the students to distribute the cards around the classroom. As the teacher, you can decide which rounds you want to include. In a larger class it may be more appropriate to focus more on the rotation round. But a small class may find the opportunity to discuss card trading more enjoyable and would be faster with less groups.

STEM Club Presentation
The second presentation is a longer activity that aims to take up a whole lesson or to be used during lunchtime or after school STEM club. This activity uses the “Build a Battery” card game but focuses on electric vehicles. The students will use the cards to build a battery best suited for their type of electric car (for example performance and eco-friendly electric cars). This can also include the students designing the appearance of their car and producing a presentation explaining their design to the class.

The presentation is very similar to the classroom version. The start is identical, however, the electric cars are introduced later.

Slide 21 - electric cars and UK laws are introduced
Slide 22 to 26 - electric cars and images of examples of different sorts of electric cars
Slide 27- The challenge is introduced
Slide 28 - Selecting the type of electric car for the groups to select. However, as a teacher, you could distribute the types of electric cars within the groups.
Slide 29 to 33 - rounds to build the battery.
Slide 34 - Designing the electric car cars
Slide 35 - things to consider when designing the electric car
Slide 36 to 37 - examples of electric cars
Slide 39 - designing the presentation
Slide 40 - presentation time
Slide 41 - well done

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