

CLASSROOM WORKSHEET

Case Study 1: Vehicles of the future

Name: _____

Objective

- Learn how a hydrogen fuel cell works
- Operate a hydrogen fuel cell
- Discover how such a fuel cell can be integrated

Supports

- i-H2GO hybrid RC car

Resources

- Documentation and videos provided
- Online research

Time allocated

- Three hours

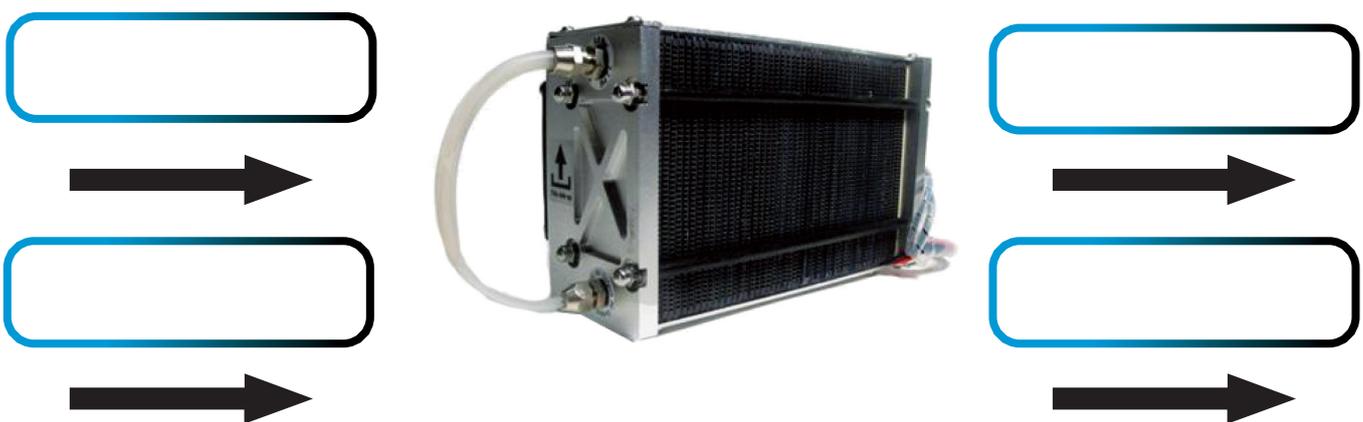


Part 1: How hydrogen fuel cells work

Resources

- Hydrogen fuel cell.wbem (video)
- Internet search engine

Complete the diagram below by filling in the boxes to show the main input and output materials of a hydrogen fuel cell. To find the right information, watch the provided video "Hydrogen Fuel Cell.wbem" and/or, if necessary, Google the question: "How does a hydrogen fuel cell work?"



Part 2: Main features and structure of the i-H2GO

Now let's take a look at the i-H2GO hydrogen hybrid RC car...



Resources

- <http://www.gizmag.com/i-h2go-fuel-cell-toy-car/28426/> (Article)
- "Introducing the i-H2GO car.webm"(Video)

Directions

- Quickly read through the the article and watch the video
- The car is described as the "World's most technologically advanced toy car" – what different kinds of technology are used in the i-H2GO?

- According to the article, what is the main thing that is new about the I-H2GO ?

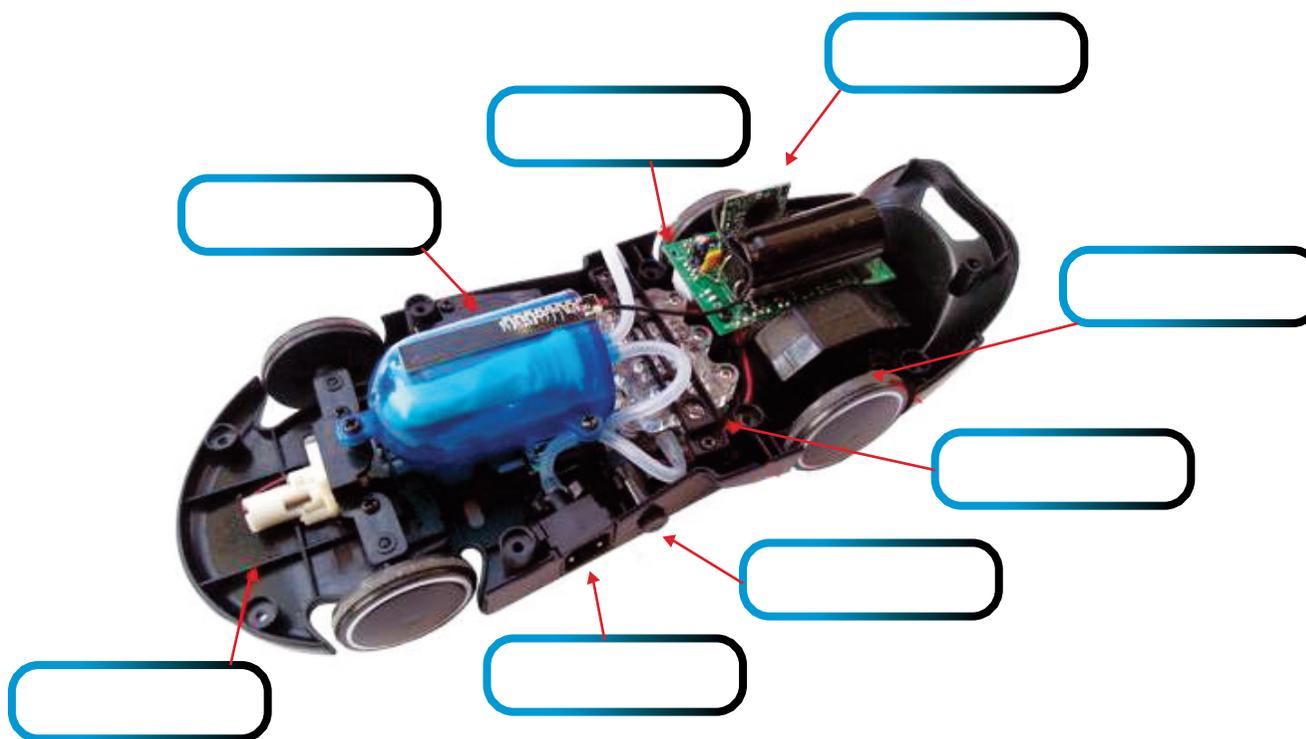
- Is the hydrogen produced on board the I-H2GO car ?
(If your answer is NO, explain where and how it is produced)

i-H2GO Worksheet: Part 2



FUELCELL
Store

Fill in the boxes below to correctly label the key components of the i-H2GO (you can use the i-H2GO features document to help).



Part 3: i-H2GO's guidance and communication system

In the documents and videos introducing the i-H2GO car, it is specified that it has to be guided by means of an smartphone or tablet.

- What is the name of the communication system used to guide the car by means of an I-phone or an I-pad? (Look in the "i-H2GO features" document)

Run researches on the internet to answer the following questions: (Use for example <http://www.bluetooth.com/Pages/Fast-Facts.aspx>)

Explain briefly how such a communication system work

- What is the range (distance) of this system?

- What is the frequency range ?

For the two following questions, use the "i-H2GO Features" document and the "i-H2GO User Manual".

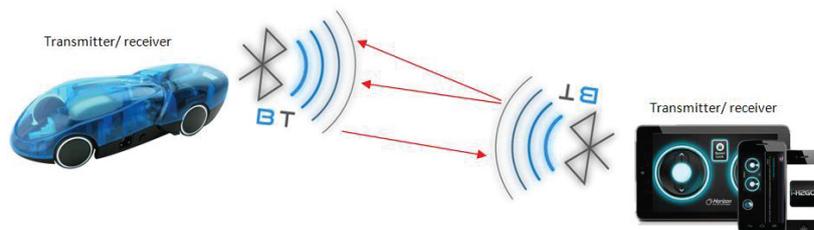
- Give the input and output data:

Flowing from the I-phone to the car

1. _____
2. _____

Flowing from the car to the I-phone

1. _____



- When trying to pair the two devices, which one must be detected first (which one is the network client ?)

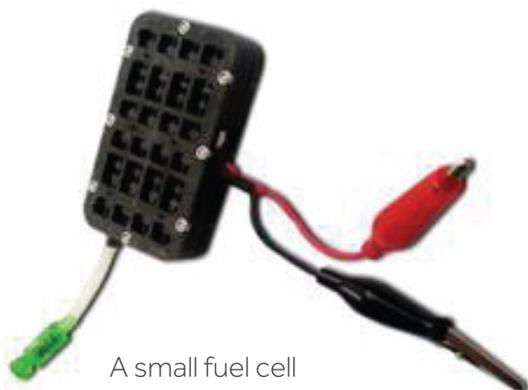
PART 4: Operating a hydrogen fuel cell and the i-H2GO car



CAUTION !

The equipment that you are going to use is very fragile!
Please use this equipment responsibly.

Equipment needed



A small fuel cell



A multimeter



A hydrogen producing station



Deionised water

Resources

- <http://www.gizmag.com/i-h2go-fuel-cell-toy-car/28426/> (Article)
- "Introducing the i-H2GO car.webm"(Video)

- Connect and run the hydrogen fuel cell

Measure the output voltage of the fuel cell
(make sure that the multimeter is set to DC Voltage)

- Research on the internet to find the supply voltage of:

- a LED (Light-Emitting Diode): _____
- a filament light bulb: _____
- an electrical toy engine: _____

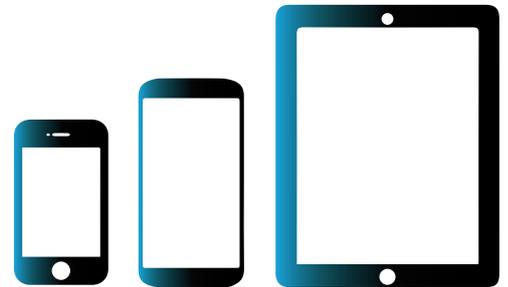
- What conclusions can you draw from you findings?

Connect the I-H2GO engine to the fuel cell and run a test to male sure that it runs.



Download the free i-H2GO app to your smartphone/tablet
(available on Google Play and the iTunes).

Operate the I-H2GO car making sure to follow
recommendations given in the user manual



- Measure and compare:

- the charging time of the car: _____
- the autonomy time of the car: _____
- Comments: _____

- If this system is used on a real car, what will be the main disadvantage for the owner?

- What could be done to fix the problem ?

PART 5: Current status of fuel cell research

- Would you say that hydrogen fuel cells are widely used in comparison with other energy technologies?

- Give a few examples of new technologies using hydrogen fuel cells:

- In your opinion, what will make hydrogen fuel cells become widely adopted across industry?
