

Cells Fuel Cells

GCSE Chemistry · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

A student makes cells using copper with different second metals. Predict which gives the biggest voltage: zinc, iron or magnesium. Explain. (2 marks)

Step 1 · Rule

The bigger the difference in reactivity between the two metals, the bigger the voltage.

Step 2 · Apply

Magnesium is the most reactive of the three, so magnesium with copper gives the biggest voltage.

Answer: Magnesium

Check: Copper is low in the series; magnesium is high.

2. Now try one with the steps

Explain why a non-rechargeable alkaline battery eventually stops working. (2 marks)

Step 1 · Chemistry

Step 2 · Stops

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. Describe what is meant by a chemical cell. [2]

2. State what a battery is. [1]

3. Give two factors that affect the voltage of a simple cell. [2]

4. Four 1.5 V cells are connected in series. Calculate the total voltage in volts. [1]

5. Explain why a non-rechargeable cell stops producing electricity. [1]
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6. Describe how a rechargeable cell is recharged. [1]
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7. Name the two substances supplied to a hydrogen fuel cell and the only product. [2]
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8. Write the overall balanced equation for the reaction in a hydrogen fuel cell. [1]
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9. Predict which pair of metals gives the larger voltage: magnesium and copper, or zinc and copper. Explain. [2]
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10. A data table gives zinc -0.76 V and copper $+0.34\text{ V}$. The cell voltage is the difference. Calculate the voltage in volts. [1]
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11. Give two advantages of hydrogen fuel cells compared with rechargeable batteries. [2]
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12. Give two disadvantages of hydrogen fuel cells. [2]
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13. Write the half equation at the negative electrode of an acidic hydrogen fuel cell. [1]
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14. Write the half equation at the positive electrode of an acidic hydrogen fuel cell. [1]
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4. Before you hand it in

"Fuel cells burn hydrogen."

Hydrogen is oxidised electrochemically, producing a voltage directly.

"Fuel cells cause no pollution at all."

Only water is made in the cell, but hydrogen production may use fossil fuels.

"Using the same metal twice gives a big voltage."

A cell needs two different metals; the bigger the difference, the bigger the voltage.