Candidate 3 evidence

Title
Electrochemical Cells

Aim
To investigate the effects of different metal pairings on voltage.

Underlying Chemistry
An electrochemical cell can be made by placing two different metals in an electrolyte solution. A voltage is produced when the circuit is completed by an electrically conducting path. Different metal pairings create different voltages. The higher the voltage the more energy produced. When looking at the electrochemical series the metals higher up the table lose their electrons easier than metals further down the table. When an electrochemical cell is made metals with a bigger gap between them on the electrochemical series will create a higher voltage. This is because the metal further up the series finds it easier to oxidise meaning it loses its electrons and the metal lower down the table reduces, this is where the metal gains electrons. As a metal oxidises it becomes a positive ion and when a metal ion is reduced it becomes a solid metal.

Experiment Method
After setting up the experiment different pairs of metals were placed in a beaker containing sodium chloride acting as an electrolyte. The voltage produced was measured by a voltmeter.

Experiment Data

Metal pairing	Attempt 1(Volts)	Attempt 2(Volts)	Attempt 3(Volts)	Average(Volts)
Copper+Zinc	0.9	0.91	0.89	0.9
Copper+Lead	0.4	0.37	0.36	0.38
Copper+Aluminium	0.62	0.6	0.6	0.6

Internet Source

	Magnesium -2.37	Zinc -0.76	Copper +0.34
Magnesium	0.00 V	1.61 V	+2.71
Zinc	-1.61 V	0.00 V	+1.10 V
Copper	2.71 V	-1.10 V	0.00 V

https://www.bbc.co.uk/bitesize/guides/z2396yc/revision/1

Analysis

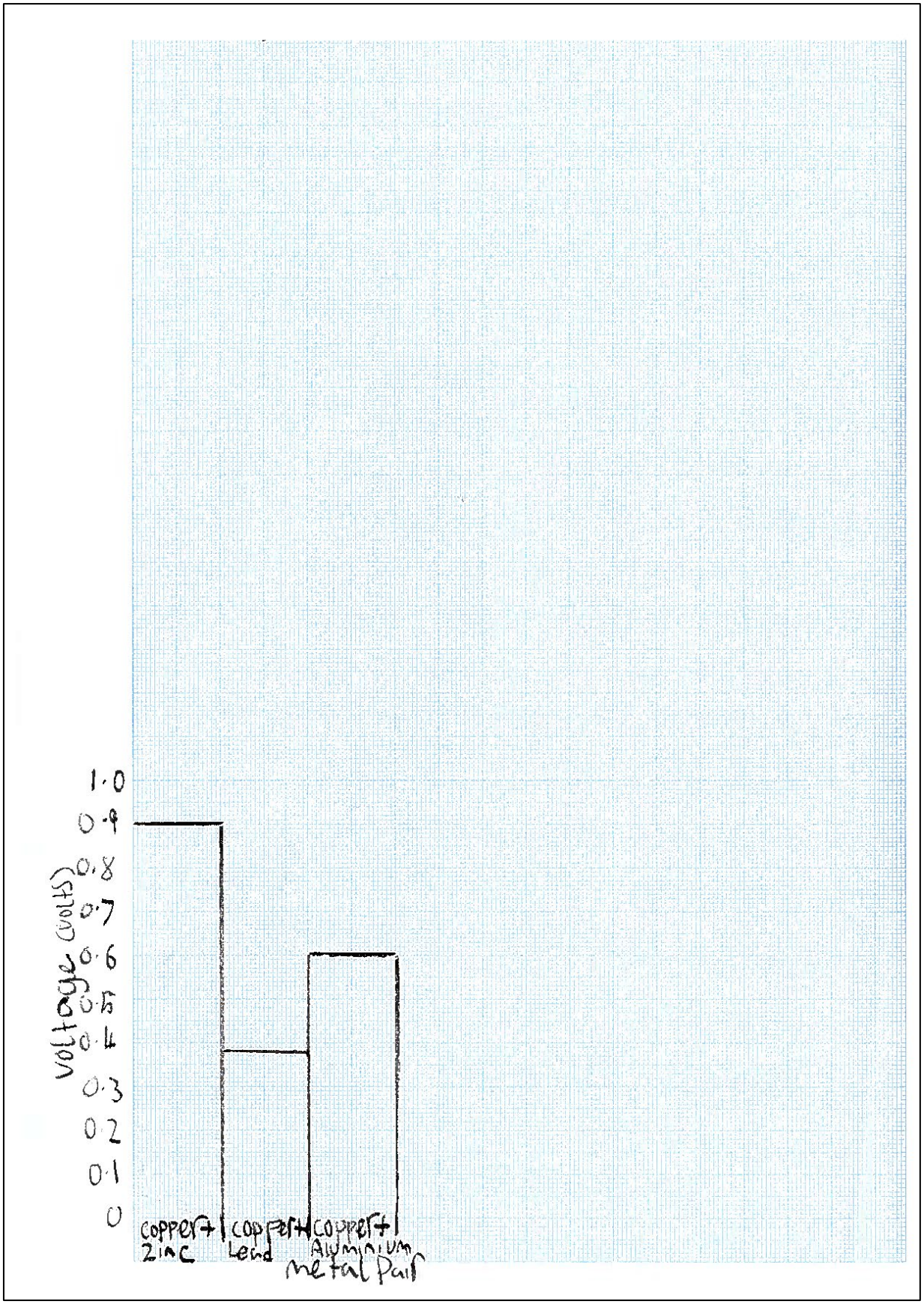
Both tables measure the voltage created by different metal pairings, the only comparison however that I am able to make is between Copper and Zinc as this is the only pairing on both tables. My copper and zinc pairing is lower than the pairing on the other table. My pairing is on average 0.2 volts less than the pairing from my source.

Conclusion

In conclusion metals further apart on the electrochemical series will create a higher voltage when paired in an electrochemical cell.

Evaluation

A factor that may have affected the accuracy of my experiment is that certain metals react with oxygen. for example, when copper is exposed to oxygen it begins to oxidise. This may have affected the reactivity of some of the metals because reactions had already begun.


Voltage (volts)
1·0
0·9
0·8
0·7
0·6
0·5
0·4
0·3
0·2
0·1
0
copper + zinc
copper + lead
copper + aluminium
metal pair