Questions

Q1.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

A chemical cell can be made by placing two metals into an electrolyte.

Figure 3 shows how the voltage of a simple chemical cell can be measured.

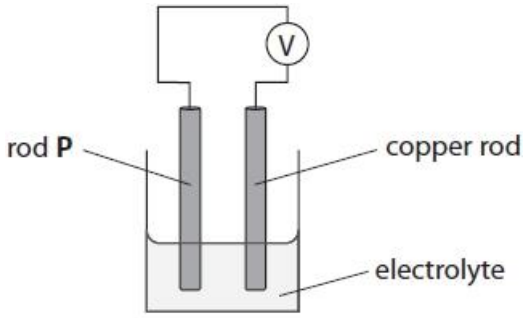

Figure 3

A student investigated how the voltage of this cell was affected by the metal used for the rods.

Which is the only variable that should be changed in the investigation?

(1)

- ☒ **A** the size of the beaker
- ☒ **B** the element used for rod **P**
- ☒ **C** the concentration of the electrolyte
- ☒ **D** the temperature of the electrolyte

(Total for question = 1 mark)

Q2.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Hydrogen and oxygen are reactants in some fuel cells.

Which word equation shows the overall reaction that occurs in these fuel cells?

(1)

- ☐ **A** hydrogen + oxygen → hydroxide
- ☐ **B** hydrogen + oxygen → sulfuric acid
- ☐ **C** hydrogen + oxygen → water
- ☐ **D** hydrogen + oxygen → hydrochloric acid

(Total for question = 1 mark)

Q3.

Many metals corrode.

When a metal corrodes

(1)

- ☐ **A** the metal reacts with nitrogen
- ☐ **B** the metal reacts with another metal
- ☐ **C** the metal element decomposes
- ☐ **D** the metal is oxidised

(Total for question = 1 mark)

Q4.

Transition metals and group 1 metals have many properties in common because they are all metals.

However some properties of transition metals are different from properties of group 1 metals.

Which is a property of transition metals but not of group 1 metals?

(1)

- ☒ **A** good conductor of electricity
- ☒ **B** high melting point
- ☒ **C** malleable
- ☒ **D** shiny when cut or polished

(Total for question = 1 mark)

Q5.

Objects made from transition metals are sometimes coated with a thin layer of another transition metal to improve their appearance and to protect against corrosion.

Figure 10 shows equipment that can be used to electroplate an iron spoon with silver.

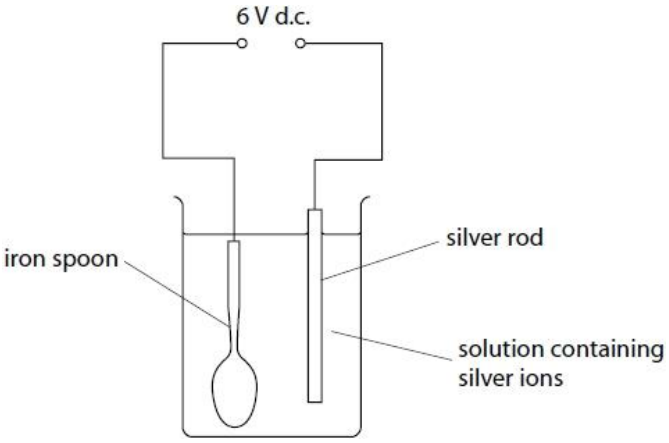

Figure 10

(i) Which row of the table correctly shows the charge on the silver rod electrode and the type of reaction occurring at this electrode?

(1)

	charge	type of reaction
☒ **A**	negative	oxidation
☒ **B**	negative	reduction
☒ **C**	positive	oxidation
☒ **D**	positive	reduction

(ii) Silver metal is deposited on the spoon.

Which half-equation represents this reaction?

(1)

☒ **A** $Ag + e \rightarrow Ag^+$

☒ **B** $Ag \rightarrow Ag^+ + e^-$

☒ **C** $Ag^+ + e \rightarrow Ag$

☒ **D** $Ag^+ \rightarrow Ag + e^-$

(Total for question = 2 marks)

Q6.

Alloy steels are made when iron is alloyed with other transition metals such as cobalt and chromium.

Which row of the table shows the typical properties of a transition metal?

(1)

	used as a catalyst	density	colour of metal chloride
☒ **A**	yes	high	colourless
☒ **B**	no	low	colourless
☒ **C**	yes	high	coloured
☒ **D**	no	low	coloured

(Total for question = 1 mark)

Q7.

The industrial production of sulfuric acid involves several steps.

One of these steps is the reaction of sulfur dioxide, SO_2, with oxygen to form sulfur trioxide, SO_3.

$$2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$$

What volume of sulfur trioxide, in dm^3, is produced by the complete reaction of 750 dm^3 of sulfur dioxide?

(all volumes of gases are measured under the same conditions of temperature and pressure)

(1)

☒ **A** 375.5
☒ **B** 750
☒ **C** 1125.5
☒ **D** 1500

(Total for question = 1 mark)

Q8.

Some questions must be answered with a cross in a box (☒). If you change your mind about an answer, put a line through the box (☒) and then mark your new answer with a cross (☒).

When iron wool reacts with oxygen from the air, the iron corrodes and iron oxide is formed.

What happens to the iron in this reaction?

(1)

- ☐ **A** it is decomposed
- ☐ **B** it is neutralised
- ☐ **C** it is oxidised
- ☐ **D** it is reduced

(Total for question = 1 mark)

Q9.

Some questions must be answered with a cross in a box (☒). If you change your mind about an answer, put a line through the box (☒) and then mark your new answer with a cross (☒).

A student wanted to find the volume of dilute hydrochloric acid that would react with 25.0 cm^3 of lithium hydroxide solution.

They used the equipment in Figure 7 to carry out a rough titration and then a further two accurate titrations.

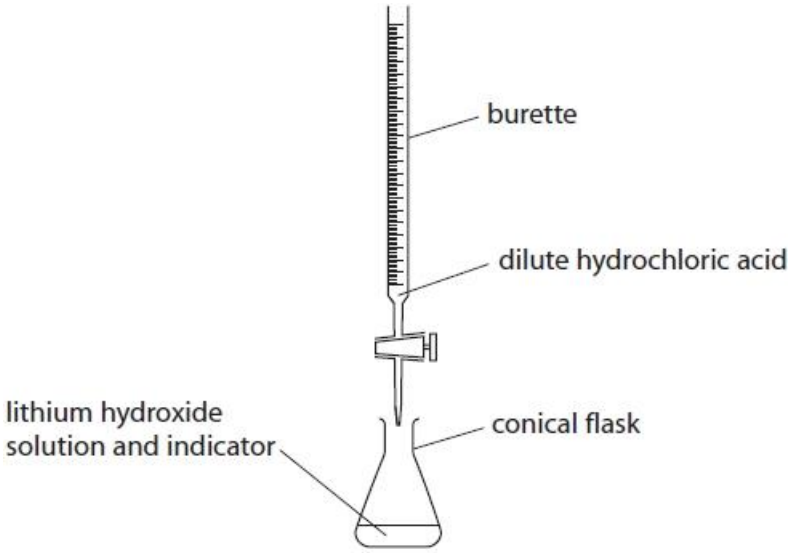

Figure 7

Figure 8 shows the results of the rough titration.

final reading on burette in cm^3	30.10
initial reading on burette in cm^3	2.50

Figure 8

What was the volume of acid added in the rough titration?

(1)

- ☒ **A** 2.50 cm^3
- ☒ **B** 27.60 cm^3
- ☒ **C** 30.10 cm^3
- ☒ **D** 32.60 cm^3

(Total for question = 1 mark)

Mark Scheme

Q1.

Question number	Answer	Mark
	B the element used for rod P is the only correct answer **A, C** and **D** are incorrect because the electrode material must be changed	**(1)** **AO2**

Q2.

Question number	Answer	Mark
	C hydrogen + oxygen → water is the only correct answer **A, B** and **D** are incorrect as water is the product	**(1)** **AO1**

Q3.

Question number	Answer	Mark
	D the metal is oxidised **A** is incorrect because the reaction is with oxygen **B** is incorrect because the reaction is with oxygen **C** is incorrect because the metal does not decompose	**(1)**

Q4.

Question number	Answer	Mark
	B high melting point The only correct answer is **B**. **A, C** and **D** are incorrect because good conductor of electricity, malleable and shiny when cut or polished, are properties of both transition metals and group 1 metals, not just transition metals.	**(1)**

Q5.

Question number	Answer	Mark
(i)	C	(1)

Question number	Answer	Mark
(ii)	C	(1)

Q6.

Question Number	Answer	Mark
	C yes high coloured **The only correct answer is C** ***A*** *is not correct because transition metal chlorides are coloured* ***B*** *is not correct because all properties are incorrect* ***D*** *is not correct because transition metals are used as catalysts and have a high density*	**(1)** AO 1 1

Q7.

Question Number	Answer	Mark
	B 750 **The only correct answer is B** ***A*** *is not correct because 375.5 dm³ is half the actual volume formed* ***C*** *is not correct because 1125.5 dm³is one and a half times the actual volume formed* ***D*** *is not correct because 1500 dm³ is double the actual volume formed*	**(1)** AO 2 1

Q8.

Question number	Answer	Mark
(i)	**C** it is oxidised is the only correct answer **A**, **B** and **D** are not correct as the reaction of iron with oxygen is an oxidation reaction	**(1)** **AO1-1**

Q9.

Question number	Answer	Mark
	B 27.60 is the only correct answer **A** is incorrect as this is the initial reading on the burette **C** is incorrect as this is the final reading on the burette **D** is incorrect as the values have been added rather than subtracted	**(1)** **AO2-1**