

Use of Amount of Sub; Masses

Pure Subs

Question Paper

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Chemistry
Exam Board	AQA
Topic	5.3 Quantitative Chemistry
Sub-Topic	Use of Amount of Sub; Masses Pure Subs
Difficulty Level	Gold Level
Booklet	Question Paper

Time Allowed: 31 minutes

Score: /29

Percentage: /100

Grade Boundaries:

Q1. Copper can be produced from copper(II) sulfate solution by two different methods.

Method 1 – Electrolysis

- (a) To produce copper by electrolysis a student has inert electrodes, a d.c. power supply, a switch and electrical wires for the external circuit.

Draw and label the apparatus set up to produce copper from copper(II) sulfate solution by electrolysis.

(2)

- (b) Suggest why the colour of the copper(II) sulfate solution fades during the electrolysis.

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(3)

- (c) Explain how copper is produced from copper(II) sulfate solution by electrolysis.

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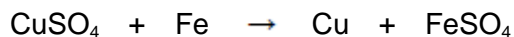
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(4)

Method 2 – Displacement

- (d) The chemical equation for the displacement of copper using iron is:



Calculate the minimum mass of iron needed to displace all of the copper from 50 cm³ of copper(II) sulfate solution.

The concentration of the copper(II) sulfate solution is 80 g CuSO₄ per dm³.

Relative atomic masses (*A_r*): O = 16; S = 32; Fe = 56; Cu = 63.5

Give your answer to 2 significant figures.

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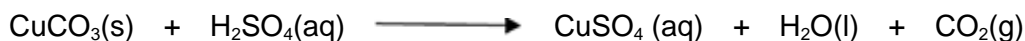
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Mass of iron = g

(4)
(Total 13 marks)

Q2. The salt copper sulfate can be made by reacting copper carbonate with dilute sulfuric acid.



- (a) Write a method that a student could use to prepare a pure, dry sample of copper

You do **not** need to write a risk assessment or include safety points.

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(6)

- (b) Calculate the **number of molecules** in 14 g of carbon dioxide.

Give your answer in standard form.

Relative atomic masses (A_r): C = 14; O = 16

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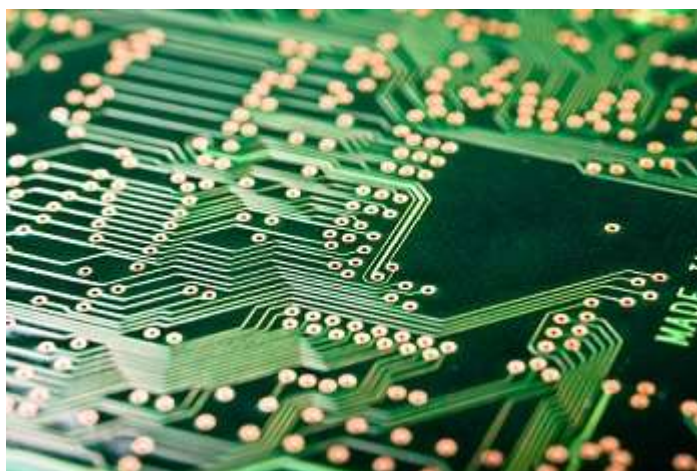
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Answer = molecules

(4)

(Total 10 marks)

Q3. Etching is a way of making printed circuit boards for computers.



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Printed circuit boards are made when copper sheets are etched using iron(III) chloride solution. Where the copper has been etched, only plastic remains.

- (a) Copper is a good conductor of electricity.

Explain why.

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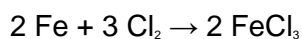
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(2)

- (b) Iron(III) chloride can be produced by the reaction shown in the equation:



- (i) Calculate the maximum mass of iron(III) chloride (FeCl_3) that can be produced from 11.20 g of iron.

Relative atomic masses (A_r): Cl = 35.5; Fe = 56.

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Maximum mass of iron(III) chloride = g

(3)

- (ii) The actual mass of iron(III) chloride (FeCl_3) produced was 24.3 g.

Calculate the percentage yield.

(If you did not answer part (b)(i) assume that the maximum theoretical mass of iron(III) chloride (FeCl_3) is 28.0 g. This is **not** the correct answer to part (b)(i).)

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Percentage yield =%

(1)

(Total 6 marks)

