

1. June/2022/Paper_11/No.14

The relative molecular mass, M_r , of liquid Z is 60. Z contains 40.0% carbon, 6.70% hydrogen and 53.3% oxygen.

Which row shows the correct empirical and molecular formulae of Z?

	empirical formula	molecular formula
A	CH ₂ O	CH ₂ O
B	CH ₂ O	C ₂ H ₄ O ₂
C	C ₂ H ₄ O ₂	C ₂ H ₄ O ₂
D	CH ₃ O	C ₂ H ₆ O ₂

2. June/2022/Paper_11/No.15

How many tonnes of aluminium oxide, Al₂O₃, are required to produce 27 tonnes of aluminium?

- A** 27 **B** 51 **C** 54 **D** 102

3. June/2022/Paper_12/No.13

What is the relative formula mass of anhydrous sodium carbonate?

- A** 51 **B** 83 **C** 106 **D** 124

4. June/2022/Paper_12/No.14

What contains the greatest mass of solute?

- A** 100 cm³ of 1.00 mol/dm³ sodium hydroxide, NaOH
B 500 cm³ of 0.05 mol/dm³ sulfuric acid, H₂SO₄
C 1.00 dm³ of 0.10 mol/dm³ potassium hydroxide, KOH
D 2.00 dm³ of 0.01 mol/dm³ hydrochloric acid, HCl

5. June/2022/Paper_12/No.15

How many tonnes of aluminium oxide, Al₂O₃, are required to produce 27 tonnes of aluminium?

- A** 27 **B** 51 **C** 54 **D** 102

6. June/2022/Paper_21/No.2(f)

(f) Calculate the volume, in dm^3 , of 19.2g of nitrogen at room temperature and pressure.

Give your answer to **two** significant figures.

volume dm^3 [3]

7. June/2022/Paper_21/No.5(b)

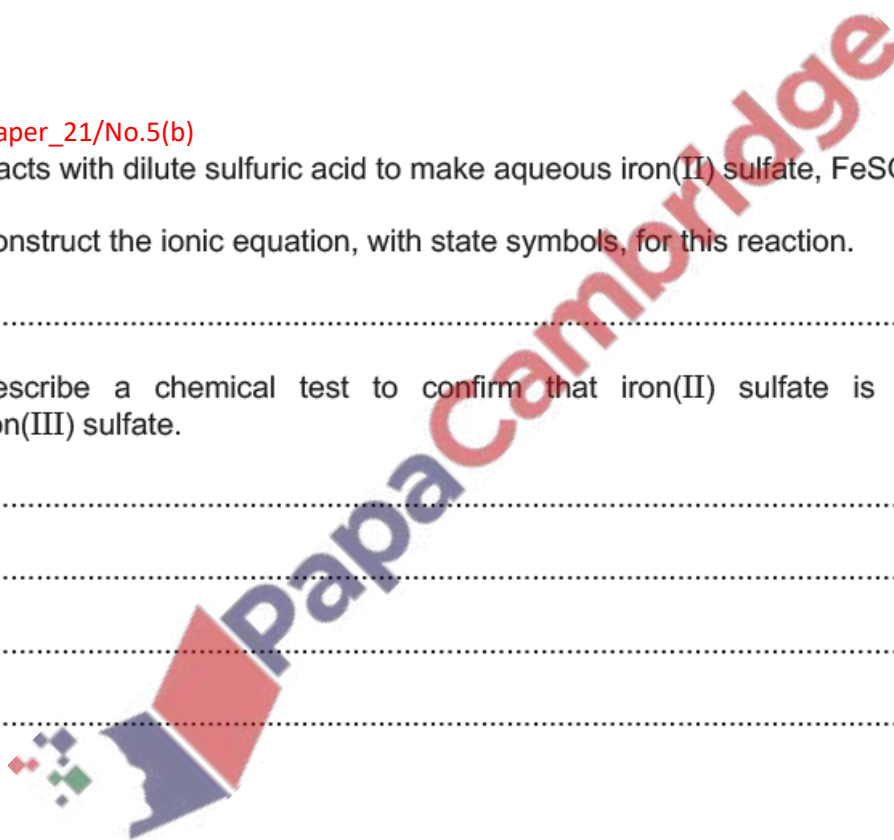
(b) Iron reacts with dilute sulfuric acid to make aqueous iron(II) sulfate, FeSO_4 .

(i) Construct the ionic equation, with state symbols, for this reaction.

..... [2]

(ii) Describe a chemical test to confirm that iron(II) sulfate is formed instead of iron(III) sulfate.

.....
.....
.....
.....
..... [2]



(iii) The aqueous iron(II) sulfate formed is crystallised to make hydrated iron(II) sulfate, $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$.

Calculate the relative formula mass of hydrated iron(II) sulfate.

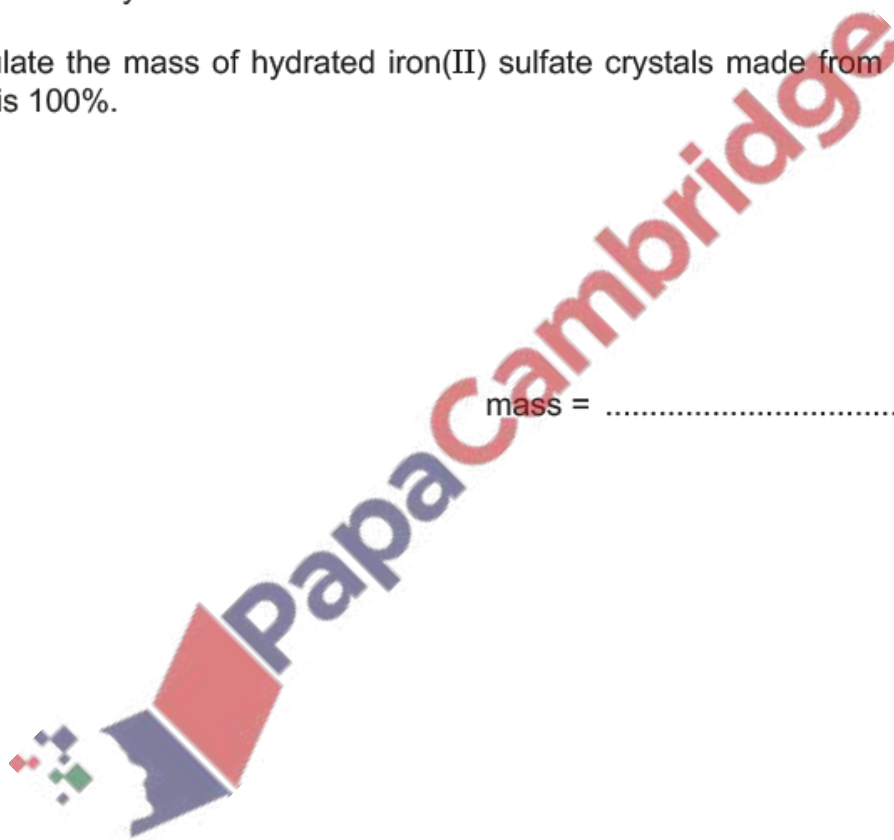
relative formula mass = [1]

(iv) A student uses 2.80 g of iron to make 12.5 g of hydrated iron(II) sulfate crystals.

This is a 90% yield.

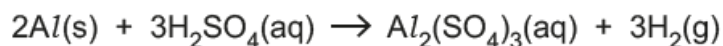
Calculate the mass of hydrated iron(II) sulfate crystals made from 2.80 g of iron if the yield is 100%.

mass =g [1]



8. June/2022/Paper_21/No.7(e)

(e) A sample of 2.34 g of aluminium is reacted with 50.0 cm³ of 2.00 mol/dm³ sulfuric acid.



Show by calculation that the aluminium is in excess in this reaction.

[3]

9. June/2022/Paper_21/No.8d(ii)

(ii) Compound X contains 85.7% carbon by mass and 14.3% hydrogen by mass.

Calculate, using the percentage composition data, the empirical formula of X.

Show your working.

State the molecular formula of X.

empirical formula

molecular formula

[3]

10. June/2022/Paper_22/No.2(f)

(f) Calculate the volume, in dm^3 , of 30.2g of oxygen at room temperature and pressure.

Give your answer to **two** significant figures.

volume dm^3 [3]

11. June/2022/Paper_22/No.6(c)

(c) The aqueous aluminium sulfate formed is crystallised to make hydrated aluminium sulfate, $\text{Al}_2(\text{SO}_4)_3 \cdot x\text{H}_2\text{O}$.

The relative formula mass of hydrated aluminium sulfate is 666.

Calculate the value of x in the formula $\text{Al}_2(\text{SO}_4)_3 \cdot x\text{H}_2\text{O}$.

$x =$ [2]

12. June/2022/Paper_22/No.8(d)

(d) A sample of 2.34 g of zinc is reacted with 50.0 cm³ of 2.00 mol/dm³ hydrochloric acid.



Show by calculation that the hydrochloric acid is in excess in this reaction.

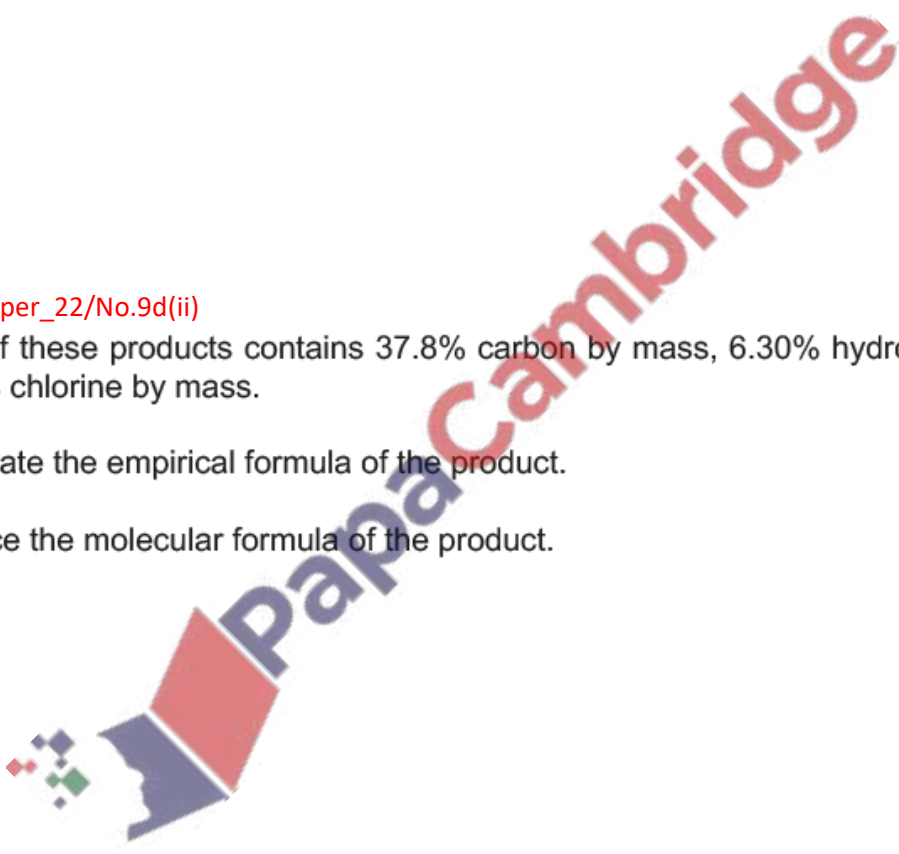
[3]

13. June/2022/Paper_22/No.9d(ii)

(ii) One of these products contains 37.8% carbon by mass, 6.30% hydrogen by mass and 55.9% chlorine by mass.

Calculate the empirical formula of the product.

Deduce the molecular formula of the product.



empirical formula

molecular formula

[3]