1 The relative molecular mass (M_r) of benzene-1,4-dicarboxylic acid is

A 164

B 166

C 168

C 170

(Total 1 mark)

2 What is the number of atoms in 0.0100 mol of NH_3?
(The Avogadro constant L = $6.022 \times 10^{23} mol^{-1}$)

A 6.02×10^{25} ⬭

B 1.20×10^{23} ⬭

C 1.81×10^{22} ⬭

D 2.41×10^{22} ⬭

(Total 1 mark)

3 2.40 g of an explosive, J, contains 0.473 g of nitrogen. J also contains 33.8% carbon and 1.41% hydrogen by mass. The remainder of J is oxygen.

What is the empirical formula of J?

A C_4HNO_2 ⬭

B CH_2N_2O ⬭

C C_2HNO_2 ⬭

D CHNO ⬭

(Total 1 mark)

4 After reaction of some zinc metal with excess sulfuric acid, a student collected 40.8 g of $ZnSO_4.7H_2O$ crystals. The yield of crystals was 70.0%.

What was the original mass of zinc used?

A 9.28 g ⬭

B 13.3 g ⬭

C 23.6 g ⬭

D 58.3 g ⬭

(Total 1 mark)

5 Which reaction has the largest atom economy for the production of hydrogen?

A $C + H_2O \longrightarrow CO + H_2$ ⬭

B $Zn + 2HCl \longrightarrow ZnCl_2 + H_2$ ⬭

C $CH_4 + H_2O \longrightarrow CO + 3H_2$ ⬭

D $CO + H_2O \longrightarrow CO_2 + H_2$ ⬭

(Total 1 mark)

6 What is the volume of 0.200 mol dm^{-3} $Ba(OH)_2$ (aq) required to neutralise exactly 30.0 cm^3 of 0.100 mol dm^{-3} HCl(aq)?

A 150.0 cm^3 ⬭

B 75.0 cm^3 ⬭

C 15.0 cm^3 ⬭

D 7.50 cm^3 ⬭

(Total 1 mark)

7 An organic compound is found to contain 40.0% carbon, 6.7% hydrogen and 53.3% oxygen.

Which of the following compounds could this be?

A Ethanol ⬭

B Ethanoic acid ⬭

C Methanol ⬭

D Methanoic acid ⬭

(Total 1 mark)

8 Which of the following contains the most chloride ions?

A 15 cm^3 of 3.40×10^{-2} mol dm^{-3} aluminium chloride solution ⬭

B 30 cm^3 of 5.50×10^{-2} mol dm^{-3} calcium chloride solution ⬭

C 40 cm^3 of 2.30×10^{-2} mol dm^{-3} hydrochloric acid ⬭

D 45 cm^3 of 2.20×10^{-2} mol dm^{-3} sodium chloride solution ⬭

(Total 1 mark)

9 In an experiment to identify a Group 2 metal (X), 0.102 g of X reacts with an excess of aqueous hydrochloric acid according to the following equation.

$$X + 2HCl \longrightarrow XCl_2 + H_2$$

The volume of hydrogen gas given off is 65 cm^3 at 99 kPa pressure and 303 K.
The gas constant is $R = 8.31$ J K^{-1} mol^{-1}.

Which is X?

A Barium ⬭

B Calcium ⬭

C Magnesium ⬭

D Strontium ⬭

(Total 1 mark)

10 A sample of 2.18 g of oxygen gas has a volume of 1870 cm^3 at a pressure of 101 kPa.

What is the temperature of the gas?
The gas constant is $R = 8.31\ J\ K^{-1}\ mol^{-1}$.

A 167 K ⬭

B 334 K ⬭

C 668 K ⬭

D 334 000 K ⬭

(Total 1 mark)

Mark schemes

1 B **[1]**

2 D **[1]**

3 C **[1]**

4 B **[1]**

5 C **[1]**

6 D **[1]**

7 B **[1]**

8 B **[1]**

9 B **[1]**

10 B **[1]**