

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 $L = 6.022 \times 10^{23} \text{mol}^{-1}$)

- 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 $\text{CH}_2\text{N}_2\text{O}$
- 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 $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ 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 $\text{C} + \text{H}_2\text{O} \rightarrow \text{CO} + \text{H}_2$

B $\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$

C $\text{CH}_4 + \text{H}_2\text{O} \rightarrow \text{CO} + 3\text{H}_2$

D $\text{CO} + \text{H}_2\text{O} \rightarrow \text{CO}_2 + \text{H}_2$

(Total 1 mark)

6

What is the volume of $0.200 \text{ mol dm}^{-3}$ $\text{Ba}(\text{OH})_2$ (aq) required to neutralise exactly 30.0 cm^3 of $0.100 \text{ mol dm}^{-3}$ 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 cm³ of 3.40×10^{-2} mol dm⁻³ aluminium chloride solution

B 30 cm³ of 5.50×10^{-2} mol dm⁻³ calcium chloride solution

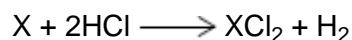
C 40 cm³ of 2.30×10^{-2} mol dm⁻³ hydrochloric acid

D 45 cm³ 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.



The volume of hydrogen gas given off is 65 cm³ at 99 kPa pressure and 303 K.

The gas constant is $R = 8.31 \text{ J K}^{-1} \text{ mol}^{-1}$.

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 cm³ at a pressure of 101 kPa.

What is the temperature of the gas?

The gas constant is $R = 8.31 \text{ J K}^{-1} \text{ mol}^{-1}$.

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]