Atoms, Amount, Equations & Reactions
Multiple Choice

Question Paper 2

Level	A Level
Subject	Chemistry
Exam Board	OCR
Module	Foundations in Chemistry
Topic	Atoms, Amount, Equations & Reactions
Paper	Multiple Choice
Booklet	Question Paper 2

Time allowed: **31 minutes**

Score: **/23**

Percentage: **/100**

Grade Boundaries:

A*	A	B	C	D	E
>85%	73%	60%	47%	34%	21%

Question 1

Which ion has a different number of electrons from the other three ions? **[1]**

A Ga^{3+}

B Cl^{-}

C S^{2-}

D Ca^{2+}

Question 2

An organic compound has the composition by mass:

C, 53.33 %; H, 11.11%; O, 35.56%.

What is the empirical formula of the organic compound? **[1]**

A $C_4H_8O_2$

B $C_4H_{10}O_2$

C. C_2H_4O

D. C_2H_5O

Samples of four hydrocarbons are completely burnt under the same conditions of temperature and pressure.

Which sample produces the greatest volume of CO_2? **[1]**

A 0.4 mol C_2H_6

B 0.3 mol C_3H_8

C 0.2mol C_4H_{10}

D 0.1mol C_5H_{12}

Question 4

Which reaction produces the smallest atom economy of $BaCl_2$?

[1]

A. $BaCl_2 \cdot 2H_2O \rightarrow BaCl_2 + 2H_2O$

B. $BaO + 2HCl \rightarrow BaCl_2 + H_2O$

C. $BaCO_3 + 2HCl \rightarrow BaCl_2 + CO_2 + H_2O$

D. $Ba + 2HCl \rightarrow BaCl_2 + H_2$

Question 5

Which row shows the atomic structure of $^{37}Cl^-$?

[1]

	protons	neutrons	electrons
A	17	18	20
B	17	20	18
C	18	19	17
D	20	17	21

Question 6

What is the formula of ammonium sulfide? **[1]**

A. NH_4S

B. NH_4SO_4

C. $(NH_4)_2S$

D. $(NH_4)_2SO_4$

Calcium nitrate, $Ca(NO_3)_2$, decomposes when heated, as shown below.

$$Ca(NO_3)_2(s) \rightarrow CaO(s) + 2NO_2(g) + \tfrac{1}{2}O_2(g)$$

A student decomposes 0.00500 mol of $Ca(NO_3)_2$ and collects the gas that is produced.

Calculate the volume of gas that the student should expect to collect, measured at room temperature and pressure. **[1]**

A. $60\,cm^3$

B. $120\,cm^3$

C. $240\,cm^3$

D. $300\,cm^3$

Question 8

Which equation is **not** a neutralisation reaction? **[1]**

A. $Ca(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + H_2(g)$

B. $H^+(aq) + OH^-(aq) \rightarrow H_2O(l)$

C. $K_2CO_3(s) + 2HNO_3(aq) \rightarrow 2KNO_3(aq) + H_2O(l) + CO_2(g)$

D. $NH_3(aq) + HCl(aq) \rightarrow NH_4Cl(aq)$

Question 9

What is the oxidation number of nitrogen in $Mg(NO_3)_2$?

[1]

A –3

B +2

C +5

D +6

Question 10

How many electrons are in a $^{24}_{12}Mg^{2+}$ ion?

[1]

A 10

B 12

C 14

D 22

Question 11

What is the formula of chromium(III) sulfate? **[1]**

A. Cr_3SO_4

B. $Cr(SO_4)_3$

C. $Cr_2(SO_4)_3$

D. Cr_3SO_3

Question 12

Which equation represents a redox reaction? **[1]**

A $Mg + 2HCl \rightarrow MgCl_2 + H_2$

B $MgO + 2HCl \rightarrow H_2O + MgCl_2$

C $MgCO_3 + 2HCl \rightarrow CO_2 + H_2O + MgCl_2$

D $Mg(OH)_2 + 2HCl \rightarrow MgCl_2 + 2H_2O$

Question 13

A sample of a compound **M** contains 1.46 g of carbon, 0.482 g of hydrogen and 1.69 g of nitrogen.

What is the empirical formula of **M**?

[1]

A CH_2N

B C_4HN_4

C CH_4N

D C_2H_4N

A student mixes 100 cm^3 of 0.200 mol dm^{-3} NaCl(aq) with 100 cm^3 of 0.200 mol dm^{-3} Na_2CO_3(aq).

What is the total concentration of Na^+ ions in the mixture formed? **[1]**

A 0.100 mol dm^{-3}

B 0.200 mol dm^{-3}

C 0.300 mol dm^{-3}

D 0.400 mol dm^{-3}

Question 15

Which mass of substance contains the greatest number of atoms? **[1]**

A. 3.00 g of ammonia, NH_3

B. 3.00 g of chloromethane, $CHCl_3$

C. 4.00 g of hydrogen sulfide, H_2S

D. 4.00 g of hydrogen chloride, HCl

Question 16

Which reagent would exactly neutralise 100 cm^3 of 1.00 mol dm^{-3} $H_2SO_4(aq)$? **[1]**

A 0.100 mol $Al(OH)_3$

B 0.100 mol NH_3

C 0.100 mol $Ba(OH)_2$

D 0.100 mol NaOH

Question 17

Which volume of oxygen gas, at room temperature and pressure, is required for complete combustion of 1.25×10^{-3} mol of propan-1-ol?

[1]

A 105 cm^3

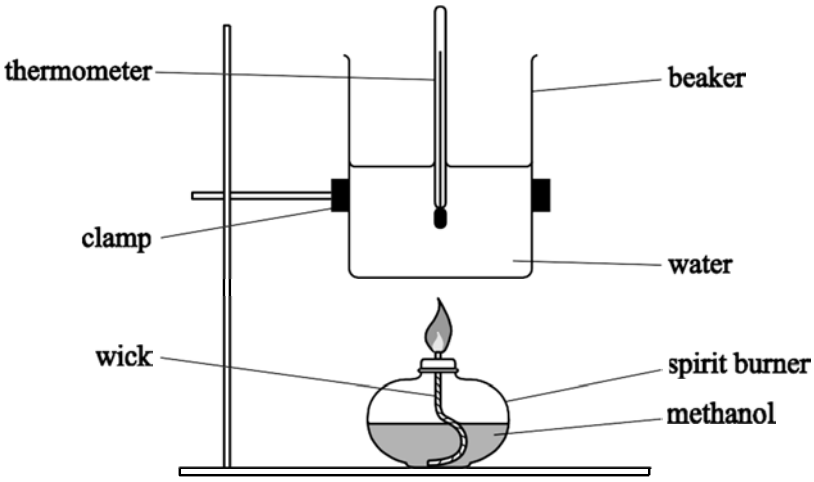
B 120 cm^3

C 135 cm^3

D 120 cm^3

(a) A student used the apparatus below in an experiment to determine the enthalpy change of combustion of methanol.

The student measured 100 cm^3 and poured it into the beaker.



The student measured a temperature rise of 10.5 °C.

The student calculated the amount of energy transferred to the water.

Which of the following uses the appropriate number of significant figures and correct standard form to represent the result of the calculation?

[1]

A 4.389×10^3 J

B 4.39×10^3 J

C 43.9×10^2 J

D 44.0×10^2 J

(b) The student's calculated enthalpy change was less exothermic than the value in data books.

Which of the following errors could have contributed to this result? **[1]**

Error 1: After the final temperature was recorded, the student removed the burner from under the beaker. The flame burnt for a further 5 minutes before weighing the spirit burner.

Error 2: The student recorded the final temperature 5 minutes after removing the burner.

Error 3: The student spilt some water on the bench when pouring the water from the measuring cylinder into the beaker.

A 1, 2 and 3

B Only 1 and 2

C Only 2 and 3

D Only 1

Question 19

A student prepares a standard solution and carries out a titration.
The standard solution is placed in the burette.

Which of the following would result in a titre that is larger than it should be? **[1]**

1: Water is added to completely fill the volumetric flask, rather than to the graduation line.

2: The conical flask is washed out with water before carrying out each titration.

3: The pipette is washed out with water before carrying out each titration.

A 1, 2 and 3

B Only 1 and 2

C Only 2 and 3

D Only 1

Question 20

Which row shows the atomic structure of $^{55}Mn^{2+}$?

[1]

	Protons	Neutrons	Electrons
A	25	30	23
B	25	55	23
C	27	30	25
D	30	25	28

Zinc reacts with copper(II) sulfate solution, $CuSO_4(aq)$.

Which apparatus could be used to determine the effect of the concentration of $CuSO_4(aq)$ on the rate of reaction?

[1]

A balance

B gas syringe

C colorimeter

D pH meter

Complete combustion of 40 cm^3 of a gaseous hydrocarbon **X** requires 240 cm^3 of oxygen. 160 cm^3 of carbon dioxide forms. All gas volumes are at room temperature and pressure.

What is the formula of **X**? **[1]**

A C_4H_8

B C_4H_{10}

C C_6H_{12}

D C_6H_{14}