Paper 1

Questions are applicable for both core and extended candidates

1 The equations for two reactions are shown.

equation 1 $C + CO_2 \rightarrow x\ CO$

equation 2 $2C_2H_6 + 7O_2 \rightarrow 4CO_2 + y\ H_2O$

Which row shows the value of *x*, the value of *y* and the equations that are for redox reactions?

	value of *x*	value of *y*	redox reactions
A	1	3	equation 1 only
B	2	3	equations 1 and 2
C	2	6	equation 1 only
D	2	6	equations 1 and 2

2 Methane, CH_4, burns in air to form carbon dioxide and water.

What is the balanced equation for this reaction?

A $CH_4(g) + O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$

B $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$

C $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + H_2O(g)$

D $CH_4(g) + 3O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$

Paper 2

Questions are applicable for both core and extended candidates unless indicated in the question

3 Magnetite is an ore of iron which contains the ions Fe^{2+}, Fe^{3+} and O^{2-} only.

What is the formula of magnetite? **(extended only)**

A Fe_2O **B** Fe_2O_3 **C** Fe_3O_2 **D** Fe_3O_4

4 Which formula is an empirical formula? **(extended only)**

A C_2H_4O

B $C_4H_8O_2$

C C_3H_7COOH

D $CH_3CH_2CH_2COOH$

5 Which equations are balanced?

1 $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

2 $ZnCO_3 + 2HCl \rightarrow ZnCl_2 + CO_2 + 2H_2O$

3 $Mg(NO_3)_2 + NaOH \rightarrow Mg(OH)_2 + 2NaNO_3$

4 $CaCO_3 + H_2SO_4 \rightarrow CaSO_4 + H_2O + CO_2$

A 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 3 and 4

6 Aqueous iron(III) sulfate and aqueous sodium hydroxide react to give a precipitate of iron(III) hydroxide and a solution of sodium sulfate.

What is the balanced symbol equation for this reaction? **(extended only)**

A $Fe_2(SO_4)_3(aq) + 2NaOH(aq) \rightarrow Fe(OH)_3(s) + Na_2SO_4(aq)$

B $Fe_2(SO_4)_3(aq) + 3NaOH(aq) \rightarrow Fe(OH)_3(s) + 3Na_2SO_4(aq)$

C $Fe_2(SO_4)_3(aq) + 6NaOH(aq) \rightarrow 2Fe(OH)_3(s) + 3Na_2SO_4(aq)$

D $2Fe_2(SO_4)_3(aq) + 6NaOH(aq) \rightarrow 4Fe(OH)_3(s) + 6Na_2SO_4(aq)$

7 Sodium nitride contains the nitride ion, N^{3-}.

Sodium nitride is unstable and decomposes into its elements.

What is the equation for the decomposition of sodium nitride? **(extended only)**

A $2NaN_3 \rightarrow 2Na + 3N_2$

B $2Na_3N \rightarrow 6Na + N_2$

C $2NaN_3 \rightarrow Na_2 + 3N_2$

D $2Na_3N \rightarrow 6Na + 2N$

8 Compound X contains carbon, hydrogen and oxygen only.

By mass, it contains 26.7% carbon and 2.2% hydrogen.

What is the empirical formula of X? **(extended only)**

A CHO **B** C_2HO **C** CH_2O **D** CHO_2

9 Which word equation represents a reaction that occurs?

A sodium oxide + carbon → sodium + carbon dioxide

B sodium oxide + iron → sodium + iron(II) oxide

C iron(II) oxide + copper → iron + copper(II) oxide

D iron(III) oxide + carbon → iron + carbon dioxide

10 Aqueous iron(III) chloride, $FeCl_3$, reacts with aqueous potassium iodide, KI.

$$v FeCl_3 + w KI \rightarrow x FeCl_2 + y KCl + I_2$$

Which statements are correct?

1 In the balanced equation, *v*, *w*, *x* and *y* have the same value.

2 Potassium iodide is an oxidising agent.

3 A dark brown solution is produced in the reaction.

A 1 and 2 **B** 1 and 3 **C** 2 only **D** 2 and 3

11 Which row shows the formulae of sodium carbonate, zinc nitrate and ammonium sulfate?

	sodium carbonate	zinc nitrate	ammonium sulfate
A	Na_2CO_3	$ZnNO_3$	$(NH_4)_2SO_4$
B	Na_2CO_3	$Zn(NO_3)_2$	$(NH_4)_2SO_4$
C	$NaCO_3$	$ZnNO_3$	$(NH_3)_2SO_4$
D	$NaCO_3$	$Zn(NO_3)_2$	$(NH_3)_2SO_4$

12 Zinc oxide reacts with carbon to produce zinc.

Which equation represents this reaction?

A $2ZnO + C \rightarrow 2Zn + CO$

B $2ZnO + 2C \rightarrow 2Zn + 2CO_2$

C $ZnO + C \rightarrow Zn + CO$

D $ZnO + 2C \rightarrow Zn + 2CO_2$