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 Which row describes the changes that occur when metals burn in oxygen?

	temperature	metal
A	decreases	oxidised
B	decreases	reduced
C	increases	oxidised
D	increases	reduced

3 Silver oxide reacts with magnesium to make silver and magnesium oxide.

$$Ag_2O + Mg \rightarrow 2Ag + MgO$$

Which substance is oxidised in this reaction?

A magnesium

B magnesium oxide

C silver

D silver oxide

4 Four redox equations and statements about the equations are shown.

	reaction	statement
1	$C + O_2 \rightarrow CO_2$	carbon is oxidised
2	$CO_2 + C \rightarrow 2CO$	carbon dioxide is oxidised
3	$CO_2 + C \rightarrow 2CO$	carbon is oxidised
4	$Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$	iron(III) oxide is oxidised

Which statements about the equations are correct?

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

5 Which equation shows the reduction of copper?

A $CuO + C \rightarrow Cu + CO$

B $2CuS + 3O_2 \rightarrow 2CuO + 2SO_2$

C $Cu(g) \rightarrow Cu(l)$

D $Cu(l) \rightarrow Cu(s)$

6 Which equation shows an oxidation reaction?

A $C + O_2 \rightarrow CO_2$

B $CaCO_3 \rightarrow CaO + CO_2$

C $CaO + 2HCl \rightarrow CaCl_2 + H_2O$

D $N_2O_4 \rightarrow 2NO_2$

7 The equation for the reaction between magnesium and copper(II) oxide is shown.

$$Mg + CuO \rightarrow MgO + Cu$$

Which substance is oxidised?

A Cu **B** CuO **C** Mg **D** MgO

8 When magnesium is heated with zinc oxide a reaction occurs.

The equation is shown.

$$Mg + ZnO \rightarrow MgO + Zn$$

Which substance is oxidised?

A magnesium

B magnesium oxide

C zinc

D zinc oxide

Paper 2

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

9 Hydrogen iodide is dissolved in water.

$$HI \rightarrow H^+ + I^-$$

Which row describes the final colours seen when the solution is tested with damp red litmus paper and with acidified aqueous potassium manganate(VII)? **(extended only)**

	damp red litmus paper	acidified aqueous potassium manganate(VII)
A	blue	brown
B	blue	colourless
C	red	brown
D	red	colourless

10 The equation for the reaction of metal M with aqueous zinc sulfate is shown.

$$M(s) + ZnSO_4(aq) \rightarrow MSO_4(aq) + Zn(s)$$

Which statement explains why metal M reacts with aqueous zinc sulfate? **(extended only)**

A Zinc is less reactive than M because M is able to accept electrons from zinc ions.

B Zinc is a more powerful reducing agent than M.

C Zinc is more reactive than M because it can lose electrons more easily than M.

D Zinc ions can remove electrons from M.

11 In which equation is the underlined substance acting as a reducing agent? **(extended only)**

A $3\underline{CO} + Fe_2O_3 \rightarrow 2Fe + 3CO_2$

B $\underline{CO_2} + C \rightarrow 2CO$

C $\underline{CuO} + H_2 \rightarrow Cu + H_2O$

D $\underline{CaO} + H_2O \rightarrow Ca(OH)_2$

12 Ethanoic acid is made by reacting ethanol with acidified potassium manganate(VII).

Which type of reaction occurs when ethanol reacts with acidified potassium manganate(VII)? **(extended only)**

A displacement

B fermentation

C oxidation

D neutralisation

13 Sodium ions, Na^+, and oxygen ions, O^{2-}, combine with chromium ions to form a salt.

The salt sodium dichromate has the formula $Na_2Cr_2O_7$.

What is the oxidation state of chromium in this salt? **(extended only)**

A +2 **B** +3 **C** +6 **D** +12

14 When chlorine gas dissolves in water a reaction occurs.

$$Cl_2 + H_2O \rightarrow HCl + HClO$$

Which row of the table identifies the oxidation number for chlorine in the chlorine-containing species? **(extended only)**

	Cl_2	HCl	$HClO$
A	−1	−1	−1
B	0	−1	−1
C	−1	+1	+1
D	0	−1	+1

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

$$vFeCl_3 + wKI \rightarrow xFeCl_2 + yKCl + I_2$$

Which statements are correct? **(extended only)**

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