7.4 Redox

01. 0620_s21_qp_21 Q: 16

An example of a redox reaction is shown.

$$Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$$

Which statement about the reaction is correct?

A Zn is the oxidising agent and it oxidises Cu^{2+}.

B Zn is the oxidising agent and it reduces Cu^{2+}.

C Zn is the reducing agent and it oxidises Cu^{2+}.

D Zn is the reducing agent and it reduces Cu^{2+}.

---

02. 0620_s21_qp_23 Q: 32

The formulae of two compounds of manganese are MnO_2 and $KMnO_4$.

In these two compounds the oxidation state of potassium is +1 and the oxidation state of oxygen is –2.

What are the oxidation states of manganese in each of these two compounds?

	MnO_2	$KMnO_4$
A	+2	+3
B	+2	+7
C	+4	+3
D	+4	+7

---

03. 0620_w21_qp_21 Q: 16

Iron(II) chloride solution reacts with chlorine gas.

The equation is shown.

$$2FeCl_2(aq) + Cl_2(g) \rightarrow 2FeCl_3(aq)$$

Which statements about this reaction are correct?

1 Fe^{2+} ions are reduced to Fe^{3+} ions.

2 Chlorine acts as a reducing agent.

3 Fe^{2+} ions each lose an electron.

4 Cl_2 molecules are reduced to Cl^- ions.

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

---

04. 0620_w21_qp_22 Q: 16

Iron(II) chloride solution reacts with chlorine gas.

The equation is shown.

$$2FeCl_2(aq) + Cl_2(g) \rightarrow 2FeCl_3(aq)$$

Which statements about this reaction are correct?

1 Fe^{2+} ions are reduced to Fe^{3+} ions.

2 Chlorine acts as a reducing agent.

3 Fe^{2+} ions each lose an electron.

4 Cl_2 molecules are reduced to Cl^- ions.

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

---

05. 0620_m20_qp_22 Q: 17

In which reaction is the underlined compound acting as a reducing agent?

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

B $2CuO + \underline{C} \rightarrow 2Cu + CO_2$

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

D $CaCO_3 + \underline{2HCl} \rightarrow CaCl_2 + H_2O + CO_2$

---

06. 0620_p20_qp_20 Q: 20

Which of these reactions shows only reduction?

A $Cu^{2+} + 2e^- \rightarrow Cu$

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

C $HCl + NaOH \rightarrow NaCl + H_2O$

D $Mg + ZnSO_4 \rightarrow Zn + MgSO_4$

---

07. 0620_p20_qp_20 Q: 21

The red colour in some pottery glazes may be formed as a result of the reactions shown.

$$CuCO_3 \xrightarrow{\text{heat}} CuO + CO_2$$

$$CuO + SnO \longrightarrow Cu + SnO_2$$

These equations show that .....1..... is oxidised and .....2..... is reduced.

Which substances correctly complete gaps 1 and 2 in the above sentence?

	1	2
A	CO_2	SnO_2
B	$CuCO_3$	CuO
C	CuO	SnO
D	SnO	CuO

---

08. 0620_s20_qp_21 Q: 17

The equations for two reactions of iodide ions are shown.

reaction 1 $2I^-(aq) + H_2O_2(aq) \rightarrow I_2(aq) + 2OH^-(aq)$

reaction 2 $I^-(aq) + Ag^+(aq) \rightarrow AgI(s)$

Which statement is correct?

A Both reactions are redox reactions.

B Neither reaction is a redox reaction.

C Only reaction 1 is a redox reaction.

D Only reaction 2 is a redox reaction.

---

09. 0620_s20_qp_22 Q: 17

When aqueous iron(III) chloride is added to aqueous potassium iodide a chemical reaction occurs and iodine is formed.

Which statement is correct?

A Iodide ions are oxidised, they gain electrons in this reaction.

B Iodide ions are oxidised, they lose electrons in this reaction.

C Iron(III) chloride is oxidised in this reaction.

D Neither iodide ions nor iron(III) chloride is oxidised in this reaction.

---

10. 0620_s20_qp_23 Q: 17

The equation for the reaction between zinc and aqueous copper(II) sulfate is shown.

$$Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$$

Which statement is correct?

A The oxidation state of the oxidising agent has changed from 0 to +2.

B The oxidation state of the reducing agent has changed from 0 to +2.

C The oxidation state of the reducing agent has changed from +2 to 0.

D This is not a redox reaction. The solution changes from colourless to blue.

---

11. 0620_w20_qp_21 Q: 21

The reaction between chlorine and bromide ions is a redox reaction.

$$Cl_2 + 2Br^- \rightarrow 2Cl^- + Br_2$$

What is the change in oxidation state of the reducing agent in this reaction?

A –2 to 0 **B** –1 to 0 **C** 0 to –1 **D** 0 to +1

---

12. 0620_w20_qp_22 Q: 19

During the manufacture of sulfuric acid, sulfur dioxide is converted to sulfur trioxide.

$$2SO_2 + O_2 \rightarrow 2SO_3$$

Which type of reaction is this?

A displacement

B neutralisation

C oxidation

D thermal decomposition

---

13. 0620_w20_qp_22 Q: 20

The equation for a redox reaction is shown.

$$2FeSO_4 + Cl_2 + H_2SO_4 \rightarrow Fe_2(SO_4)_3 + 2HCl$$

Which element is reduced?

A chlorine

B iron

C oxygen

D sulfur

---

14. 0620_w20_qp_23 Q: 17

Which reaction of hydrochloric acid is a redox reaction?

A $2Na + 2HCl \rightarrow 2NaCl + H_2$

B $Na_2O + 2HCl \rightarrow 2NaCl + H_2O$

C $NaOH + HCl \rightarrow NaCl + H_2O$

D $Na_2CO_3 + 2HCl \rightarrow 2NaCl + H_2O + CO_2$

---

15. 0620_w20_qp_23 Q: 21

Which metal has variable oxidation states?

A aluminium

B calcium

C copper

D sodium

---

16. 0620_m19_qp_22 Q: 18

The reaction between magnesium and carbon dioxide is shown in the equation.

$$2Mg + CO_2 \rightarrow 2MgO + C$$

Which statement describes what happens in this reaction?

A Carbon is oxidised.

B Magnesium is reduced.

C Neither oxidation nor reduction happens.

D The carbon in carbon dioxide is reduced.

---

17. 0620_m19_qp_22 Q: 19

Which changes involve reduction?

1 $2I^- \rightarrow I_2 + 2e^-$

2 $CuO + H_2 \rightarrow Cu + H_2O$

3 $Al^{3+} + 3e^- \rightarrow Al$

4 $Pb^{2+} + SO_4^{2-} \rightarrow PbSO_4$

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

---

18. 0620_s19_qp_21 Q: 16

Which changes represent oxidation?

1 $2I^- \rightarrow I_2 + 2e^-$

2 Cr(VI) $\rightarrow$ Cr(III)

3 Fe(II) $\rightarrow$ Fe(III)

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

---

19. 0620_s19_qp_22 Q: 16

The ionic equation for the reaction of aqueous potassium bromide with chlorine gas is shown.

$$2Br^- + Cl_2 \rightarrow Br_2 + 2Cl^-$$

Which statement is correct?

A Bromide ions are oxidised by gaining electrons.

B Bromide ions are oxidised by losing electrons.

C Chlorine is oxidised by gaining electrons.

D Chlorine is oxidised by losing electrons.

---

20. 0620_s19_qp_23 Q: 16

Which changes represent reduction?

1 $Cl_2 + 2e^- \rightarrow 2Cl^-$

2 Mn(VII) $\rightarrow$ Mn(II)

3 sulfate(IV) $\rightarrow$ sulfate(VI)

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

---

21. 0620_w19_qp_21 Q: 18

The equation for the reaction between iron(II) sulfate and bromine is shown.

$$6FeSO_4 + 3Br_2 \rightarrow 2Fe_2(SO_4)_3 + 2FeBr_3$$

Which row identifies the oxidising agent and the reducing agent?

	oxidising agent	reducing agent
A	Br_2	$FeSO_4$
B	$FeSO_4$	Br_2
C	$FeBr_3$	$Fe_2(SO_4)_3$
D	$Fe_2(SO_4)_3$	$FeBr_3$

---

22. 0620_w19_qp_22 Q: 18

In the blast furnace, iron is formed when iron(III) oxide reacts with carbon monoxide in a redox reaction.

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

Which substance is the oxidising agent and which substance is the reducing agent?

	oxidising agent	reducing agent
A	CO	Fe_2O_3
B	CO_2	Fe
C	Fe	CO_2
D	Fe_2O_3	CO

---

23. 0620_w19_qp_23 Q: 18

Chlorine displaces bromine from aqueous potassium bromide.

The ionic equation for the reaction is shown.

$$Cl_2 + 2Br^- \rightarrow 2Cl^- + Br_2$$

Which statement about this reaction is correct?

A Bromide ions act as an oxidising agent.

B Bromide ions are oxidised when electrons are lost.

C Chlorine acts as a reducing agent.

D Chlorine is reduced when electrons are lost.

---

24. 0620_m18_qp_22 Q: 14

The ionic equation for the reaction between zinc and aqueous copper ions is shown.

$$Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)$$

Which statement about this reaction is correct?

A Copper ions are oxidised and their oxidation state changes.

B Copper ions are reduced because they lose electrons.

C Zinc atoms are oxidised and their oxidation state changes.

D Zinc atoms are reduced because they gain electrons.

---

25. 0620_s18_qp_21 Q: 16

Chlorine displaces iodide ions from potassium iodide.

$$Cl_2 + 2I^- \rightarrow I_2 + 2Cl^-$$

What is the oxidising agent?

A chloride ions

B chlorine

C iodide ions

D iodine

---

26. 0620_s18_qp_22 Q: 16

Iron(II) chloride solution reacts with chlorine gas.

The equation is shown.

$$2FeCl_2(aq) + Cl_2(g) \rightarrow 2FeCl_3(aq)$$

Which statements about this reaction are correct?

1 Fe^{2+} ions are reduced to Fe^{3+} ions.

2 Chlorine acts as a reducing agent.

3 Fe^{2+} ions each lose an electron.

4 Cl_2 molecules are reduced to Cl^- ions.

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

---

27. 0620_s18_qp_23 Q: 16

The equation for a redox reaction is shown.

$$2Fe^{3+} + Zn \rightarrow 2Fe^{2+} + Zn^{2+}$$

Which statements are correct?

1 Fe^{3+} is reduced to form Fe^{2+}.

2 Zn oxidises the Fe^{3+} ions.

3 Fe^{3+} is an oxidising agent.

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

---

28. 0620_w18_qp_21 Q: 16

An excess of iron(II) chloride is added to acidified potassium manganate(VII).

Which statements are correct?

1 The purple colour disappears.

2 Iron(II) is reduced to iron(III).

3 Manganate(VII) ions are oxidised to manganese(II) ions.

4 Potassium manganate(VII) is an oxidising agent.

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

---

29. 0620_w18_qp_22 Q: 16

The thermite reaction can be used to produce iron from iron(III) oxide.

The equation for the reaction is shown.

$$2Al + Fe_2O_3 \rightarrow 2Fe + Al_2O_3$$

Which statements about this reaction are correct?

1 Aluminium is the oxidising agent.

2 Aluminium is less reactive than iron.

3 Electrons are transferred from aluminium to iron.

4 The iron in the iron(III) oxide is reduced.

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

---

30. 0620_w18_qp_23 Q: 16

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

$$Zn + CuO \rightarrow ZnO + Cu$$

Which row shows the oxidising agent and the reducing agent?

	oxidising agent	reducing agent
A	CuO	Cu
B	CuO	Zn
C	Zn	CuO
D	Zn	ZnO

---

31. 0620_m17_qp_22 Q: 17

Chlorine displaces bromine from a solution of potassium bromide.

$$Cl_2 + 2KBr \rightarrow 2KCl + Br_2$$

What is the oxidising agent in this reaction?

A bromide ions

B bromine

C chloride ions

D chlorine

---

32. 0620_s17_qp_21 Q: 17

An example of a redox reaction is shown.

$$Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$$

Which statement about the reaction is correct?

A Zn is the oxidising agent and it oxidises Cu^{2+}.

B Zn is the oxidising agent and it reduces Cu^{2+}.

C Zn is the reducing agent and it oxidises Cu^{2+}.

D Zn is the reducing agent and it reduces Cu^{2+}.

---

33. 0620_w17_qp_21 Q: 14

Copper(II) oxide reacts with hydrogen.

$$CuO + H_2 \rightarrow Cu + H_2O$$

Which row is correct?

	oxidising agent	reducing agent
A	H_2	CuO
B	CuO	H_2
C	H_2O	Cu
D	Cu	H_2O

---

34. 0620_w17_qp_22 Q: 14

Copper metal donates electrons to silver ions.

Zinc metal donates electrons to copper ions.

What is the strongest reducing agent?

A copper ions

B copper metal

C silver ions

D zinc metal

---

35. 0620_m16_qp_22 Q: 16

Zinc is extracted from zinc blende by roasting it in air to form zinc oxide.

The zinc oxide is then heated with carbon to form zinc.

The equations for the reactions are shown.

1 $2ZnS + 3O_2 \rightarrow 2ZnO + 2SO_2$

2 $ZnO + C \rightarrow Zn + CO$

Which statement about reactions 1 and 2 is **not** correct?

A In reaction 1 the oxidation state of sulfur increases and it is oxidised.

B In reaction 1 the oxidation state of zinc increases and it is oxidised.

C In reaction 2 the carbon acts as a reducing agent and it is oxidised.

D In reaction 2 the oxidation state of zinc decreases and it is reduced.

---

36. 0620_p16_qp_20 Q: 20

Which of these reactions shows only reduction?

A $Cu^{2+} + 2e^- \rightarrow Cu$

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

C $HCl + NaOH \rightarrow NaCl + H_2O$

D $Mg + ZnSO_4 \rightarrow Zn + MgSO_4$

---

37. 0620_p16_qp_20 Q: 21

The red colour in some pottery glazes may be formed as a result of the reactions shown.

$$CuCO_3 \xrightarrow{\text{heat}} CuO + CO_2$$

$$CuO + SnO \longrightarrow Cu + SnO_2$$

These equations show that .....1..... is oxidised and .....2..... is reduced.

Which substances correctly complete gaps 1 and 2 in the above sentence?

	1	2
A	CO_2	SnO_2
B	$CuCO_3$	CuO
C	CuO	SnO
D	SnO	CuO

---

38. 0620_s16_qp_21 Q: 17

Which equation represents a reduction reaction?

A $Fe^{2+} + e^- \rightarrow Fe^{3+}$

B $Fe^{2+} \rightarrow Fe^{3+} + e^-$

C $Fe^{3+} + e^- \rightarrow Fe^{2+}$

D $Fe^{3+} \rightarrow Fe^{2+} + e^-$

---

39. 0620_w16_qp_21 Q: 17

Four ionic half-equations are shown.

1 $Cu^{2+}(aq) + 2e^- \rightarrow Cu(s)$

2 $2I^-(aq) \rightarrow I_2(aq) + 2e^-$

3 $Fe^{2+}(aq) \rightarrow Fe^{3+}(aq) + e^-$

4 $Cl_2(g) + 2e^- \rightarrow 2Cl^-(aq)$

Which statement is correct?

A In equation 1, copper(II) ions are oxidised to copper.

B In equation 2, iodide ions are reduced to iodine.

C In equation 3, iron(II) ions are oxidised to iron(III) ions.

D In equation 4, chlorine is oxidised to chloride ions.

---

40. 0620_w16_qp_22 Q: 17

Chromium forms the compound chromium(III) sulfate.

What does the (III) represent?

A the charge on a sulfate ion

B the number of chromium ions combined with one sulfate ion

C the number of sulfate ions combined with one chromium ion

D the oxidation state of chromium

---

41. 0620_w16_qp_23 Q: 17

Which change represents an oxidation reaction?

A chlorine changes to chlorate(I) ions

B chlorine changes to chloride ions

C copper(II) ions change to copper

D potassium manganate(VII) ions change to potassium manganate(VI) ions

---

SN	Paper	Q. No.	Answer
01	0620_s21_qp_21	16	D
02	0620_s21_qp_23	32	D
03	0620_w21_qp_21	16	D
04	0620_w21_qp_22	16	D
05	0620_m20_qp_22	17	B
06	0620_p20_qp_20	20	A
07	0620_p20_qp_20	21	D
08	0620_s20_qp_21	17	C
09	0620_s20_qp_22	17	B
10	0620_s20_qp_23	17	B
11	0620_w20_qp_21	21	B
12	0620_w20_qp_22	19	C
13	0620_w20_qp_22	20	A
14	0620_w20_qp_23	17	A
15	0620_w20_qp_23	21	C
16	0620_m19_qp_22	18	D
17	0620_m19_qp_22	19	C
18	0620_s19_qp_21	16	B
19	0620_s19_qp_22	16	B
20	0620_s19_qp_23	16	A
21	0620_w19_qp_21	18	A
22	0620_w19_qp_22	18	D
23	0620_w19_qp_23	18	B
24	0620_m18_qp_22	14	C
25	0620_s18_qp_21	16	B
26	0620_s18_qp_22	16	D
27	0620_s18_qp_23	16	C
28	0620_w18_qp_21	16	B
29	0620_w18_qp_22	16	D
30	0620_w18_qp_23	16	B
31	0620_m17_qp_22	17	D
32	0620_s17_qp_21	17	D
33	0620_w17_qp_21	14	B
34	0620_w17_qp_22	14	D
35	0620_m16_qp_22	16	B
36	0620_p16_qp_20	20	A
37	0620_p16_qp_20	21	D
38	0620_s16_qp_21	17	C
39	0620_w16_qp_21	17	C
40	0620_w16_qp_22	17	D
41	0620_w16_qp_23	17	A