01. 0620_w16_qp_22 Q: 26

Y displaces X from its aqueous sulfate.

X does not displace W from its aqueous sulfate.

X displaces Z from its aqueous sulfate.

What is the order of reactivity of elements W, X, Y and Z?

	most reactive	⟶		least reactive
A	W	X	Y	Z
B	W	Y	X	Z
C	Z	X	Y	W
D	Z	W	Y	X

---

02. 0620_w16_qp_23 Q: 26

The results of two experiments are given.

1 Cobalt displaces manganese from an aqueous solution of a manganese salt.

2 Manganese displaces silver from an aqueous solution of a silver salt.

Three more experiments are carried out.

3 Cobalt is added to an aqueous solution of a silver salt.

4 Manganese is added to an aqueous solution of a cobalt salt.

5 Silver is added to an aqueous solution of a cobalt salt.

In which experiments does a reaction take place?

A 3 only **B** 3 and 4 **C** 4 and 5 **D** 5 only

10.3 Extraction of metals

03. 0620_m21_qp_22 Q: 25

Why is cryolite used in the extraction of aluminium from bauxite?

A as a catalyst for the process

B as a solvent for aluminium oxide

C it stops the carbon anodes burning away

D it reduces aluminium ions in aluminium oxide

---

04. 0620_s21_qp_22 Q: 27

Aluminium is extracted from its ore by electrolysis.

Which equation represents the reaction that occurs at the anode during the electrolysis?

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

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

C $2O^{2-} \rightarrow O_2 + 4e^-$

D $2O^{2-} + 2e^- \rightarrow O_2$

---

05. 0620_s21_qp_23 Q: 26

Which compounds are released by the extraction of zinc from zinc blende and by respiration?

	extraction of zinc	respiration
A	CO_2 and SO_2	CO_2 only
B	CO_2 and SO_2	CO_2 and H_2O
C	CO_2 only	CO_2 only
D	CO_2 only	CO_2 and H_2O

---

06. 0620_s21_qp_23 Q: 29

Which reaction does **not** occur during the extraction of iron from hematite in a blast furnace?

A $C + O_2 \rightarrow CO_2$

B $CaO + SiO_2 \rightarrow CaSiO_3$

C $CO_2 + C \rightarrow 2CO$

D $4Fe + 3O_2 \rightarrow 2Fe_2O_3$

---

07. 0620_w21_qp_21 Q: 26

Which statement about the extraction of metals is correct?

A Aluminium is extracted from the ore bauxite by electrolysis.

B Aluminium is extracted from the ore hematite by electrolysis.

C Iron is extracted from the ore bauxite by electrolysis.

D Iron is extracted from the ore hematite by electrolysis.

---

08. 0620_w21_qp_22 Q: 26

Carbon dioxide is produced during the extraction of aluminium from bauxite.

Which statement describes how this carbon dioxide is made?

A Carbon monoxide reduces aluminium oxide forming carbon dioxide and aluminium.

B Carbon is burned in the blast furnace to release heat energy.

C Oxygen made in the process reacts with the carbon electrode.

D The ore of aluminium undergoes thermal decomposition.

---

09. 0620_m20_qp_22 Q: 27

Aluminium is extracted from bauxite by electrolysis.

Which statement is correct?

A Aluminium ions are oxidised to form aluminium.

B The cathode has to be replaced regularly because it reacts with the oxygen which is formed.

C Cryolite is added to remove impurities.

D Carbon dioxide is produced at the anode.

---

10. 0620_p20_qp_20 Q: 30

Zinc is extracted from zinc blende. Zinc blende is an ore of zinc and consists mainly of zinc sulfide.

One of the steps in the process involves zinc sulfide reacting with oxygen from the air.

What is the equation for this reaction?

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

B $2ZnS + O_2 \rightarrow 2Zn + SO_2$

C $2ZnS + O_2 \rightarrow 2ZnO + S$

D $ZnS + 2O_2 \rightarrow ZnSO_4$

---

11. 0620_s20_qp_21 Q: 27

Molten iron from the blast furnace contains impurities.

The process of turning the impure iron into steel involves blowing oxygen into the molten iron and adding calcium oxide.

What are the reasons for blowing in oxygen and adding calcium oxide?

	blowing in oxygen	adding calcium oxide
A	carbon is removed by reacting with oxygen	reacts with acidic impurities making slag
B	carbon is removed by reacting with oxygen	reacts with slag and so removes it
C	iron reacts with the oxygen	reacts with acidic impurities making slag
D	iron reacts with the oxygen	reacts with slag and so removes it

---

12. 0620_w20_qp_21 Q: 29

Which statements about the metal zinc are correct?

1 It is extracted from the ore bauxite.

2 It is used to galvanise steel.

3 It is used to make the alloy brass.

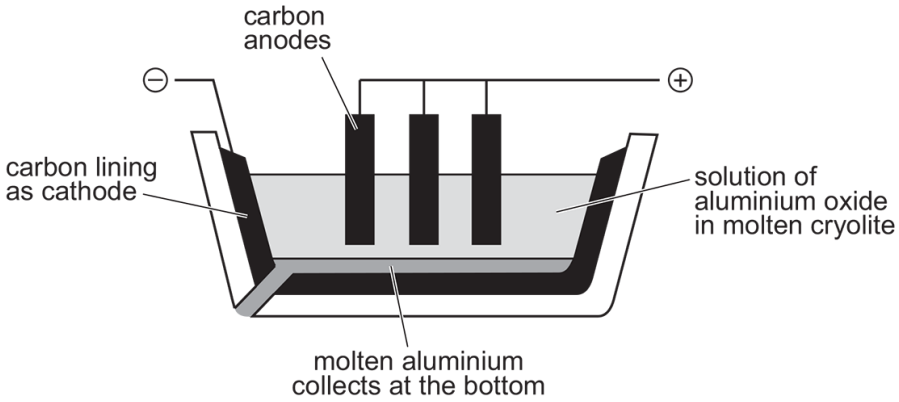
4 It reacts with dilute hydrochloric acid to produce hydrogen gas.

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

---

13. 0620_w20_qp_22 Q: 31

The apparatus used for the extraction of aluminium oxide by electrolysis is shown.



Which equation represents a reaction taking place at the anode?

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

B $2O^{2-} \rightarrow O_2 + 4e^-$

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

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

14. 0620_w20_qp_23 Q: 29

The equation for the reaction between iron(III) oxide and carbon monoxide is shown.

$$Fe_2O_3 + xCO \rightarrow yFe + zCO_2$$

Which values of x, y and z balance the equation?

	x	y	z
A	2	2	2
B	2	3	3
C	3	1	3
D	3	2	3

Which process is used to separate oxygen from liquid air?

A chromatography

B distillation

C filtration

D fractional distillation

---

15. 0620_m19_qp_22 Q: 30

Which statement about the extraction of metals is correct?

A Aluminium is extracted by the electrolysis of hematite.

B Cryolite acts as a reducing agent in the extraction of aluminium.

C Zinc is extracted by the electrolysis of zinc blende.

D Zinc is obtained by heating zinc oxide with coke.

---

16. 0620_s19_qp_21 Q: 25

Zinc is extracted from its ore, zinc blende, using two chemical reactions.

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

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

Which substance is reduced in reactions 1 and 2?

	reaction 1	reaction 2
A	O_2	C
B	O_2	ZnO
C	ZnS	C
D	ZnS	ZnO

---

17. 0620_w19_qp_21 Q: 29

Which statement about the extraction of aluminium is correct?

A Aluminium is formed at the cathode during the electrolysis of aluminium oxide.

B Hematite is mainly aluminium oxide.

C Molten cryolite is used to raise the melting point of the aluminium oxide.

D Oxygen gains electrons at the anode during the electrolysis of aluminium oxide.

---

18. 0620_w19_qp_22 Q: 29

Which statement about the extraction of aluminium from aluminium oxide is correct?

A Aluminium is formed at the positive electrode during electrolysis.

B Pure aluminium oxide is dissolved in molten cryolite.

C Pure aluminium oxide is electrolysed using aluminium as the positive electrode.

D Pure aluminium oxide is heated with carbon to form carbon dioxide and aluminium.

---

19. 0620_w19_qp_23 Q: 29

Why is cryolite used in the extraction of aluminium by electrolysis?

A It changes bauxite to aluminium oxide.

B It decreases the melting point of the aluminium.

C It dissolves the aluminium oxide.

D It protects the anodes from corrosion.

---

20. 0620_m18_qp_22 Q: 25

Aluminium is extracted from aluminium oxide using electrolysis.

Carbon dioxide is formed in this process.

Which equation shows the formation of carbon dioxide during the extraction of aluminium from aluminium oxide by electrolysis?

A $Al_2(CO_3)_3 \rightarrow Al_2O_3 + 3CO_2$

B $Al_2O_3 + 3CO \rightarrow 2Al + 3CO_2$

C $C + O_2 \rightarrow CO_2$

D $C^{4+} + 2O^{2-} \rightarrow CO_2$

---

21. 0620_s18_qp_21 Q: 26

Aluminium metal is extracted from aluminium oxide using electrolysis.

Which statement about the extraction process is **not** correct?

A A large amount of electricity is required.

B Molten cryolite is used to dissolve the aluminium oxide.

C Oxygen gas is released which reacts to form carbon dioxide.

D The negative electrodes burn away and have to be replaced.

---

22. 0620_s18_qp_22 Q: 26

Which statement about the industrial extraction of zinc is correct?

A Cryolite is added to lower the melting point.

B Molten zinc oxide is electrolysed.

C Zinc oxide is heated with coke.

D Zinc sulfide is heated with coke.

---

23. 0620_s18_qp_23 Q: 26

Which equation represents the first stage in the extraction of zinc from zinc blende?

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

B $ZnS + H_2O \rightarrow ZnO + H_2S$

C $ZnO + CO \rightarrow Zn + CO_2$

D $ZnO + H_2SO_4 \rightarrow ZnSO_4 + H_2O$

---

24. 0620_w18_qp_22 Q: 27

Bauxite contains aluminium oxide.

Aluminium is extracted from aluminium oxide by electrolysis.

Why is cryolite added to the electrolytic cell used to extract aluminium?

A Cryolite prevents the carbon anodes being burned away.

B Cryolite removes impurities from the bauxite.

C Cryolite increases the rate at which aluminium ions are discharged.

D Molten cryolite dissolves the aluminium oxide.

---

25. 0620_w18_qp_23 Q: 27

Which statement about the manufacture of aluminium by electrolysis is correct?

A Aluminium ions are oxidised to aluminium by gaining electrons.

B Aluminium is extracted from its ore hematite.

C Molten cryolite is used to dissolve the aluminium oxide.

D Oxygen is formed at the negative electrode.

---

26. 0620_m17_qp_22 Q: 27

Which substance produces sulfur dioxide when roasted in air?

A bauxite

B cryolite

C hematite

D zinc blende

---

27. 0620_s17_qp_21 Q: 27

Zinc metal is extracted from its ore zinc blende in a similar method to that used to extract iron from hematite.

In which way is zinc extraction different from iron extraction?

A Carbon and carbon monoxide are the main reducing agents.

B Hot air at the base of the furnace reacts with coke to keep the furnace hot.

C The metal is removed as a vapour at the top of the furnace.

D The metal oxide is added into the top of the furnace.

---

28. 0620_s17_qp_22 Q: 25

Which process is involved in the extraction of zinc from zinc blende?

A Cryolite is added to lower the melting point of zinc blende.

B Molten zinc blende is electrolysed.

C Zinc blende is heated with carbon.

D Zinc blende is roasted in air.

---

29. 0620_s17_qp_23 Q: 25

Which equation from the zinc extraction process shows the metal being produced by reduction?

A $ZnO + C \rightarrow Zn + CO$

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

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

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

---

30. 0620_w17_qp_21 Q: 26

Aluminium is extracted by the electrolysis of aluminium oxide.

Which statement is **not** correct?

A Aluminium ions are oxidised at the cathode.

B Carbon dioxide is made at the anode.

C Cryolite is added to lower the melting point of the aluminium oxide.

D The electrodes are made from graphite.

---

31. 0620_w17_qp_22 Q: 26

Aluminium is extracted from bauxite by electrolysis.

Which row shows the anode material and the anode reaction?

	anode material	anode reaction
A	carbon	$Al^{3+} + 3e^- \rightarrow Al$
B	carbon	$2O^{2-} \rightarrow O_2 + 4e^-$
C	steel	$Al^{3+} + 3e^- \rightarrow Al$
D	steel	$2O^{2-} \rightarrow O_2 + 4e^-$

---

32. 0620_w17_qp_23 Q: 26

Aluminium is obtained by the electrolysis of a mixture of aluminium oxide and cryolite.

Why is cryolite used?

A as a catalyst to speed up the process

B as a coolant to prevent the process getting too hot

C as a solvent for aluminium oxide

D as the main source of aluminium ions

---

33. 0620_m16_qp_22 Q: 26

Iron is extracted from hematite in the blast furnace.

The hematite contains silicon(IV) oxide (sand) as an impurity.

What reacts with this impurity to remove it?

A calcium oxide

B carbon

C carbon dioxide

D slag

---

34. 0620_p16_qp_20 Q: 30

Zinc is extracted from zinc blende. Zinc blende is an ore of zinc and consists mainly of zinc sulfide.

One of the steps in the process involves zinc sulfide reacting with oxygen from the air.

What is the equation for this reaction?

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

B $2ZnS + O_2 \rightarrow 2Zn + SO_2$

C $2ZnS + O_2 \rightarrow 2ZnO + S$

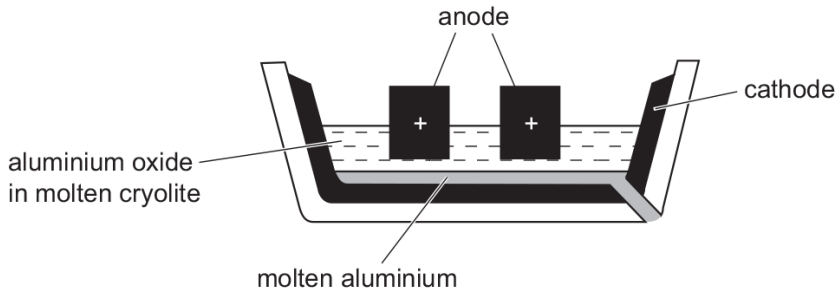
D $ZnS + 2O_2 \rightarrow ZnSO_4$

---

35. 0620_s16_qp_21 Q: 28

Aluminium is manufactured by electrolysis of aluminium oxide.

The diagram shows the electrolysis cell.



Which statement about the process is **not** correct?

A Aluminium ions gain electrons during the electrolysis and are reduced.

B Cryolite is added to reduce the melting point of the aluminium oxide.

C The anode and cathode are made of graphite.

D The cathode has to be replaced regularly because it is burnt away.

---

36. 0620_s16_qp_22 Q: 27

Iron from a blast furnace is treated with oxygen and with calcium oxide to make steel.

Which substances in the iron are removed?

	oxygen removes	calcium oxide removes
A	carbon	acidic oxides
B	carbon	basic oxides
C	iron	acidic oxides
D	iron	basic oxides

---

37. 0620_s16_qp_22 Q: 28

Why is cryolite used during the extraction of aluminium by electrolysis?

A It is a catalyst for the reaction.

B It lowers the melting point of the electrolyte.

C It protects the anodes.

D It separates the aluminium from the electrolyte.

---

38. 0620_s16_qp_23 Q: 28

Aluminium is extracted by electrolysis of a mixture of aluminium oxide and cryolite.

Which statement is **not** correct?

A The electrodes are made from graphite.

B The formula for aluminium oxide is Al_2O_3.

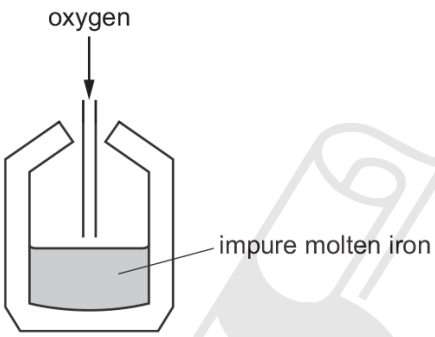
C The purpose of the cryolite is to lower the melting point of the mixture.

D The reaction taking place at the anode is $Al^{3+} + 3e^- \rightarrow Al$.

---

39. 0620_w16_qp_21 Q: 25

Impure iron from the blast furnace is converted to steel as shown.



Which statement about the process is correct?

A Acidic oxides are added to remove alkaline impurities.

B Coke is added as a reducing agent.

C Oxygen is blown in to oxidise the impure iron.

D The steel produced contains less carbon than the impure iron.

---

40. 0620_w16_qp_21 Q: 27

Aluminium is extracted by electrolysis.

From which ore is aluminium extracted and at which electrode is aluminium deposited during electrolysis?

	ore	electrode
A	bauxite	negative
B	bauxite	positive
C	cryolite	negative
D	cryolite	positive

---

41. 0620_w16_qp_21 Q: 28

Zinc oxide can be reacted with carbon to produce zinc metal.

Which equation for this reaction is correct?

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

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

C $ZnO + C \rightarrow Zn + CO$

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

---

42. 0620_w16_qp_22 Q: 25

Impurities in iron obtained from the blast furnace include carbon, phosphorus and silicon.

Which impurities are removed from the molten iron as gases when it is made into steel?

A carbon and phosphorus

B carbon and silicon

C carbon only

D phosphorus and silicon

---

43. 0620_w16_qp_22 Q: 27

Which statement about the industrial extraction of aluminium from aluminium oxide is correct?

A Aluminium is extracted by heating its oxide with carbon.

B Aluminium is extracted using electrolysis and is collected at the anode.

C Aluminium is extracted using platinum electrodes and direct current.

D Molten cryolite is used as a solvent for aluminium oxide.

---

44. 0620_w16_qp_23 Q: 25

Basic oxides and oxygen are used to convert iron into steel.

Which statement is **not** correct?

A Carbon is converted into carbon dioxide.

B Silicon is converted into silicon(IV) oxide.

C The basic oxides react with acidic impurities to form slag.

D The oxygen reacts with the iron to produce hematite.

SN	Paper	Q. No.	Answer
01	0620_w16_qp_22	26	B
02	0620_w16_qp_23	26	A
03	0620_m21_qp_22	25	B
04	0620_s21_qp_22	27	C
05	0620_s21_qp_23	26	B
06	0620_s21_qp_23	29	D
07	0620_w21_qp_21	26	A
08	0620_w21_qp_22	26	C
09	0620_m20_qp_22	27	D
10	0620_p20_qp_20	30	A
11	0620_s20_qp_21	27	A
12	0620_w20_qp_21	29	D
13	0620_w20_qp_22	31	B
14	0620_w20_qp_23	29	D
15	0620_m19_qp_22	30	D
16	0620_s19_qp_21	25	B
17	0620_w19_qp_21	29	A
18	0620_w19_qp_22	29	B
19	0620_w19_qp_23	29	C
20	0620_m18_qp_22	25	C
21	0620_s18_qp_21	26	D
22	0620_s18_qp_22	26	C
23	0620_s18_qp_23	26	A
24	0620_w18_qp_22	27	D
25	0620_w18_qp_23	27	C
26	0620_m17_qp_22	27	D
27	0620_s17_qp_21	27	C
28	0620_s17_qp_22	25	D
29	0620_s17_qp_23	25	A
30	0620_w17_qp_21	26	A
31	0620_w17_qp_22	26	B
32	0620_w17_qp_23	26	C
33	0620_m16_qp_22	26	A
34	0620_p16_qp_20	30	A
35	0620_s16_qp_21	28	D
36	0620_s16_qp_22	27	A
37	0620_s16_qp_22	28	B
38	0620_s16_qp_23	28	D
39	0620_w16_qp_21	25	D
40	0620_w16_qp_21	27	A
41	0620_w16_qp_21	28	C
42	0620_w16_qp_22	25	C
43	0620_w16_qp_22	27	D
44	0620_w16_qp_23	25	D