5070 Chemistry Paper 1 - Metals

Topical questions | 52 questions

1. Question | 5070 May-June 2023 P1 V1 Q6

6 When a strip of copper is placed in aqueous silver nitrate, a displacement reaction takes place.

What is the ionic equation for the reaction which takes place?

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

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

C $2AgNO_3(aq) + Cu(s) \rightarrow 2Ag(s) + Cu(NO_3)_2(aq)$

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

2. Question | 5070 May-June 2023 P1 V1 Q24

24 Three statements about the properties of metals are shown.

1 All metals conduct electricity.

2 All metals have two electrons in their innermost shell.

3 All metals have high melting points.

Which statements are correct?

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

3. Question | 5070 May-June 2023 P1 V1 Q25

25 Which statements about metals and their uses are correct?

1 Aluminium is used to make overhead electrical cables because it has a low density.

2 Aluminium is used to make food containers because it is resistant to corrosion.

3 Copper is used to make electrical wiring because it is ductile.

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

4. Question | 5070 May-June 2023 P1 V1 Q26

26 Stainless steel is an alloy. It contains iron and more than one other element.

Which elements other than iron are commonly used in stainless steel?

A copper and chromium

B copper and nickel

C nickel and carbon

D zinc and carbon

5. Question | 5070 May-June 2023 P1 V1 Q27

27 The equations for some of the reactions of metals Q, R and T are shown.

$$2QNO_3(aq) + Cu(s) \rightarrow 2Q(s) + Cu(NO_3)_2(aq)$$

$$R(s) + TSO_4(aq) \rightarrow T(s) + RSO_4(aq)$$

$$T(s) + H_2SO_4(aq) \rightarrow TSO_4(aq) + H_2(g)$$

Using the equations, what is the order of reactivity of Q, R and T?

	most reactive ⟶		least reactive
A	Q	T	R
B	R	Q	T
C	R	T	Q
D	T	R	Q

6. Question | 5070 May-June 2023 P1 V1 Q28

28 Zinc is used to galvanise iron, which prevents the iron from rusting.

Which statements are correct?

1 The layer of zinc forms a barrier between the iron and the oxygen and water in the atmosphere.

2 Zinc will oxidise before the iron does, even if the layer of zinc is scratched.

3 When iron rusts, atoms of iron gain electrons to form ions.

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

7. Question | 5070 May-June 2023 P1 V1 Q29

29 Three statements about the extraction of aluminium are shown.

1 The electrolyte is aluminium oxide dissolved in molten cryolite.

2 Carbon is used for both the cathode and the anode.

3 Carbon dioxide is given off at the cathode.

Which statements are correct?

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

8. Question | 5070 May-June 2023 P1 V2 Q29

29 Metal X reacts with cold water to form a gas.

Zinc displaces metal Y from solutions of its salts.

The carbonate of metal Z is insoluble.

What could be the identities of X, Y and Z?

	X	Y	Z
A	sodium	magnesium	sodium
B	sodium	copper	copper
C	copper	magnesium	copper
D	sodium	copper	sodium

9. Question | 5070 May-June 2023 P1 V2 Q30

30 Which statement about alloys is correct?

A They are compounds of two or more metals.

B They are mixtures of metals with other metals or non-metals.

C They conduct electricity because they have ionic bonds between the metal atoms.

D They have identical physical properties to the metals they contain.

10. Question | 5070 May-June 2023 P1 V2 Q31

31 Pieces of magnesium can be attached to the steel hull of a ship to prevent rusting.

This is sacrificial protection.

Which statements about sacrificial protection are correct?

1 Iron atoms gain electrons and form hydrated iron(III) oxide.

2 Magnesium atoms gain electrons to form magnesium ions.

3 Magnesium is oxidised.

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

11. Question | 5070 Oct-Nov 2023 P1 V1 Q25

25 A power cable requires an element that:

1 conducts electricity

2 has a relatively low density

3 is ductile.

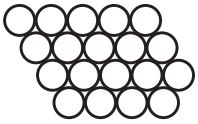
Which of these properties does aluminium have?

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

12. Question | 5070 Oct-Nov 2023 P1 V1 Q26

26 Which diagram represents the structure of an alloy?

A



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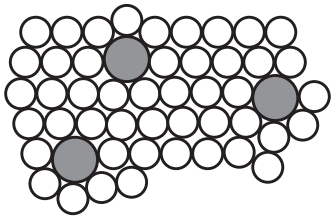

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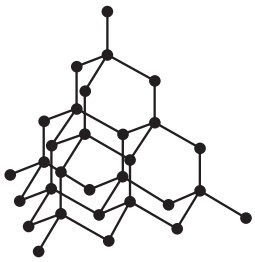

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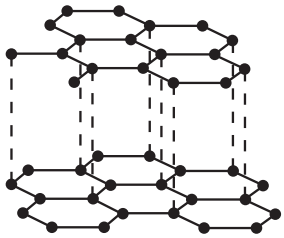


13. Question | 5070 Oct-Nov 2023 P1 V1 Q27

27 Most metals react with oxygen in the air to form a metal oxide.

Which metal forms a metal oxide layer that reduces its apparent reactivity?

A aluminium

B copper

C iron

D silver

14. Question | 5070 Oct-Nov 2023 P1 V1 Q28

28 Which statement about corrosion of metals is correct?

A A barrier method is needed to prevent the corrosion of stainless steel.

B Iron corrodes to produce hydrated iron(I) oxide.

C Sacrificial protection uses a less reactive metal attached to the metal object that is being protected.

D When corrosion occurs, the metal loses electrons to become positive ions.

15. Question | 5070 Oct-Nov 2023 P1 V1 Q29

29 Some metals and the compounds in their ores are shown.

metal	Al	Ca	Pb	Na	Fe	Mg
compound in ore	Al_2O_3	$CaCO_3$	PbS	NaCl	Fe_2O_3	$MgCO_3$

Which type of reaction occurs in the extraction of each of these metals from its ore?

A decomposition by heat

B electrolysis

C precipitation

D reduction

16. Question | 5070 Oct-Nov 2023 P1 V2 Q25

25 Aircraft manufacture requires a metal that:

1 has a relatively low density

2 is resistant to corrosion.

Which properties apply to aluminium?

A both 1 and 2

B 1 only

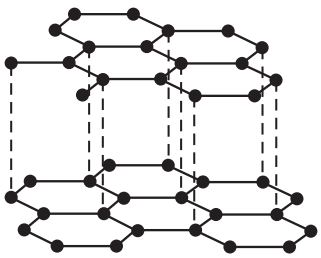
C 2 only

D neither 1 nor 2

17. Question | 5070 Oct-Nov 2023 P1 V2 Q26

26 Which diagram represents an alloy?

A



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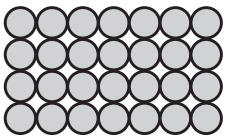

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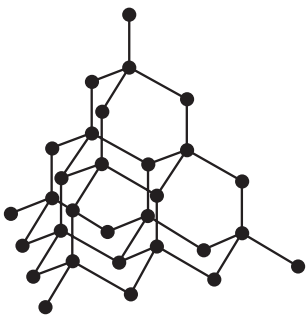

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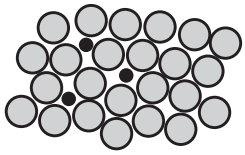


18. Question | 5070 Oct-Nov 2023 P1 V2 Q27

27 A small piece of metal is added to a large beaker of water.

A vigorous reaction occurs.

When the reaction stops, a few drops of litmus are added to the solution.

What is the metal and which colour is the solution after the litmus is added?

	metal	colour of solution
A	calcium	blue
B	calcium	red
C	magnesium	blue
D	magnesium	red

19. Question | 5070 Oct-Nov 2023 P1 V2 Q28

28 The rusting of iron can be prevented by coating the iron with another material.

Which statement explains why coating with zinc is more effective than painting?

A If the coating is damaged, zinc corrodes instead of iron.

B Iron is above zinc in the reactivity series.

C Zinc does not react with air or with water.

D Zinc forms an unreactive alloy coating with iron.

20. Question | 5070 Oct-Nov 2023 P1 V2 Q29

29 The list shows the position of metal X in the reactivity series of metals.

Na Al Fe X Cu Ag

Which methods could be used to extract metal X?

1 electrolysis of the solid metal oxide

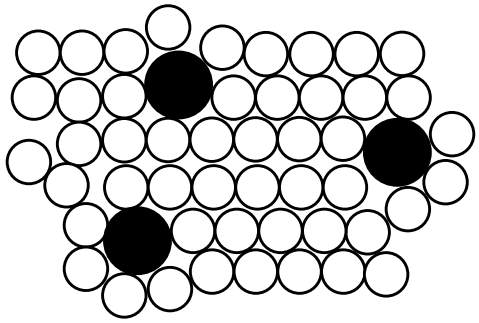
2 heating the metal oxide with carbon

3 heating the metal oxide with copper

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

21. Question | 5070 Specimen 2023 P1 Q30

30 The diagram shows the structure of an alloy.



Which statement about alloys is correct?

A Alloys can only be formed by mixing copper or iron with other metals.

B Carbon and iron are the only two elements in stainless steel.

C In an alloy there is attraction between positive ions and a ‘sea’ of delocalised electrons.

D The alloy brass has a chemical formula.

22. Question | 5070 May-June 2024 P1 V1 Q29

29 Which statement about alloys is correct?

A Alloys are **not** electrical or thermal conductors.

B Alloys are softer than pure metals because the layers in the alloy slip over each other more easily.

C Brass is a mixture of copper with small amounts of chromium, nickel and carbon.

D The percentage of each metal in an alloy may vary.

23. Question | 5070 May-June 2024 P1 V1 Q30

30 The table shows the reactions of four metals, P, Q, R and S, and their oxides.

	reaction with water	reaction with dilute acid	reaction of oxide with carbon
P	reacts only with steam	reacts rapidly	no reaction
Q	no reaction	reacts slowly	reacts when heated strongly
R	no reaction	no reaction	reacts when heated
S	reacts rapidly	reacts rapidly	no reaction

What is the order of reactivity, from the most reactive to the least reactive metal?

A P > S > Q > R

B P > S > R > Q

C S > P > Q > R

D S > P > R > Q

24. Question | 5070 May-June 2024 P1 V1 Q31

31 Which reactions take place during the extraction of aluminium from aluminium oxide using carbon electrodes?

1 $2O^{2-} \rightarrow O_2 + 4e^-$

2 $C + O_2 \rightarrow CO_2$

3 $Al^{3+} + 2e^- \rightarrow Al$

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

25. Question | 5070 May-June 2024 P1 V2 Q27

27 Which properties are correct for the element copper?

	melting point / °C	malleability
A	83	low
B	83	high
C	1083	low
D	1083	high

26. Question | 5070 May-June 2024 P1 V2 Q28

28 Which statement is correct?

A Copper is unreactive because of an oxide layer.

B Gold and silver are used to make jewellery because they corrode very slowly.

C Magnesium can be displaced from aqueous solutions of its ions by adding aluminium.

D Zinc gains electrons more readily than magnesium gains electrons.

27. Question | 5070 May-June 2024 P1 V2 Q29

29 Which reaction takes place in the blast furnace?

A $FeCr_2O_4 + 4C \rightarrow Fe + 2Cr + 4CO$

B $3Fe + 4H_2O \rightarrow Fe_3O_4 + 4H_2$

C $SiO_2 + CaO \rightarrow CaSiO_3$

D $SiO_2 + 2NaOH \rightarrow Na_2SiO_3 + H_2O$

28. Question | 5070 Oct-Nov 2024 P1 V1 Q25

25 A student makes three statements about metals and non-metals.

1 All alloys contain at least one metal.

2 All metals are good thermal and electrical conductors.

3 All solid non-metals are malleable.

Which statements are correct?

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

29. Question | 5070 Oct-Nov 2024 P1 V1 Q26

26 Group I elements and transition elements are metals.

Student X suggests that the Group I elements are above hydrogen in the reactivity series but that not all transition elements are above hydrogen.

Student Y suggests that the densities of Group I elements are lower than those of the transition elements.

Which students are correct?

A both X and Y

B X only

C Y only

D neither X nor Y

30. Question | 5070 Oct-Nov 2024 P1 V1 Q27

27 The equations for three reactions are given.

1 $2O^{2-} \rightarrow O_2 + 4e^-$

2 $C + O_2 \rightarrow CO_2$

3 $CaO + SiO_2 \rightarrow CaSiO_3$

These reactions take place in the extraction of metals.

Which row is correct?

	reaction in extraction of aluminium only	reaction in extraction of iron only	reaction in extraction of aluminium and iron
A	1	2	3
B	1	3	2
C	2	1	3
D	2	3	1

31. Question | 5070 Oct-Nov 2024 P1 V2 Q28

28 Aluminium and copper are good conductors of electricity.

Why is aluminium used in overhead electrical cables instead of copper?

A Aluminium is above copper in the reactivity series.

B Aluminium is less dense than copper.

C Copper does not have an oxide coating.

D Copper reacts with water.

32. Question | 5070 Oct-Nov 2024 P1 V2 Q29

29 The oxide of Z is reduced by heating with carbon.

What is Z?

A aluminium

B calcium

C magnesium

D zinc

33. Question | 5070 Oct-Nov 2024 P1 V2 Q30

30 A metal ore contains an oxide, MO.

Metal M forms coloured compounds.

When a piece of iron is placed into a solution containing aqueous M^{2+} ions, M is displaced.

Which row is correct?

	density of M	possible method of extraction of M from MO
A	high	electrolysis only
B	high	electrolysis or heating with carbon
C	high	heating with carbon only
D	low	heating with carbon only

34. Question | 5070 May-June 2025 P1 V1 Q26

26 Which statement about brass is correct?

A It is a compound.

B It is an alloy.

C It is an isomer.

D It is an isotope.

35. Question | 5070 May-June 2025 P1 V1 Q27

27 Iron is galvanised with zinc to prevent rusting.

Which type of protection is provided by galvanising?

A alloy formation

B barrier and sacrificial

C barrier only

D sacrificial only

36. Question | 5070 May-June 2025 P1 V1 Q28

28 Iron is extracted from its ore hematite in a blast furnace.

Which statement about this extraction process is correct?

A Air is blown into the blast furnace to react with carbon.

B At the bottom of the blast furnace, a layer of molten iron floats on top of a layer of molten slag.

C Limestone is decomposed in the blast furnace to produce carbon monoxide.

D Silicon dioxide, an impurity in the ore, is a basic oxide.

37. Question | 5070 May-June 2025 P1 V2 Q27

27 Which statement explains why objects manufactured from aluminium corrode very slowly?

A Aluminium is above hydrogen in the reactivity series.

B Aluminium is below hydrogen in the reactivity series.

C The objects become coated with a protective layer of aluminium nitride.

D The objects become coated with a protective layer of aluminium oxide.

38. Question | 5070 May-June 2025 P1 V2 Q28

28 The iron(III) oxide used in a blast furnace contains the impurity silicon(IV) oxide, SiO_2.

Which reaction removes the silicon(IV) oxide?

A $3SiO_2 + Fe_2O_3 \rightarrow 2Fe + 3SiO_3$

B $SiO_2 + C \rightarrow Si + CO_2$

C $SiO_2 + CaO \rightarrow CaSiO_3$

D $2SiO_2 + N_2 \rightarrow 2Si + 2NO_2$

39. Question | 5070 Oct-Nov 2025 P1 V1 Q24

24 Which statement is correct?

A Aluminium is used in food containers because of its resistance to corrosion.

B Aluminium is used in the manufacture of aircraft because of its low ductility.

C Copper is used in electrical wiring because of its high density.

D Copper is used in the manufacture of overhead electrical cables because it forms an unreactive oxide layer.

40. Question | 5070 Oct-Nov 2025 P1 V1 Q25

25 Which elements are the major constituents of brass?

A Br and As **B** Cu and Sn **C** Cu and Zn **D** Sn and Zn

41. Question | 5070 Oct-Nov 2025 P1 V1 Q26

26 The diagrams show two methods in which metal X is used to prevent the rusting of iron.



A student suggests that metal X must be less reactive than iron and must have a lower proton number than iron.

Which suggestions are correct?

	less reactive	lower proton number
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key
✓ = yes
✗ = no

42. Question | 5070 Oct-Nov 2025 P1 V1 Q27

27 Aluminium is extracted from molten aluminium oxide by electrolysis.

Which material is used for the electrodes in the industrial extraction?

A aluminium

B carbon

C cryolite

D platinum

43. Question | 5070 Oct-Nov 2025 P1 V2 Q25

25 When a piece of aluminium is placed in cold, dilute hydrochloric acid, no reaction is observed initially.

What is the reason for this?

A Aluminium contains small amounts of a more reactive metal that reacts with the acid instead.

B Aluminium is above hydrogen in the reactivity series.

C Aluminium is amphoteric and will only react with bases.

D Aluminium is coated with an oxide layer that prevents the acid getting to the metal.

44. Question | 5070 Oct-Nov 2025 P1 V2 Q26

26 A piece of zinc is attached to a steel car to prevent it from rusting.

Which statement is correct?

A A piece of copper is more effective than zinc because copper does **not** rust.

B A piece of magnesium is more effective than zinc because magnesium is less reactive than zinc.

C The piece of zinc provides a barrier around the entire steel car.

D The piece of zinc provides sacrificial protection to the steel car.

45. Question | 5070 Oct-Nov 2025 P1 V2 Q27

27 Which statement about the extraction of iron from hematite in the blast furnace is correct?

A Coke is reduced to carbon dioxide producing thermal energy to heat the furnace.

B Hematite contains iron(III) oxide which is reduced by carbon monoxide.

C Limestone is added to the blast furnace and is a substance that consists mainly of calcium oxide.

D Molten slag is formed from a reaction between hematite and silicon(IV) oxide.

46. Question | 5070 May-June 2026 P1 V1 Q24

24 Which statement about aluminium is correct?

A It is used in the electrical wiring of houses because of its high resistance to corrosion and poor electrical conductivity.

B It is used in the manufacture of aircraft because of its high ductility and high density.

C It is used in overhead electrical cables because of its good electrical conductivity and poor resistance to corrosion.

D It is used in food containers because of its high malleability and high resistance to corrosion.

47. Question | 5070 May-June 2026 P1 V1 Q25

25 Which statement is correct?

A Copper displaces magnesium from aqueous magnesium sulfate.

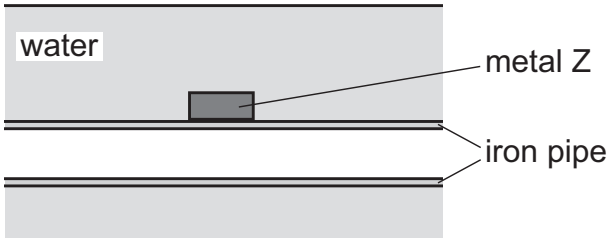
B Carbon reacts with magnesium oxide; carbon dioxide is one product of this reaction.

C Iron displaces silver from aqueous silver nitrate.

D Hydrogen reacts with zinc oxide; water is one product of this reaction.

48. Question | 5070 May-June 2026 P1 V1 Q26

26 The diagram shows how an underwater iron pipe can be protected from rusting.



Metal Z can be .....1..... because it is .....2..... reactive than iron.

Which words correctly complete gaps 1 and 2?

	1	2
A	copper	less
B	copper	more
C	magnesium	less
D	magnesium	more

49. Question | 5070 May-June 2026 P1 V1 Q27

27 Process 1: Iron is extracted from hematite in a blast furnace.

Process 2: Aluminium is extracted from purified bauxite in an electrolytic cell.

Which statements are correct for **both** processes?

1 An oxide in the ore is reduced.
2 Carbon reacts with oxygen to form carbon dioxide.
3 Impurities are removed as slag.
4 Thermal decomposition takes place.

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

50. Question | 5070 May-June 2026 P1 V2 Q26

26 Which statement about metals and alloys is correct?

A Brass is a mixture of copper and tin.

B Cutlery made of stainless steel contains iron and does **not** rust easily.

C In pure metals, the negative ions are all the same size.

D The hardness of iron is decreased by forming an alloy with chromium, nickel and carbon.

51. Question | 5070 May-June 2026 P1 V2 Q27

27 When element X is added to aqueous copper(II) sulfate, no effervescence is observed.

The blue solution turns colourless.

What is element X?

A calcium

B potassium

C silver

D zinc

52. Question | 5070 May-June 2026 P1 V2 Q28

28 Which substance is used for the electrodes when aluminium is extracted from its ore?

A bauxite

B carbon

C cryolite

D platinum