26 What is the correct order of reactivity of the following metals, from least reactive to most reactive?

A calcium → magnesium → zinc → copper

B copper → zinc → magnesium → calcium

C copper → zinc → calcium → magnesium

D zinc → copper → magnesium → calcium

27 The equation for the reaction between aluminium and iron(III) oxide is shown.

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

Which statement about this reaction is correct?

A The aluminium acts as an oxidising agent.

B It shows that iron is more reactive than aluminium.

C The oxidation number of the aluminium decreases during the reaction.

D It shows that aluminium has a greater tendency to form ions than iron.

28 Which row identifies methods used to prevent iron from rusting?

	greasing	painting	washing with distilled water
A	✓	✗	✓
B	✗	✓	✓
C	✓	✓	✗
D	✓	✓	✓

key

✓ = yes

✗ = no

29 Which statement about the extraction of aluminium by electrolysis is correct?

A Aluminium oxide is dissolved in molten cryolite to increase its melting point.

B At the cathode, oxygen ions lose electrons to form oxygen gas.

C The carbon in the graphite anode reacts with oxygen gas forming carbon dioxide.

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

26 Four different metals are separately added to water.

The oxide of each metal is separately heated with carbon.

The results are shown.

metal	metal with water	metal oxide with carbon
Q	no reaction	brown solid forms
R	rapid fizzing	no reaction
S	a few bubbles	no reaction
T	a few bubbles	grey solid forms

What is the order of reactivity of the four metals, least reactive first?

A Q → T → S → R

B Q → S → T → R

C R → S → T → Q

D R → T → S → Q

27 An iron nail is fully covered with zinc to prevent it from rusting.

Which row describes this method of protection and explains why zinc is used to protect the iron nail?

	method of protection	reason zinc is used
A	barrier method and sacrificial protection	zinc is more reactive than iron
B	barrier method and sacrificial protection	iron is more reactive than zinc
C	sacrificial protection only	zinc is more reactive than iron
D	barrier method only	iron is more reactive than zinc

28 Iron is extracted from hematite in the blast furnace.

Which reaction increases the temperature in the blast furnace to over 1500 °C?

A calcium carbonate → calcium oxide + carbon dioxide

B calcium oxide + silicon(IV) oxide → calcium silicate

C carbon + oxygen → carbon dioxide

D carbon dioxide + carbon → carbon monoxide

29 Aluminium is extracted by the electrolysis of purified bauxite.

Which row shows the half-equations at the electrodes and explains why one of the electrodes has to be replaced regularly?

	half-equation at anode	half-equation at cathode	electrode replacement
A	$2O^{2-} \rightarrow O_2 + 4e^-$	$Al^{3+} + 3e^- \rightarrow Al$	cathode replaced as it gets coated with aluminium
B	$2O^{2-} \rightarrow O_2 + 4e^-$	$Al^{3+} + 3e^- \rightarrow Al$	anode replaced as it burns away in oxygen
C	$Al^{3+} + 3e^- \rightarrow Al$	$2O^{2-} \rightarrow O_2 + 4e^-$	cathode replaced as it burns away in oxygen
D	$Al^{3+} + 3e^- \rightarrow Al$	$2O^{2-} \rightarrow O_2 + 4e^-$	anode replaced as it gets coated with aluminium

28 Some information about four metals P, Q, R and S is listed.

Metal P does **not** react with dilute hydrochloric acid.

Metal Q is more reactive than magnesium.

Metal R reacts rapidly with cold water to produce hydrogen.

Metal S reacts with dilute hydrochloric acid to produce hydrogen.

Which row identifies P, Q, R and S?

	P	Q	R	S
A	gold	aluminium	sodium	copper
B	copper	potassium	calcium	magnesium
C	silver	calcium	iron	zinc
D	magnesium	sodium	potassium	iron

32 Iron is extracted from iron(III) oxide in the blast furnace.

Three steps in the process are listed.

1 Carbon (coke) is completely oxidised.

2 Iron(III) oxide is reduced.

3 Carbon dioxide is reduced to carbon monoxide.

What is the correct order of the steps in the extraction of iron?

A $1 \rightarrow 2 \rightarrow 3$ **B** $1 \rightarrow 3 \rightarrow 2$ **C** $2 \rightarrow 1 \rightarrow 3$ **D** $3 \rightarrow 1 \rightarrow 2$