



**IGCSE Chemistry**

# **REDOX**

0620 - PAPER 2 MCQ

2026 EDITION

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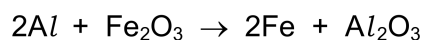
## SECTION - OXIDATION NUMBERS AND ROMAN NUMERALS

Q1

0620/23/M/J/25 Q18

Easy

18 The equation represents a redox reaction.



What is the change in the oxidation number of iron in this reaction?

- A from +2 to +3
- B from +2 to 0
- C from +3 to +2
- D from +3 to 0

Q2

0620/23/M/J/21 Q32

Hard

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       |

Q3

0620/22/F/M/23 Q24

Hard

24 Which pair of compounds shows a transition element in two different oxidation states?

- A  $Cr_2O_3$  and  $Cr_2(SO_4)_3$
- B  $Cu_2O$  and  $CuCO_3$
- C  $ZnS$  and  $ZnSO_4$
- D  $NiO$  and  $Ni(NO_3)_2$

## SECTION - OXIDATION NUMBERS AND ROMAN NUMERALS

Q4

0620/21/M/J/23 Q14

Hard

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

The salt sodium dichromate has the formula  $\text{Na}_2\text{Cr}_2\text{O}_7$ .

What is the oxidation state of chromium in this salt?

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

Q5

0620/22/O/N/23 Q24

Hard

24 Which pair of compounds shows that transition elements have variable oxidation states?

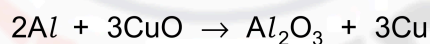
- A  $\text{Cr}_2\text{O}_3$  and  $\text{CrBr}_3$   
B  $\text{CuSO}_4$  and  $\text{CuCl}_2$   
C  $\text{Fe}_2\text{O}_3$  and  $\text{FeCl}_2$   
D  $\text{NiO}$  and  $\text{NiCl}_2$

Q6

0620/22/M/J/24 Q17

Hard

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



Which statements about this equation are correct?

- 1 The oxidation number of the aluminium reactant is +2.
- 2 The oxidation number of the aluminium in the product is +6.
- 3 The oxidation number of the copper in the reactant is +2.
- 4 The oxidation number of the copper product is 0.

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

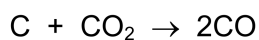
## SECTION - OXIDATION NUMBERS AND ROMAN NUMERALS

Q7

0620/22/O/N/24 Q17

Hard

- 17 The equation for the reaction of carbon with carbon dioxide is shown.



Which row identifies the carbon atom that is reduced and its change in oxidation number?

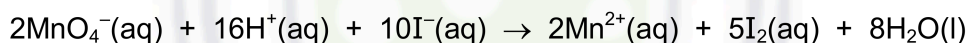
|          | atom that is reduced    | change in oxidation number |
|----------|-------------------------|----------------------------|
| <b>A</b> | carbon in $\text{CO}_2$ | $+2 \rightarrow +4$        |
| <b>B</b> | carbon in $\text{CO}_2$ | $+4 \rightarrow +2$        |
| <b>C</b> | elemental carbon, C     | $0 \rightarrow +2$         |
| <b>D</b> | elemental carbon, C     | $+2 \rightarrow 0$         |

Q8

0620/21/O/N/25 Q18

Hard

- 18 The ionic equation for the redox reaction between acidified manganate(VII) ions and iodide ions is shown.



Which row shows the changes in oxidation number for manganese and for iodine during this reaction?

|          | manganese |    | iodine |    |
|----------|-----------|----|--------|----|
|          | from      | to | from   | to |
| <b>A</b> | -2        | +4 | -1     | 0  |
| <b>B</b> | -2        | +4 | -10    | +5 |
| <b>C</b> | +7        | +2 | -1     | 0  |
| <b>D</b> | +7        | +2 | -10    | +5 |

Q9

0620/22/O/N/25 Q19

Hard

- 19 What is the oxidation number of chromium in the  $\text{Cr}_2\text{O}_7^{2-}$  ion?

**A** -2                      **B** -1                      **C** +6                      **D** +12

## SECTION - OXIDATION AND REDUCTION

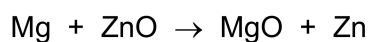
Q10

0620/21,23/O/N/22 Q16

Easy

**16** When magnesium is heated with zinc oxide a reaction occurs.

The equation is shown.



Which substance is oxidised?

- A** magnesium
- B** magnesium oxide
- C** zinc
- D** zinc oxide

Q11

0620/21/O/N/23 Q16

Easy

**16** Which equation shows the reduction of copper?

- A**  $\text{CuO} + \text{C} \rightarrow \text{Cu} + \text{CO}$
- B**  $2\text{CuS} + 3\text{O}_2 \rightarrow 2\text{CuO} + 2\text{SO}_2$
- C**  $\text{Cu(g)} \rightarrow \text{Cu(l)}$
- D**  $\text{Cu(l)} \rightarrow \text{Cu(s)}$

Q12

0620/22/O/N/23 Q18

Easy

**18** Which row describes what happens to  $\text{Fe}^{2+}$  ions when they are oxidised?

|          | electron movement   | oxidation number of iron |
|----------|---------------------|--------------------------|
| <b>A</b> | they gain electrons | decreases                |
| <b>B</b> | they gain electrons | increases                |
| <b>C</b> | they lose electrons | decreases                |
| <b>D</b> | they lose electrons | increases                |

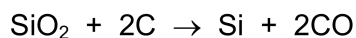
## SECTION - OXIDATION AND REDUCTION

Q13

0620/23/O/N/23 Q19

Easy

19 When heated strongly, silicon(IV) oxide reacts with carbon.



Which term describes what happens to silicon(IV) oxide?

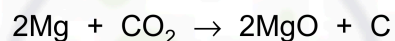
- A thermal decomposition
- B neutralisation
- C oxidation
- D reduction

Q14

0620/21/M/J/24 Q22

Easy

22 The equation for the reaction of magnesium with carbon dioxide is shown.



Which statement about this reaction is correct?

- A Magnesium is oxidised and carbon dioxide is reduced.
- B Magnesium is reduced and carbon dioxide is oxidised.
- C Magnesium and carbon dioxide are both oxidised.
- D Magnesium and carbon dioxide are neither oxidised nor reduced.

## SECTION - OXIDATION AND REDUCTION

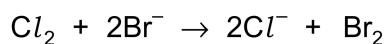
Q15

0620/21/M/J/24 Q23

Easy

**23** Chlorine displaces bromine from aqueous potassium bromide.

The ionic equation for the reaction is shown.



Which statement about this reaction is correct?

- A** Bromide ions act as an oxidising agent.
- B** Bromide ions are oxidised as electrons are lost.
- C** Chlorine acts as a reducing agent.
- D** Chlorine is reduced as electrons are lost.

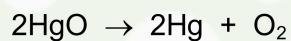
Q16

0620/22/F/M/25 Q21

Easy

**21** Mercury(II) oxide,  $\text{HgO}$ , decomposes when heated.

The equation is shown.



Why is this a reduction reaction?

- A** The products weigh less than the reactants.
- B** There are fewer reactants than products.
- C** There is a gain of oxygen.
- D** There is a loss of oxygen.

## SECTION - OXIDATION AND REDUCTION

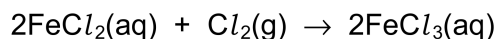
Q17

0620/21,22,23/O/N/21 Q16

Hard

16 Iron(II) chloride solution reacts with chlorine gas.

The equation is shown.



Which statements about this reaction are correct?

- 1  $\text{Fe}^{2+}$  ions are reduced to  $\text{Fe}^{3+}$  ions.
- 2 Chlorine acts as a reducing agent.
- 3  $\text{Fe}^{2+}$  ions each lose an electron.
- 4  $\text{Cl}_2$  molecules are reduced to  $\text{Cl}^-$  ions.

A 1 and 2

B 2 and 3

C 2 and 4

D 3 and 4

Q18

0620/22/M/J/24 Q16

Hard

16 Which equation represents a redox reaction?

- A  $\text{AgNO}_3 + \text{NaCl} \rightarrow \text{AgCl} + \text{NaNO}_3$
- B  $\text{PCl}_5 + 4\text{H}_2\text{O} \rightarrow \text{H}_3\text{PO}_4 + 5\text{HCl}$
- C  $3\text{Fe} + 4\text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4\text{H}_2$
- D  $\text{MgCO}_3 + 2\text{HCl} \rightarrow \text{MgCl}_2 + \text{CO}_2 + \text{H}_2\text{O}$

Q19

0620/23/O/N/24 Q19

Hard

19 Which statement about reactants in redox reactions is correct?

- A An oxidising agent donates electrons, and a reducing agent accepts electrons.
- B When one element gains electrons, the oxidation number of a different element increases.
- C When the oxidation number of one element increases, a different element gains oxygen.
- D When the oxidation number of one element increases, a different element loses electrons.

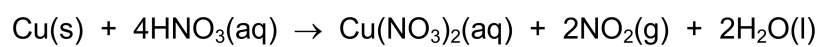
## SECTION - OXIDATION AND REDUCTION

Q20

0620/23/O/N/25 Q22

Hard

**22** The equation shows the reaction between copper and concentrated nitric acid.



Which element is reduced in this reaction?

- A** oxygen
- B** nitrogen
- C** copper
- D** hydrogen



## SECTION - OXIDISING AND REDUCING AGENTS

Q21

0620/22/F/M/21 Q18

Easy

**18** Magnesium reacts with copper(II) oxide to give magnesium oxide and copper.

Which substance is the oxidising agent in this reaction?

- A** copper
- B** copper(II) oxide
- C** magnesium
- D** magnesium oxide

Q22

0620/21,22,23/M/J/21 Q16

Easy

**16** An example of a redox reaction is shown.



Which statement about the reaction is correct?

- A** Zn is the oxidising agent and it oxidises  $\text{Cu}^{2+}$ .
- B** Zn is the oxidising agent and it reduces  $\text{Cu}^{2+}$ .
- C** Zn is the reducing agent and it oxidises  $\text{Cu}^{2+}$ .
- D** Zn is the reducing agent and it reduces  $\text{Cu}^{2+}$ .

Q23

0620/22/M/J/22 Q20

Easy

**20** Substance J takes part in a redox reaction.

In the reaction, J gains electrons.

Which statement is correct?

- A** J is the oxidising agent and it is oxidised in the reaction.
- B** J is the oxidising agent and it is reduced in the reaction.
- C** J is the reducing agent and it is oxidised in the reaction.
- D** J is the reducing agent and it is reduced in the reaction.

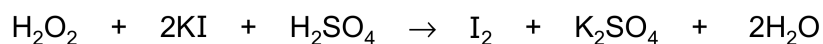
## SECTION - OXIDISING AND REDUCING AGENTS

Q24

0620/23/M/J/24 Q19

Easy

19 The equation for a redox reaction is shown.



Potassium iodide is ..... 1 ..... agent in this reaction because iodide ions ..... 2 ..... electrons.

Which words complete gaps 1 and 2?

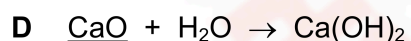
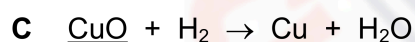
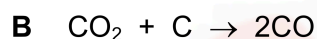
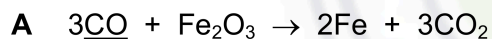
|          | 1            | 2    |
|----------|--------------|------|
| <b>A</b> | an oxidising | lose |
| <b>B</b> | an oxidising | gain |
| <b>C</b> | a reducing   | lose |
| <b>D</b> | a reducing   | gain |

Q25

0620/22/F/M/23 Q18

Hard

18 In which equation is the underlined substance acting as a reducing agent?



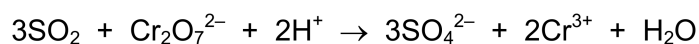
## SECTION - OXIDISING AND REDUCING AGENTS

Q26

0620/22/M/J/23 Q15

Hard

- 15 The equation for the reaction of sulfur dioxide with acidified potassium dichromate(VI) is shown.



What is oxidised and what is the oxidising agent?

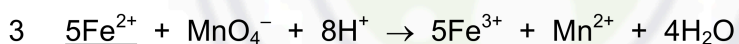
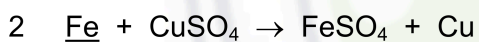
|          | oxidised                     | oxidising agent              |
|----------|------------------------------|------------------------------|
| <b>A</b> | $\text{SO}_2$                | $\text{Cr}_2\text{O}_7^{2-}$ |
| <b>B</b> | $\text{SO}_2$                | $\text{H}^+$                 |
| <b>C</b> | $\text{Cr}_2\text{O}_7^{2-}$ | $\text{H}^+$                 |
| <b>D</b> | $\text{Cr}_2\text{O}_7^{2-}$ | $\text{Cr}_2\text{O}_7^{2-}$ |

Q27

0620/22/M/J/25 Q17

Hard

- 17 Which equations show the underlined species acting as a reducing agent?



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

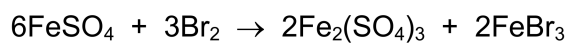
## SECTION - OXIDISING AND REDUCING AGENTS

Q28

0620/23/M/J/25 Q17

Hard

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



Which row identifies the oxidising agent and the reducing agent?

|          | oxidising agent              | reducing agent               |
|----------|------------------------------|------------------------------|
| <b>A</b> | $\text{Br}_2$                | $\text{FeSO}_4$              |
| <b>B</b> | $\text{FeSO}_4$              | $\text{Br}_2$                |
| <b>C</b> | $\text{FeBr}_3$              | $\text{Fe}_2(\text{SO}_4)_3$ |
| <b>D</b> | $\text{Fe}_2(\text{SO}_4)_3$ | $\text{FeBr}_3$              |

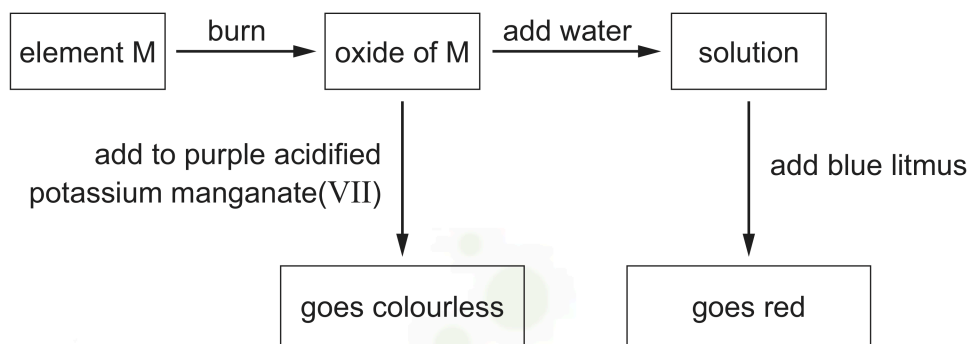
## SECTION - REDOX TESTS AND COLOUR CHANGES

Q29

0620/21/M/J/21 Q20

Hard

20 Some reactions of element M are shown.



What is element M?

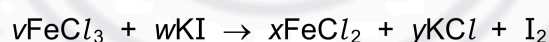
- A carbon
- B iron
- C magnesium
- D sulfur

Q30

0620/21/M/J/22 Q16

Hard

16 Aqueous iron(III) chloride,  $\text{FeCl}_3$ , reacts with aqueous potassium iodide, KI.



Which statements are correct?

- 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

## SECTION - REDOX TESTS AND COLOUR CHANGES

Q31

0620/23/M/J/23 Q40

Hard

**40** Element X burns in air to form an acidic gas that decolourises potassium manganate(VII).

What is X?

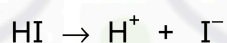
- A** carbon
- B** nitrogen
- C** magnesium
- D** sulfur

Q32

0620/22/F/M/24 Q19

Hard

**19** Hydrogen iodide is dissolved in water.



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

|          | damp red litmus paper | acidified aqueous potassium manganate(VII) |
|----------|-----------------------|--------------------------------------------|
| <b>A</b> | blue                  | brown                                      |
| <b>B</b> | blue                  | colourless                                 |
| <b>C</b> | red                   | brown                                      |
| <b>D</b> | red                   | colourless                                 |

## SECTION - REDOX TESTS AND COLOUR CHANGES

Q33

0620/22/O/N/24 Q18

Hard

- 18** Aqueous iron(II) sulfate is added to acidified potassium manganate(VII). The purple colour of the potassium manganate(VII) disappears.

Aqueous potassium iodide is added to acidified potassium dichromate(VI). A dark brown solution forms.

Which row identifies the role of the iron(II) sulfate and the potassium dichromate(VI) in these reactions?

|          | iron(II) sulfate | potassium dichromate(VI) |
|----------|------------------|--------------------------|
| <b>A</b> | oxidising agent  | oxidising agent          |
| <b>B</b> | oxidising agent  | reducing agent           |
| <b>C</b> | reducing agent   | reducing agent           |
| <b>D</b> | reducing agent   | oxidising agent          |

## MARKING SCHEME

| Q   | ANS | Paper Number             |
|-----|-----|--------------------------|
| Q1  | D   | 0620/23/M/J/25 Q18       |
| Q2  | D   | 0620/23/M/J/21 Q32       |
| Q3  | B   | 0620/22/F/M/23 Q24       |
| Q4  | C   | 0620/21/M/J/23 Q14       |
| Q5  | C   | 0620/22/O/N/23 Q24       |
| Q6  | C   | 0620/22/M/J/24 Q17       |
| Q7  | B   | 0620/22/O/N/24 Q17       |
| Q8  | C   | 0620/21/O/N/25 Q18       |
| Q9  | C   | 0620/22/O/N/25 Q19       |
| Q10 | A   | 0620/21,23/O/N/22 Q16    |
| Q11 | A   | 0620/21/O/N/23 Q16       |
| Q12 | D   | 0620/22/O/N/23 Q18       |
| Q13 | D   | 0620/23/O/N/23 Q19       |
| Q14 | A   | 0620/21/M/J/24 Q22       |
| Q15 | B   | 0620/21/M/J/24 Q23       |
| Q16 | D   | 0620/22/F/M/25 Q21       |
| Q17 | D   | 0620/21,22,23/O/N/21 Q16 |
| Q18 | C   | 0620/22/M/J/24 Q16       |
| Q19 | B   | 0620/23/O/N/24 Q19       |
| Q20 | B   | 0620/23/O/N/25 Q22       |
| Q21 | B   | 0620/22/F/M/21 Q18       |
| Q22 | D   | 0620/21,22,23/M/J/21 Q16 |
| Q23 | B   | 0620/22/M/J/22 Q20       |
| Q24 | C   | 0620/23/M/J/24 Q19       |
| Q25 | A   | 0620/22/F/M/23 Q18       |
| Q26 | A   | 0620/22/M/J/23 Q15       |
| Q27 | C   | 0620/22/M/J/25 Q17       |
| Q28 | A   | 0620/23/M/J/25 Q17       |
| Q29 | D   | 0620/21/M/J/21 Q20       |
| Q30 | B   | 0620/21/M/J/22 Q16       |
| Q31 | D   | 0620/23/M/J/23 Q40       |
| Q32 | C   | 0620/22/F/M/24 Q19       |
| Q33 | D   | 0620/22/O/N/24 Q18       |