AQA A-Level Chemistry

Redox mark scheme · goes with “Redox” · whiteboardchemistry.com/revision/aqa-a-level-chemistry/exam-questions

Mark schemes

Redox · 19 questions

Q1 · June 2022 · AS Paper 1 · Q6 · [5 marks]

(a) Electron acceptor / gains electrons

Do not allow electron pair acceptor / gain of electrons

[1 mark]

(b) Oxidation half equation

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

Allow multiples.

[1 mark]

Reduction half equation

$2IO_3^- + 12H^+ + 10e^- \rightarrow I_2 + 6H_2O$

Award 1 mark if the two equations are shown transposed

[1 mark]

(c) Equation:

$6I^- + 6H^+ + H_2SO_4 \rightarrow S + 3I_2 + 4H_2O$

Allow 6HI

Allow $6I^- + 8H^+ + SO_4^{2-}$

[1 mark]

Foul smelling gas – H_2S / hydrogen sulphide

[1 mark]

Q2 · June 2017 · AS Paper 1 · Q20 · [1 mark]

Answer: **B**

Q3 · June 2017 · AS Paper 1 · Q8 · [10 marks]

08.1

NO_2^- +3 or III or 3 or 3+

NO +2 or II or 2 or 2+

[2 marks]

08.2

NO_2^- + e^- + $2H^+$ → NO + H_2O (OR double)

[1 mark]

08.3

$2I^-$ → I_2 + $2e^-$ (OR half)

[1 mark]

08.4

$2NO_2^-$ + $2I^-$ + $4H^+$ → I_2 + 2NO + $2H_2O$

[1 mark]

08.5

Oxidising agent

Allow to accept/gain electrons

Allow Oxidant

Do not allow accept/ gain pairs of electrons

Do not allow Oxidise

[1 mark]

08.6

Mol ClO_3^- = $0.02 \times \frac{27.4}{1000} = 5.48 \times 10^{-4}$

Mol NO_2^- = $\frac{5}{2}(0.02 \times \frac{27.4}{1000}) = 1.37 \times 10^{-3}$

$[NO_2^-] = \frac{\text{mol } NO_2^-}{(25/1000)}$

$[NaNO_2]$ = 0.0548 $moldm^{-3}$

Conc $NaNO_2$ = (0.0548) x 69.0 = 3.78 gdm^{-3}

Minimum 2 sf

[4 marks]

Q4 · June 2019 · AS Paper 1 · Q15 · [1 mark]

Answer: **D**

Q5 · June 2025 · AS Paper 1 · Q1 · [6 marks]

01.1

M1: $\left(\frac{M_r \text{ of product}}{\text{total } M_r \text{ of reactants}}\right) \times 100$

$\left(\frac{189.9}{245.9}\right) \times 100$

M2: 77.2%

Allow ECF from incorrect M_r values in M1

Do not allow M2 if greater than or equal to 100%

[2 marks]

01.2

Idea of maximising the mass of reactants/atoms that ends up in the useful products

OR

Idea of minimising waste / biproduct (to be disposed of)

Ignore references to yield and energy

Do not allow it costs less unless qualified.

[1 mark]

01.3

$TiCl_4 + 2Mg \rightarrow 2MgCl_2 + Ti$

Reducing agent / electron donor

allow multiples

ignore state symbols

[2 marks]

01.4

The process to extract magnesium uses a lot of energy

OR

The extraction uses electrolysis

[1 mark]

Q6 · June 2025 · AS Paper 1 · Q20 · [1 mark]

Answer: **D**

SO_2 loses electrons and the oxidation state of sulfur increases.

Q7 · November 2020 · Paper 3 · Q11 · [1 mark]

Answer: **D**

Q8 · June 2022 · AS Paper 1 · Q19 · [1 mark]

Answer: **A**

OF_2

Q9 · June 2023 · Paper 3 · Q14 · [1 mark]

Answer: **B**

magnesium in MgO

Q10 · June 2023 · AS Paper 1 · Q18 · [1 mark]

Answer: **B**

$VO^{2+} \rightarrow V^{3+} + H_2O$

Q11 · June 2023 · AS Paper 1 · Q16 · [1 mark]

Answer: **B**

ClO_4^-

Q12 · June 2023 · AS Paper 1 · Q17 · [1 mark]

Answer: **C**

$Cr_2O_7^{2-}$ is the oxidising agent and it gains electrons.

Q13 · June 2024 · AS Paper 1 · Q9 · [4 marks]

(a) An electron acceptor

Do not accept electron pair acceptor or gain of electrons

[1 mark]

(b) $Cu \rightarrow Cu^{2+} + 2e^-$

Ignore state symbols, even if incorrect.

Accept multiples

[1 mark]

(c) $NO_3^- + 2H^+ + e^- \rightarrow NO_2 + H_2O$

Ignore state symbols, even if incorrect.

Accept multiples

[1 mark]

(d) $Cu + 2NO_3^- + 4H^+ \rightarrow Cu^{2+} + 2NO_2 + 2H_2O$

Ignore state symbols, even if incorrect.

Accept multiples

[1 mark]

Q14 · November 2020 · AS Paper 1 · Q21 · [1 mark]

Answer: **A**

Cl_2O

Q15 · November 2020 · AS Paper 1 · Q13 · [1 mark]

Answer: **A**

1

Q16 · November 2021 · Paper 3 · Q21 · [1 mark]

Answer: **D**

$CoO + 4HCl \rightarrow [CoCl_4]^{2-} + H_2O + 2H^+$

Q17 · November 2021 · AS Paper 1 · Q16 · [1 mark]

Answer: **C**

ClO_2

Q18 · November 2021 · AS Paper 1 · Q3 · [4 marks]

(a) Electron acceptor

Do not allow electron pair acceptor

[1 mark]

(b) $SO_3^{2-} + H_2O \rightarrow SO_4^{2-} + 2H^+ + 2e^-$

Allow multiples in each case

[1 mark]

$Cr_2O_7^{2-} + 14H^+ + 6e^- \rightarrow 2Cr^{3+} + 7H_2O$

[1 mark]

$3SO_3^{2-} + Cr_2O_7^{2-} + 8H^+ \rightarrow 3SO_4^{2-} + 2Cr^{3+} + 4H_2O$

[1 mark]

Q19 · June 2022 · Paper 3 · Q10 · [1 mark]

Answer: **C**

Fluorine in F_2O is –1

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