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A' Level Chemistry
Year 1

Unit 6: REDOX

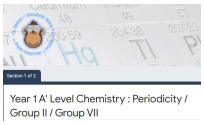
Summer Examination Revision Pack

The questions in this pack should be attempted **AFTER** completing all other revision.

Grade Accelerator
Recall Definitions
Drawing Diagrams
Using Equations
Drawing Graphs

Quizlet Classes
Flashcard Based
Games
Tests & Quizzes
Keyword Spell Checker

Condensed Notes
Keywords & Definitions
Key Concepts
Application
Key Skills



Online Forms
Take Time to Answer
Use Paper & Calculator
Work It Out
Review Missed Marks

Use the 3 Wave Process when completing these revision packs.

1. Complete the questions without assistance
(Can't answer a question? Leave it and move on)
2. Use your notes to fill any gaps after step 1
3. Use the mark scheme to fill in any remaining gaps.

1. Having gaps after step 1 is normal, that's why we are doing revision!
2. If your notes don't help during step 2, they are not good enough!
(Change your note taking method and try to understand the problem)
3. If you don't understand why the mark scheme answer is correct, **see Andy.**

If you struggle with the questions in the pack, **STOP!** and complete some more revision.

If you come to a complete dead-end, **STOP!** and speak to **Andy** asap.

0 8 When an acidified solution of sodium nitrite ($NaNO_2$) is added to aqueous potassium iodide, iodine and nitrogen monoxide (NO) are formed.

0 8 . 1 Give the oxidation state of nitrogen in the following species.

[2 marks]

NO_2^- _____

NO _____

0 8 . 2 Write a half-equation for the conversion of NO_2^- in an acidic solution into NO

[1 mark]

_____

0 8 . 3 Write a half-equation for the conversion of I^- into I_2

[1 mark]

_____

0 8 . 4 Write an overall ionic equation for the reaction of NO_2^- in an acidic solution with I^-

[1 mark]

_____

0 8 . 5 State the role of NO_2^- in the reaction with I^-

[1 mark]

_____

Question 8 continues on the next page

0 8 . 6 In aqueous solution, nitrite ions react with acidified chlorate(V) ions according to the equation

$$2ClO_3^- + 5NO_2^- + 2H^+ \rightarrow Cl_2 + 5NO_3^- + H_2O$$

A 25.0 cm^3 sample of an aqueous solution of sodium nitrite required 27.40 cm^3 of a 0.0200 mol dm^{-3} solution of potassium chlorate(V) for complete reaction.

Calculate the concentration, in g dm^{-3}, of sodium nitrite in the sample.

[4 marks]

Concentration of sodium nitrite _____ g dm^{-3}

10

Question	Marking Guidance	Mark	Additional Comments/Guidance
08.1	NO_2^- +3 or III or 3 or 3+ NO +2 or II or 2 or 2+	1 1	
08.2	$NO_2^- + e^- + 2H^+ \rightarrow NO + H_2O$ (OR double)	1	
08.3	$2I^- \rightarrow I_2 + 2e^-$ (OR half)	1	
08.4	$2NO_2^- + 2I^- + 4H^+ \rightarrow I_2 + 2NO + 2H_2O$	1	
08.5	Oxidising agent	1	Allow to accept/gain electrons Allow Oxidant Do not allow accept/ gain pairs of electrons Do not allow Oxidise

08.6	Mol ClO_3^- = $0.02 \times {}^{27.4}/_{1000} = 5.48 \times 10^{-4}$	1	
	Mol NO_2^- = ${}^{5}/_{2}\left(0.02 \times {}^{27.4}/_{1000}\right) = 1.37 \times 10^{-3}$	1	
	$[NO_2^-]$ = mol NO_2^- / $({}^{25}/_{1000})$ $[NaNO_2]$ = 0.0548 moldm^{-3}	1	
	Conc $NaNO_2$ = (0.0548) x 69.0 = 3.78 gdm^{-3}	1	Minimum 2 sf

Do not write outside the box

0 3 . 4 Deduce the oxidation state of chromium in the $Cr_2O_7^{2-}$ ion.

[1 mark]

0 3 . 5 Iodide ions can be oxidised to iodine using $Cr_2O_7^{2-}$ ions.

Deduce a half-equation to show the oxidation of iodide ions to iodine.

State symbols are **not** required.

[1 mark]

0 3 . 6 Deduce a half-equation for the conversion in acidic solution of $Cr_2O_7^{2-}$ ions to Cr^{3+} ions.

State symbols are **not** required.

[1 mark]

0 3 . 7 Use your answers from questions **03.5** and **03.6** to deduce the overall redox equation for the reaction between iodide ions and acidified $Cr_2O_7^{2-}$ ions.

State symbols are **not** required.

[1 mark]

9

Turn over for the next question

Question	Marking guidance	Additional Comments/Guidelines	Mark
03.4	+6 / VI / six / 6+		1
03.5	$2I^- \rightarrow I_2 + 2e^-$	Allow multiples / ignore ss	1
03.6	$Cr_2O_7^{2-} + 14H^+ + 6e^- \rightarrow 2Cr^{3+} + 7H_2O$	Allow multiples / ignore ss	1
03.7	$Cr_2O_7^{2-} + 14H^+ + 6I^- \rightarrow 2Cr^{3+} + 7H_2O + 3I_2$	Allow multiples / ignore ss Allow $Cr_2O_7^{2-} + 14H^+ + 8I^- \rightarrow 2Cr^{2+} + 7H_2O + 4I_2$ as ecf to 03.6	1

Do not write outside the box

0 3 This question is about redox reactions.

0 3 . 1 State, in terms of electrons, the meaning of the term oxidising agent.

[1 mark]

0 3 . 2 $Cr_2O_7^{2-}$ can oxidise SO_3^{2-} in acidic conditions to form Cr^{3+} and SO_4^{2-}

Deduce a half-equation for the oxidation of SO_3^{2-} to SO_4^{2-}

Deduce a half-equation for the reduction of $Cr_2O_7^{2-}$ to Cr^{3+}

Deduce the overall equation for the oxidation of SO_3^{2-} by $Cr_2O_7^{2-}$

[3 marks]

Half-equation for the oxidation of SO_3^{2-} to SO_4^{2-}

Half-equation for the reduction of $Cr_2O_7^{2-}$ to Cr^{3+}

Overall equation

4

Turn over for the next question

Question	Marking guidance	Additional Comments/Guidelines	Mark
03.1	Electron acceptor	Do not allow electron pair acceptor	1

Question	Marking guidance	Additional Comments/Guidelines	Mark
03.2	$SO_3^{2-} + H_2O \rightarrow SO_4^{2-} + 2H^+ + 2e^-$	Allow multiples in each case	1
	$Cr_2O_7^{2-} + 14H^+ + 6e^- \rightarrow 2Cr^{3+} + 7H_2O$		1
	$3SO_3^{2-} + Cr_2O_7^{2-} + 8H^+ \rightarrow 3SO_4^{2-} + 2Cr^{3+} + 4H_2O$		1