InkChemistry

QUESTION WORKBOOK

Redox titrations: manganate(VII) and thiosulfate

Redox · Unit C07

AQA 3.2.5.5 · OCR A 5.2.3

16 questions · 46 marks

NAVY SCREEN EDITION

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SECTION A · Short, 1 to 2 marks

A1 RTM-Q1
State why no indicator is added in a manganate(VII) titration of iron(II) ions, and state the colour change at the end point. [2]

A2 RTM-Q13
Give the ionic equation for the reaction of iodine with thiosulfate ions, and the mole ratio it gives. [2]

A3 RTM-Q16
Name the white precipitate formed when copper(II) ions react with iodide ions. [1]

SECTION B · Standard, 3 to 5 marks

B1 RTM-Q8
Describe how to carry out a titration to find the concentration of an iron(II) solution using standard potassium manganate(VII) solution. [4]

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B2 RTM-Q11 Compare a manganate(VII) titration with an iodine–thiosulfate titration. [4]

B3 RTM-Q2 Explain why a manganate(VII) titration is acidified with dilute sulfuric acid and not with dilute hydrochloric acid. [3]

B4 RTM-Q3 Explain why starch is added near the end point of an iodine–thiosulfate titration rather than at the start. [3]

B5 RTM-Q4 Calculate the concentration of an iron(II) solution, 25.0 cm^3 of which needs 18.75 cm^3 of 0.0200 mol dm^{-3} potassium manganate(VII) for complete reaction in acid. [3]

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B6 RTM-Q9 Suggest why, in a warm titration of ethanedioate with manganate(VII), the first few drops take several seconds to lose their colour, but later drops are decolourised at once. [3]

B7 RTM-Q10 Suggest the identity of the brown precipitate that appears when a manganate(VII) titration is acidified with too little sulfuric acid, and suggest why the titre is then no longer valid. [3]

B8 RTM-Q12 Evaluate this conclusion. A student dissolves an iron tablet, leaves the solution overnight in an open beaker, then titrates it with manganate(VII). The result is 15% below the iron content on the label, and she concludes that the label is wrong. [3]

B9 RTM-Q14 Explain why one mole of copper(II) ions corresponds to one mole of thiosulfate ions when copper is determined by iodine liberation. [3]

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B10 RTM-Q17 Calculate the volume of 0.0200 mol dm^{-3} potassium dichromate(VI) that reacts with 25.0 cm^3 of 0.0750 mol dm^{-3} iron(II) ions in acid. One $Cr_2O_7^{2-}$ ion accepts six electrons. [3]

B11 RTM-Q19 Explain why an iron sample may be dissolved in hydrochloric acid before titration with potassium dichromate(VI), although hydrochloric acid is not used in a titration with potassium manganate(VII). [3]

B12 RTM-Q20 Suggest the half-equation for the oxidation of methanoic acid, HCOOH, to carbon dioxide in acid, and suggest the mole ratio of manganate(VII) to methanoic acid in an acidified titration. [3]

B13 RTM-Q22 Justify the choice of dilute sulfuric acid, rather than dilute nitric acid, to acidify a solution of iron(II) ions before it is titrated with potassium manganate(VII). [3]

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