

Redox Titrations Worksheet

Name Answer Key

- 1) Which of the following could be titrated using acidified MnO_4^- ions? Circle the correct answer. (1 mark)

Na^+

IO_3^-

SO_4^{2-}

H_2O_2

- 2) Which of the following acidified solutions could be used to determine the $[\text{Sn}^{2+}]$ by redox titration? Circle the correct answer (1 mark)

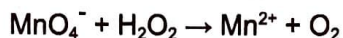
I^-

Co^{2+}

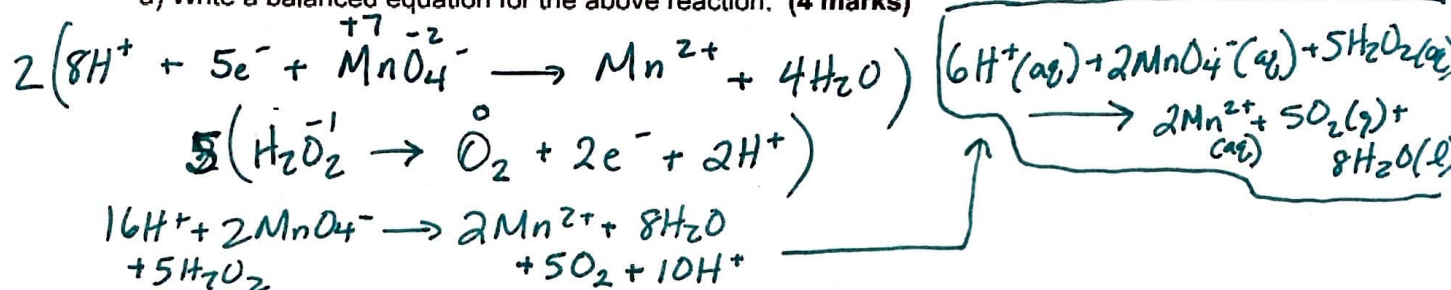
Cr^{3+}

$\text{Cr}_2\text{O}_7^{2-}$

- 3) Consider the following redox reaction in acidic solution:



- a) Write a balanced equation for the above reaction. (4 marks)



- b) The above reaction was used for a redox titration. At the equivalence point 6.725×10^{-4} mol KMnO_4 was required to titrate 7.50 mL of H_2O_2 solution. Calculate the $[\text{H}_2\text{O}_2]$. (2 marks)

$$6.725 \times 10^{-4} \text{ mol MnO}_4^- \times \frac{5 \text{ mol H}_2\text{O}_2}{2 \text{ mol MnO}_4^-} \times \frac{1}{0.0075 \text{ L}} = 0.224 \text{ mol dm}^{-3} \text{ H}_2\text{O}_2$$

- 4) The data below were obtained in a redox titration of a 30.00 cm³ sample containing Sn^{2+} ions using 0.150 mol dm⁻³ KMnO_4 :

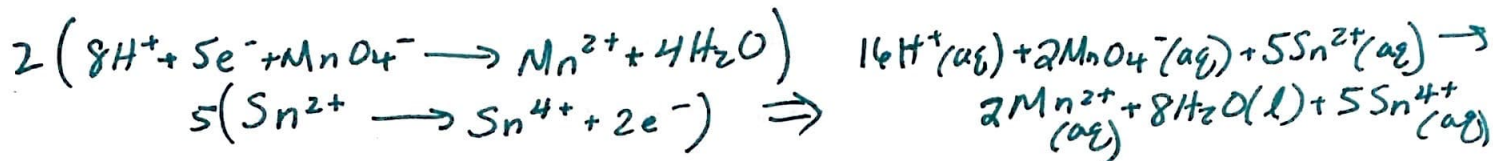
	Volume of KMnO_4 used (mL)		
	Trial #1	Trial #2	Trial #3
Initial buret reading	2.00	13.80	24.55
Final buret reading	13.80	24.55	35.32
Titre	11.80	10.75	10.77

Arg titre: 11.11 cm³

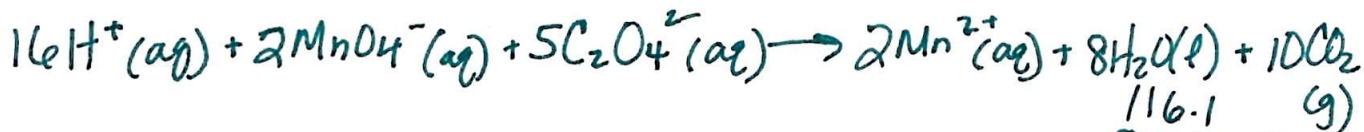
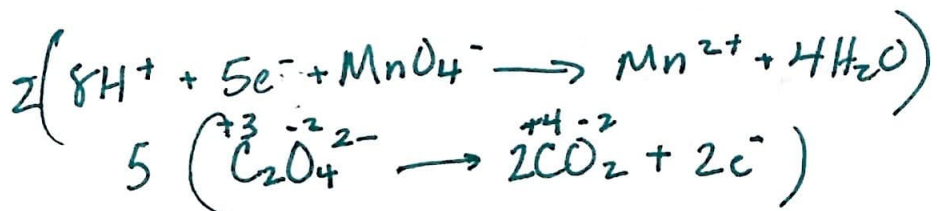
Calculate the $[\text{Sn}^{2+}]$ in the original sample. (4 marks)

$$\frac{0.0111 \text{ dm}^3}{x} \times \frac{0.150 \text{ mol MnO}_4^-}{\text{dm}^3} \times \frac{5 \text{ mol Sn}^{2+}}{2 \text{ mol MnO}_4^-} \times \frac{1}{0.03000 \text{ dm}^3}$$

$$\boxed{= 0.139 \text{ mol dm}^{-3} \text{ Sn}^{2+}}$$



- 5) An impure sample of CaC_2O_4 weighing 0.793 g is titrated with 17.30 cm³ of 0.125 mol dm⁻³ KMnO_4 . What is the percent by mass of the CaC_2O_4 in the original sample? (4 marks) Hint: carbon dioxide and water are produced in the reaction.



$$0.01730 \text{ dm}^3 \times \frac{0.125 \text{ mol MnO}_4^-}{\text{dm}^3} \times \frac{5 \text{ mol C}_2\text{O}_4^{2-}}{2 \text{ mol MnO}_4^-} \times \frac{116.1 \text{ g CaC}_2\text{O}_4}{1 \text{ mol C}_2\text{O}_4^{2-}}$$

$$= \frac{0.628}{0.793 \text{ g}} \text{ CaC}_2\text{O}_4 = \frac{79.2\%}{79.2\%} \text{ CaC}_2\text{O}_4$$