4. Use a pipette to transfer a 50 mL aliquot of salt solution into a 250 mL conical flask. Then add 5 mL of 1 mol L⁻¹ hydrochloric acid and 5 mL of 0.6 mol L⁻¹ potassium iodide solution. The solution will turn a yellow/brown colour as iodine is produced, as shown in Figure 1.

5. Titrate the solution with your 0.002 mol L⁻¹ sodium thiosulfate solution until the yellow/brown colour of iodine becomes very pale (see Figure 1). Then add 1 mL of starch indicator solution, which will produce a dark blue-black coloured complex with iodine – as shown in Figure 2 – and continue your titration until this colour completely disappears (see Figure 3).

6. Repeat the titration with further aliquots of your salt solution until concordant results (titres agreeing within 0.1 mL) are obtained.

Figure 1. Right flask: yellow/brown colour of iodine formed from reaction of iodate from

Calculations

1. From the redox equations above, determine the number of moles of thiosulfate required for reaction with each mole of iodate in the original salt solution.

2. Calculate the average volume of thiosulfate solution used from your concordant titres.

3. Calculate the amount, in moles, of thiosulfate reacting.

4. Calculate the amount, in moles, of iodate in the salt solution.

5. Calculate the concentration, in mol L⁻¹, of iodate in the salt solution.

6. Calculate the number of grams of iodate in the salt solution.

7. Based on the weight of the iodised salt you used to make your salt solution, calculate the iodate content of your salt, in mg of iodate (IO_3^-) per kg of salt. NB: the molecular weight of IO_3^- is 174.9 g mol⁻¹.

8. In order to see if your salt satisfies the Australia New Zealand Food Standards Code, calculate the iodine content (in mg of iodine (I) per kg of salt) from your result above as follows:

iodine (I) content = iodate (IO_3^-) content x 126.9/174.9

Additional Notes

1. According to the specified limits for iodate in iodised salt, the volume of 0.002 mol L⁻¹ sodium thiosulfate required in the above titration should lie between 5.9 mL and 15.4 mL. Therefore, a "rougher" method for quickly determining whether or not your salt sample conforms to these limits is to prepare the sample solution as above (adding hydrochloric acid and potassium iodide as described), but instead of titrating the solution simply add 1 mL of starch indicator, followed by 5.9 mL of thiosulfate solution, the blue-black colour of starch-iodine should persist. But when a further 9.5 mL of thiosulfate solution is added the colour should disappear.

Contact Us

If you have any questions or comments relating to this experiment, please contact us. Please note that this service is for senior school chemistry students in New Zealand only. We regret we are unable to respond to queries from overseas.

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