

- Adding sodium carbonate
 - Passing through an ion exchange column
 - Using commercial water softening products
- Sources indicate that for this method to work the pH must be kept above 7.5. Investigate how pH affects the sharpness of the end –point.
- Sources indicate that the indicator is sensitive to the presence of other metal ions. Investigate the effect of ions that may interfere with the endpoint.

Sources of Information

- The Chemistry Video Consortium and The Royal Society of Chemistry (2000) *Practical Chemistry for Schools and Colleges*
- Thorpe A., Making a standard solution, *Chemistry Review*, November
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- *Chemistry Review*, February 2003
- Thorpe A., Making a standard solution, *Chemistry Review*, 2002
- *Chemistry Review*
Lindsey D., Measuring pH. *Chemistry Review*, September 1998
- *Vogel's Textbook of Quantitative Chemical Analysis*
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- *Chemistry Review*
<http://www.chem.pacificu.edu/GenChemProjects/pages/Proposals>
- Thorpe A., Assessing the risks in practical work, *Chemistry Review*,
Thorpe A., Experimental error and error analysis: just how good are the results, *Chemistry Review*

This investigation is based around a well known experiment. The titration is can be difficult to see. This worth trying out the technique on a solution whose composition is known to calcium ions Eriochrome black T gives a poor end point. If ions are present the endpoint is easier to see. There are more details in

Volumetric analysis, Transition metals, Complexes,

Essential Equipment

H meter.

Essential Chemicals

indicator.

Safety

detailed risk assessment before they start. Teachers must this is suitable for the proposed investigation.

– Investigating the hardness of water

0.01 mol dm⁻³ disodium salt of EDTA

- ammonia – buffer pH 10 (7g ammonium chloride and 57 cm³ concentrated ammonia solution made up to 100 cm³ water)
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You will need to think about how much of each solution to prepare. This will depend on how much of experiments you do (including any repeats).

You need to use a pipette to take a suitable sized sample of water (you could start with 50 cm³ and adjust the pH to 10 using the buffer solution. Then add a few drops of indicator to the sample. The solution should turn red.

You should then titrate this with the EDTA solution until a definite colour change occurs.