

WJEC (Wales) Chemistry GCSE

SP 1.3 - Determination of the amount of Hardness in Water using Soap Solution

Flashcards

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How does soft water compare to hard water?



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Soft water readily forms a lather with soap whereas it is much more difficult for hard water to form a lather.



What does hard water contain?



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Hard water contains dissolved Calcium and Magnesium compounds.



What is the difference between temporary and permanent hard water?



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Temporary hard water becomes soft when boiled whereas permanent hard water does not.



List the apparatus required to investigate the hardness of water using a soap solution



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- 100 cm³ conical flask
- 50 cm³ measuring cylinder
- Dropping pipette
- Stopwatch



Outline an experiment to investigate the hardness of water



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1. Measure 50 cm^3 of water into a conical flask.
2. Add soap 1 cm^3 at a time, shaking vigorously for 5 seconds between additions.
3. Stop adding soap once the lather lasts for more than 30 seconds.
4. Record the volume of soap added and repeat with various other water samples.



Using the soap experiment, how can the hardness of water be determined?



Using the soap experiment, how can the hardness of water be determined?

- **Soft water:** Small volume of soap required to form a lather before and after boiling.
- **Temporary hard water:** Large volume of soap required to form a lather before boiling, small volume required to form a lather after boiling.
- **Permanent hard water:** Large volume of soap required to form a lather before and after boiling.



Why is more soap required to form a lather in harder water?



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Calcium and magnesium ions in the water react with soap, forming scum instead of a lather.



Why is it important that the mixtures are shaken for exactly 5 seconds each time?



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The time taken to shake the solutions is a control variable and will have a direct effect on how long lasting the lather is. Therefore, to maintain a valid test, the mixtures must be shaken for the same amount of time.



What are all the control variables for the experiment?



What are all the control variables for the experiment?

- Volume of soap in each addition
- Volume of water
- Temperature of soap and water
- Time taken to shake the mixture

