

AP Chemistry Lab 07

Investigation 3 *What Makes Hard Water Hard?*

Central Challenge

Samples of tap water have been collected from faculty members who live in different townships, villages, cities, and counties. Some are from municipal water sources, others are from wells. The water will be analyzed for their quantities of water hardness through principles of metal ion precipitation and separation. The samples will then be ranked in order of increasing water hardness.

Context for This Investigation

When relocating, there are many factors that go into choosing where to buy a house. One of those factors is water quality – it is advantageous to find a location where a water softener will not be needed. Hard water costs more for detergent, plumbing repairs, and appliance maintenance and replacement. Having water that is already soft is preferred to installing a water softening system. You, the students, will identify which of the areas around Western New York have the lowest hard water quantities by ranking the hardness of the water in the areas.

Materials

Distilled water	Metal scoops	250 mL Erlenmeyer flasks (optional)
Calcium chloride, anhydrous (for practice)	250 mL beakers	Buchner funnels with stoppers
Sodium carbonate, anhydrous (for practice)	100 mL graduated cylinders	Glass tubing (optional)
Wash bottles	Watch glasses	Ring stand
Analytical balances	250 mL side-arm flasks (filter flasks)	Drying oven
Clamps	Aspirators	Filter papers
Double hole rubber stoppers (optional)		Water samples

Safety and Disposal

All solutions can be flushed down the drain. Normal laboratory precautions, including wearing goggles at all times, should be taken as these solutions may be harmful if swallowed and can irritate the eyes.

Prelab Guiding Questions/Simulations

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