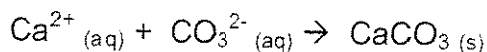


Investigation: Hard vs Soft Water

Adding Sodium carbonate, Na_2CO_3 , also known as washing soda, softens water by removing calcium ions as an insoluble precipitate, solid calcium carbonate.



In this investigation, you will compare soap suds levels in distilled water (soft), in hard water, and in hard water mixed with sodium carbonate and filtered.

In addition, you will compare soap and detergent in terms of how they react with soft and hard water.

Materials

Hard water, distilled water, soap solution, detergent solution, 3 test tubes, funnel, filter paper, sodium carbonate, ruler

Procedure

1. Fill a test tube $\frac{1}{4}$ full with distilled water, and a second test tube $\frac{1}{4}$ full with hard water.
2. Add 4 drops of soap solution to each test tube. Place your thumb over the top of each test tube and shake well.
3. Measure and record the thickness of the soap suds on the surface of the water.
4. Fill another test tube $\frac{1}{4}$ full of hard water. Add a pinch of washing soda. Cover and shake to dissolve.
5. Filter the contents of this test tube into another clean and dry test tube. The filtrate should be "softened".
6. Add 4 drops of the soap solution to the test tube containing the filtrate and shake well.
7. Measure and record the thickness of soap suds on the surface of the water.
8. Repeat steps 1 – 7 using detergent instead of soap.

Observations

Water sample	Thickness of soap suds (cm)	
	Soap	detergent
Distilled water		
Hard water		
Hard water mixed with sodium carbonate		

Questions

1. Compare the thickness of the soap suds in the soap test tubes,
2. Compare the thickness of the detergent suds in the detergent test tubes.
3. Compare the detergent hard water sample with the soap hard water sample.
4. Is sodium carbonate effective for softening water? Explain your answer.
5. Why is soap used on the body while detergent is used for clothes and dishes?