

Properties of Household Chemicals

Common household items for sale in a supermarket are usually grouped by their function. Sugar, flour, and salt are found in the baking section, toothpaste can be found in the pharmacy, and candles are found near the florist (Figure 1). You can find sand in the outdoor department in both summer and winter. Like any good chemist, however, you might be more interested in classifying these items by their physical and chemical properties. After all, it is these properties that determine their function!

In this activity, you will plan the steps to determine the properties of a variety of household items. You will use equipment and materials that your teacher makes available to you. After you have received approval from your teacher, you will carry out your planned procedure, following all safety precautions.



SKILLS MENU

- | | |
|-------------------------|-----------------|
| ● Questioning | ● Performing |
| ● Hypothesizing | ● Observing |
| ● Predicting | ● Analyzing |
| ● Planning | ● Evaluating |
| ● Controlling Variables | ● Communicating |

Figure 1 Supermarkets organize items according to their function. Chemists use physical and chemical properties to classify substances.

Purpose

To determine the physical and chemical properties of some common substances.

Equipment and Materials

- eye protection
- lab apron
- well plate
- balance
- graduated cylinder
- hot plate
- test tubes
- test tube racks
- beakers
- glass stirring rods
- thermometer
- scoopulas
- Bunsen burner
- tongs
- conductivity apparatus
- household substances: table salt, sugar, flour, candle wax, toothpaste, sand, and so on
- water



Unplug the hot plate by pulling on the plug, not on the cord. Tie back long hair and loose clothing when using the Bunsen burner.

Procedure



1. Design a procedure to determine the following properties for each of the household substances (Figure 2): colour, hardness, solubility in water, electrical conductivity, melting point, density, combustibility, and reaction with water. Include all safety precautions that are needed.



Figure 2 In this activity, you will determine the properties of common household substances.

2. After your teacher approves your plan, design a table to record your observations.
3. Perform the tests on each of the household items and record your observations.

Analyze and Evaluate



- (a) Which of the tests that you conducted determined physical properties? Give reasons for your answer. **T/I**
- (b) Which of the tests determined chemical properties? Give reasons for your answer. **T/I**

- (c) Did you encounter any problems or errors as you completed your procedure? If so, describe and explain whether they were avoidable or unavoidable. **T/I**
- (d) What improvements would you suggest for similar investigations in the future? **T/I**
- (e) Can substances be distinguished by determining several of their physical and chemical properties? Explain your answer based on what you have learned by performing this activity. **T/I**

Apply and Extend

- (f) Were any of the properties that you observed surprising to you? Explain. **c**
- (g) Sugar and salt are similar. They are both used in cooking. If you were standing in a puddle of water in an electrical storm, which would you be safer holding, a handful of sugar or a handful of salt? Explain. (Of course, you should not be standing outside in an electrical storm!) **A**
- (h) What properties of wax make it such a good material for making candles of all different shapes and sizes, even floating ones that light up a bowl of water? **K/U**
- (i) Some foods, such as chestnuts and potatoes, can be cooked in heated sand. Which properties of sand make it suitable for this culinary function? **K/U**