

Compounds can often be categorized based on the properties they possess. In this activity you will be given a number of compounds which you will first categorize as ionic or molecular based on their chemical formula. You will then determine a number of properties of these compounds and on that basis make generalizations for distinguishing between ionic and molecular substances.

Problem: Given a number of compounds, make observations and carry out tests to distinguish between ionic and molecular compounds

Materials: Samples of the following compounds in labeled covered containers (these are only suggestions):

ammonium chloride	ethanol	methanol	potassium chloride
n-pentane	zinc sulfate	copper(II) sulfate	potassium chromate
sucrose	potassium iodide	mineral oil	sodium phosphate
propane	sodium hydroxide	sodium chloride	potassium permanganate

- Procedure:**
1. Add 25 mL of deionized water to a 50 mL beaker
 2. Add a small quantity (size of a pea) of the substance to the water (if it is a gas simply allow some to bubble through the water)
 3. Use a stirring rod to stir the water and substance added
 4. Record in the data table the following:
 - (i) phase at room temperature
 - (ii) whether or not you believe the substance dissolved in water (soluble)
 - (iii) color of solution (if substance was soluble). Note: clear is not a color (all solutions are clear), use the term colorless if there is no color
 - (iv) conductivity of solution (if substance was soluble). Note: You should compare the conductivity of the solution to that of the deionized water (this is the control)
 5. Pour the water off any substance that did not dissolve and add the undissolved substance to the waste beaker provided
 6. Pour any solutions down the sink.
 7. Rinse the beaker and test the next substance

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Complete the following tables based on your findings in this lab.

Classification of substance	Phase at room temp	Solubility in water	Color of solutions	Conductivity of solutions
Ionic				
Molecular				

Questions:

1. Electrical conductivity was used in this activity to test solutions of various compounds. Why should the electrical conductivity of the deionized (or distilled) water be tested before testing the conductivity of the solution?

In the following questions, use examples from your results to support your answers.

2. Can a substance be classified as ionic or molecular based only on its phase at room temperature? Explain.
3. Can a substance be classified as ionic or molecular based only on its solubility in water? Explain.
4. Can a substance be classified as ionic or molecular based only on the color of its solution? Explain
5. Can a substance be classified as ionic or molecular based only on the electrical conductivity of its solution? Explain
6. Complete the following table by placing an (I) ionic, (M) molecular or a (?) if not enough information is given to classify the substance.

Properties of the pure substance	Ionic (I), Molecular (M) or (?) not enough information to classify
a. a solid which dissolves in water to form a colorless, non-conducting solution	
b. a liquid which dissolves in water to form a colorless solution	
c. a solid which dissolves in water to form a colorless solution	
d. a solid which dissolves in water to form a colored solution	
e. a solid which does not dissolve in water	
f. a gas at room temperature	
g. a substance which forms a conducting solution	

Conclusion.

Re-read the problem for this lab and then write a brief conclusion based on your findings.

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Table 1:

PRE-LAB EXERCISE			LAB RESULTS			
Name of substance	formula	Ionic (I) or molecular. (m)	Phase at room temp. (s, l, or g)	Soluble in water (yes/no)	If it is soluble indicate color of solution	If it is soluble does it conduct electricity (electrolyte / non-electrolyte)
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						
13.						
14.						
15.						
16.						