

Properties of Ionic & Molecular Compounds

Introduction:

In this investigation, you will study the properties of three different types of compounds: ionic (which have ionic bonding), polar covalent molecules (which have polar covalent bonds) and non-polar covalent molecules (which have non-polar covalent bonding).

Property	Ionic compounds	Polar molecules	Non-polar molecules
Example	Sodium chloride NaCl	Ethanol C ₂ H ₅ OH	Methane CH ₄
Electronegativity difference?	$\Delta EN > 1.7$	$1.7 > \Delta EN > 0.4$	$0.4 > \Delta EN$

You will test several substances to see if they conduct electricity, if they are soluble in water, and other characteristics. You will then be asked to identify each substance as either an ionic, polar covalent or non-polar covalent compound.

Background:

In order to identify each substance, we must create general characteristics for each type of compound. Use your textbook: p. 76–81 in MHR Chemistry 11 to fill in the following table.

Type of substance	Phase at room temperature	Soluble in water	Conductivity	Melting Point/ Boiling Point
Ionic				
Polar Covalent				
Non-Polar Covalent				

Materials:

Glucose (C₆H₁₂O₆)

Sodium chloride (NaCl)

Isopropyl alcohol (C₃H₇OH)

Ammonium sulfate (NH₄SO₄)

Kerosene (C₁₂H₂₆–C₁₅H₃₂)

Data Table:

Name of Substance	Formula of Substance	Phase at room temperature	Soluble in water	Conductivity	Melting/Boiling Point	Substance Type

Station 1: Test for solubility

1. Put 25 ml of water in a small beaker
2. Add a small quantity (half the size of a pinky nail) of the substance to the water
3. Stir and record results. Did it dissolve?

Station 2: Test for conductivity

1. Use beaker of solution from Station 1
2. Place wires onto ammeter as shown here
3. Place metal into beaker, being careful to hold onto rubber part only
4. Observe whether the arrow moves. If it does, the solution is conducting electricity

Station 3: Predict melting/boiling point

1. Based on your data from the above stations, predict the melting or boiling point for each substance. Use terms like high, low, intermediate.

Conclusion: Identify all substances

1. Based on your data, classify each substance as ionic compounds, non-polar or polar covalent molecules.

Homework: Complete p. 79 #13–18 in your textbook

