# Pre-Lab Information

**Purpose** Explore the properties of chemical substances that can be used to identify the types of bonds in a chemical substance using a laboratory procedure.

Time Approximately 45 minutes

**Question** Based on a substance’s properties, how can you determine whether its bonds are ionic   
or covalent?

**Hypothesis** If a substance is solid at room temperature, has a crystalline structure, dissolves easily in water, and conducts electricity well, then it likely contains ionic bonds. Otherwise, it likely contains covalent bonds.

**Summary** You will collect data for the appearance, solubility in water, and conductivity of four substances to determine whether the substances have ionic or covalent bonds.

# Safety

* Always wear safety goggles and a lab gown while performing an experiment.
* Wear gloves when handling any solid or liquid chemicals.
* Never smell a chemical directly. Smell a chemical only by wafting.
* Use caution when handling the conductivity apparatus. Do not touch the exposed leads.
* Check glassware, such as your beaker, for cracks and chips prior to use.
* Report all accidents – no matter how big or small – to your teacher.

# Procedure

**Step 1: Gather Materials.**

five 25 mL beakers

spoon

stirring rod

10 mL graduated cylinder

distilled water in a wash bottle

conductivity apparatus

5 mL oil

2 g cornstarch

2 g sodium chloride

2 g sodium bicarbonate

**Repeat steps 2–4 for each of the following: 5 mL of oil and 2g each of cornstarch, sodium chloride, and sodium bicarbonate.**

**Step 2: Note State and Appearance.**

Put the substance in a 25 mL beaker.

Observe and record in the data table its state of matter, appearance, and texture and whether it has a crystalline structure.

**Step 3: Determine Solubility in Water.**

**a)** Add distilled water to the beaker until the volume totals 15 mL.

**b)** Use the stirring rod to stir for 3 minutes.

**c)** Record the amount of oil that dissolved—all, some, a little, or none.

**Step 4: Determine Conductivity.**

**a)** Make sure the conductivity apparatus is ready. The electricity should be turned off.

**b)** Spray a small amount of distilled water on the electrical leads of the conductivity apparatus. Insert the electrical leads of the conductivity apparatus into the beaker.

**c)** Turn on the electricity. Record whether you observe conductivity. Dry completely.

**Step 5: Determine Whether the Substances Are Ionic or Covalent.**

Use the data to determine whether the substances likely have ionic or covalent bonds. Record your conclusions in the last row of the data table. (You may be asked later to justify your conclusions.)

**Step 6: Dispose of All Materials in Bulk Containers Provided by Your Teacher.**

# Data

Record your data either in the data table below or in your lab notebook.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Oil** | **Cornstarch** | **Sodium Chloride** | **Sodium Bicarbonate** |
| **State of Matter** |  |  |  |  |
| **Appearance and Texture** |  |  |  |  |
| **Crystalline Structure (Yes/No)** |  |  |  |  |
| **Solubility in Water** |  |  |  |  |
| **Conductivity (Yes/No)** |  |  |  |  |
| **Ionic/Covalent Bonds** |  |  |  |  |