Name Date

HANDS-ON LAB

Measuring the Electrical Conductivity of Mixtures

In this investigation, you will explore the electrical conductivity of various solutions. A solution is a homogeneous mixture in which two or more substances are uniformly dispersed at the molecular level.

RESEARCH QUESTION Why might some solutions be better conductors of electrical charge than others?

MAKE A CLAIM

Which of the test solutions do you think will conduct electricity well? Which do you think will not conduct electricity? Justify your predictions.

SAFETY INFORMATION

- Wear indirectly vented chemical splash goggles, a nonlatex apron, and nitrile gloves during the setup, hands-on, and takedown segments of the activity.
- Never pour chemicals, either used or unused, back into their original containers. Dispose of chemicals according to your teacher's instructions.
- Use caution when working with glassware, which can shatter and cut skin when dropped.
- Tell your teacher immediately if you spill chemicals on yourself, the work surface, or floor.
- Wash your hands with soap and water immediately after completing this activity.

MATERIALS

- indirectly vented chemical splash goggles, nonlatex apron, nitrile gloves
- beaker, 100 mL (8)
- conductivity tester
- paper towels
- wash bottle

Test Solutions

- aluminum chloride, $AlCl_3$, solution, 0.05 M (50 mL)
- calcium chloride, $CaCl_2$, solution, 0.05 M (50 mL)
- distilled water, 300 mL
- ethanol, C_2H_5OH (50 mL)
- sodium chloride, NaCl, solution, 0.05 M (50 mL)
- sugar water (50 mL)
- tap water (50 mL)

PLAN THE INVESTIGATION

In your Evidence Notebook, write a procedure to test the electrical conductivity of the seven test solutions. Consider the accuracy you could achieve based on the limitations of your materials. Your procedure should also include safety considerations and any additional materials you may need. Have your procedure checked by your teacher before you begin.

COLLECT DATA

Decide what data to record for each solution, the conditions for the measurements, and how many trials you will need to complete. Develop a data table in your Evidence Notebook.

ANALYZE

1. Did the result you found for distilled water match your result for tap water? Explain why the results do or do not make sense.

2. Compare the results you found for the NaCl solution and sugar water. Why do you think the results were the same or different?

3. Compare your results for $AlCl_3$, $CaCl_2$, and NaCl. Why do you think the results were the same or different?

DRAW CONCLUSIONS

Write a conclusion that addresses each of the points below.

Claim Compare how well each of the solutions you tested conducted electricity. What about their physical or chemical properties could influence this ability?

Evidence Give specific examples from your data to support your claim.

Reasoning Explain how the evidence you have supports your claim. Describe, in detail, the connections between the evidence you cited and the argument you are making.