



Science Objectives

- Students will observe whether different solutions conduct electricity.
- Students will relate this information to the concept of electrolytes and nonelectrolytes.
- Student will make predictions as to whether a solution will conduct electricity well, poorly, or not at all.
- Students will use solubility rules to predict the conductivity of ionic compounds.

Vocabulary

- | | |
|-----------------------|----------------------|
| • anions | • ionic compound |
| • cations | • ionization |
| • conductivity | • molecules |
| • covalent compound | • nonelectrolytes |
| • direct current (dc) | • solubility |
| • dissociation | • strong electrolyte |
| • electrolytes | • weak electrolyte |

About the Lesson




- This lesson shows on the macroscopic level what occurs on the microscopic level when electrodes and a source of DC electricity are placed in a solution.
- As a result, students will:
- Observe the particles in the solution when a source of current is added
- Identify electrolytes and nonelectrolytes.
- Predict whether substances will conduct electricity well, poorly, or not at all.

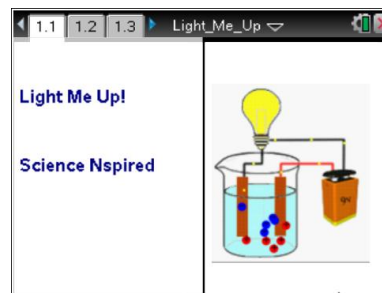


TI-Nspire™ Navigator™

- Send out the *Light_Me_Up.tns* .file.
- Monitor student progress using Class Capture.
- Use Live Presenter to spotlight student answers.

Activity Materials

- Compatible TI Technologies:  TI-Nspire™ CX Handhelds,  TI-Nspire™ Apps for iPad®,  TI-Nspire™ Software



Tech Tips:

- This activity includes screen captures taken from the TI-Nspire CX handheld. It is also appropriate for use with the TI-Nspire family of products including TI-Nspire software and TI-Nspire App. Slight variations to these directions may be required if using other technologies besides the handheld.
- Watch for additional Tech Tips throughout the activity for the specific technology you are using.
- Access free tutorials at <http://education.ti.com/calculators/pd/US/Online-Learning/Tutorials>

Lesson Files:

Student Activity

- Light_Me_Up_Student.doc
- Light_Me_Up_Student.pdf

TI-Nspire document

- Light_Me_Up.tns



Discussion Points and Possible Answers

Move to pages 1.2–1.6.

Have students answer the questions on either the handheld, on the activity sheet, or both.

Q1. An electrically neutral atom has equal numbers of _____.

Answer: C. protons and electrons

Q2. Positively charged atoms have _____ one or more electrons.

Answer: A. lost

Q3. The charge on a molecule is _____.

Answer: B. zero



TI-Nspire Navigator Opportunities

Use TI-Nspire Navigator to capture screen shots of student progress and to retrieve the file from each student at the end of the class period. The student questions can be electronically graded and added to the student portfolio.

Q4. A substance in aqueous solution that conducts electricity is _____.

Answer: C. an electrolyte

Q5. A substance that ionizes only slightly in aqueous solution is called a _____.

Answer: weak electrolyte



Tech Tip: Remind students to reset (⏮) the animation to choose a new compound. Also, be sure students understand how to use the play (▶) and reset (⏮) buttons in the simulation.

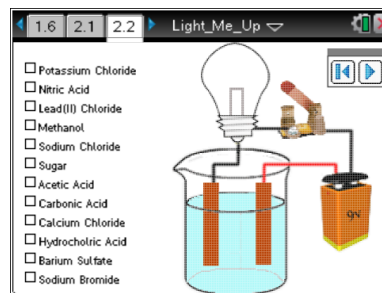


Move to pages 2.1 and 2.2.

1. On page 2.2 students choose (check) a compound to investigate. The simulation shows molecules without a charge and ions with charges (+ and -).

NOTE: Students will need a copy of solubility rules to answer questions.

2. After choosing a compound, students run (play) the simulation.



Move to pages 2.3–2.5.

Have students answer the questions on either the handheld, on the activity sheet, or both.

- Q6. If LiCl were dissolved in water, the solution would _____.

Answer: D. conduct electricity well

- Q7. An aqueous solution of HBr would _____.

Answer: D. conduct electricity well

- Q8. Predict what would happen to the light bulb if solid CaCO_3 were placed in the water and stirred. Explain.

Sample answer: The light bulb would not light up. Calcium carbonate is not soluble, so no ions would be present in solution to conduct electricity.

Move to pages 3.1–3.11.

Have students answer the questions on either the handheld, on the activity sheet, or both.

- Q9. HCl(aq) is considered to be a _____.

Answer: C. strong electrolyte

- Q10. An aqueous solution of sucrose (table sugar) is considered to be _____.

Answer: A. nonelectrolyte

- Q11. Sodium bromide would have _____ ions in solution.

Answer: D. many



Q12. An aqueous solution of nitric acid would cause the light bulb to _____.

Answer: C. burn brightly

Q13. An aqueous solution of methanol consists of _____.

Answer: A. molecules

Q14. An aqueous solution of calcium chloride (CaCl_2) would contain _____ anions as cations.

Answer: C. twice as many

Q15. Given equal molar solutions of sodium chloride, calcium chloride, and aluminum chloride: which would contain the greatest number of ions? (Hint: Write their chemical formulas.)

Answer: C. aluminum chloride

Q16. Referring to the previous question, which solution would conduct electricity best?

Answer: C. aluminum chloride

Q17. Why does the lifeguard order you out of the ocean when there is a lightning storm?

Sample answer: Ocean water is an aqueous solution of salt, therefore, it is an excellent conductor of electricity. If lightning strikes in the ocean nearby, swimmers could be electrocuted.

Q18. Why is it dangerous to use a hair dryer or other electrical appliance while you are in the bathtub?

Sample answer: If the electrical appliance should drop into the bath water, the bather would be electrocuted. While pure water is a nonconductor, the bath water would contain enough ions to conduct electricity.

Q19. Why are sports drinks advertised to replenish the electrolytes in your body?

Sample answer: Sports drinks contain sodium, potassium, and chloride ions which are supposed to replenish the electrolytes in the body.



Q20. Barium sulfate is an ionic compound. Explain why it does not conduct electricity.

Sample answer: Barium sulfate is not soluble in water, so no ions are present to conduct electricity.



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Wrap Up

When students are finished with the activity, pull back the .tns file using TI-Nspire Navigator. Save grades to Portfolio. Discuss activity questions using Slide Show.

Assessment

- Formative assessment will consist of questions embedded in the .tns file. The questions will be graded when the .tns file is retrieved by TI-Nspire Navigator. The TI-Nspire Navigator Slide Show can be utilized to give students immediate feedback on their assessment.
- Summative assessment will consist of questions/problems on the chapter test, inquiry project, performance assessment, or an application/elaborate activity.