



Name: _____ Date: _____ Group: _____

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Signs of Chemical Change (Lexile 1070L)



- 1 Hundreds of years ago, early scientists began to systematically explore the way that different compounds behave when mixed together. Over and over again, they combined various substances to see what would happen. Researchers made observations of the properties of the starting compounds and what occurred when the substances initially touched one another. They ran tests on the resulting mixtures to see if the chemical properties had changed. At every step, they took careful notes, which were shared with other scientists.
- 2 When many observations were compiled, scientists noticed patterns that led to the development of a set of rules on how to determine when a chemical change had happened. Here are the five signs that early scientists indicated would signal a chemical change:

- Production of light
- Production of a precipitate
- Production of a gas
- Color change
- Change in temperature

Even though these rules are old, they are still used today to determine when a chemical change happens. Each of these relies on empirical evidence—a property that can be directly seen or measured in an experiment. This is called empirical evidence.

- 3 Maria was assigned to investigate several pairs of compounds to determine whether a new substance is formed when they are mixed. To find the answers, she designed an experiment using these five rules as the criteria for whether a chemical change had occurred.
- 4 Maria developed a procedure that she used for each mixture. First, she measured equal portions of each of the two compounds to be mixed and put one of them into a test tube. She examined them carefully and wrote what she observed in her notebook. Watching closely, she put the second compound into the test tube, swirling to mix the two substances together. Still watching, she put the test tube into the rack, let it sit for one minute, and then recorded her observations.

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- 5 The following is a summary of the mixtures Maria tested and the observations she made.
- a) Two clear liquids began to glow with a yellow light after mixing.
 - b) Two clear liquids were mixed but did not look any different afterward.
 - c) A piece of metal was dropped into a clear liquid. Before long, small bubbles began to float to the surface.
 - d) A clear liquid was added to a dark blue liquid. The resulting mixture was light blue.
 - e) A clear liquid was added to a pale yellow liquid, forming a white powder that settled on the bottom.
 - f) She poured a clear liquid onto a white powder. Immediately, it fizzed and foamed. After one minute, the bubbles were gone and only a clear liquid remained.
- 6 After the tests were complete, Maria reviewed her observations and analyzed her results to see if a chemical change had occurred. Soon Maria knew which combinations had produced a new substance. Will your conclusions match hers?

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- 1** Identify the flaw in the way that Maria set up her experiment.
- A** She did not take pictures.
 - B** She did not wait long enough.
 - C** She did not measure the temperature.
 - D** She did not mix the substances well enough.
- 2** Which of these describes Maria making an observation?
- A** Maria measured the compounds.
 - B** Maria let the test tube sit for one minute.
 - C** Maria wrote her results in her lab notebook.
 - D** Maria saw that bubbles formed on the metal in mixture (c).
- 3** What is the best summary of this passage?
- A** Early scientists studied the way substances behaved when they were combined. They developed rules to identify when a chemical change occurred. Maria used those rules to create an experimental procedure and test six mixtures.
 - B** Maria was curious about how several compounds acted when mixed. She put them into test tubes and swirled them together. She could tell if a chemical change had occurred by watching for signs like bubbles or light.
 - C** Maria mixed compounds together to test for chemical change. One mixture produced light, two mixtures had bubbles, two mixtures had changes of color, and one mixture did not change.
 - D** You can tell if a chemical change has occurred because there will be a production of light, gas, or a precipitate, or there will be a change in color or temperature.

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- 4 Using Maria's results, determine how many mixtures produced a new substance.
- A 3
 - B 4
 - C 5
 - D 6
- 5 Which is the best definition of **empirical** in paragraph 2?
- A Can be seen or measured
 - B From a currently used procedure
 - C Collected in an old, reliable method
 - D Related to whether a chemical change has occurred
- 6 Maria made a mistake in the analysis of her results. Which of the following conclusions is incorrect?
- A A chemical change occurred in mixture (a) because there was a production of light.
 - B A chemical change occurred in mixture (d) because there was a color change.
 - C A chemical change occurred in mixture (e) because there was a production of a precipitate.
 - D A chemical change occurred in mixture (f) because there was a production of a gas.