

# Chemistry Grade 5 Evaluation

## Teacher Section

**Overview:** Kids will demonstrate how well they understand important key concepts from this section.

**Suggested Time:** 45-60 minutes

**Objectives:** Students will be tested on the key concepts:

- Chemical and physical reactions
- Molecules and atoms
- Acids and bases

Students will also demonstrate these principles:

1. How to use blue litmus paper to test for the presence of an acid
2. How to turn blue litmus paper into red litmus paper
3. How to make a saturated solution
4. How temperature and humidity may affect chemicals

### Materials (one set for entire class)

- |                          |                        |
|--------------------------|------------------------|
| • goggles                | • test tube stand      |
| • teaspoon               | • index card           |
| • cobalt chloride        | • hair dryer           |
| • distilled water        | • blue litmus paper    |
| • cotton swab            | • dropper              |
| • test tube with stopper | • vinegar              |
| • funnel                 | • baking soda solution |

### Lab Preparation

1. Print out copies of the student worksheets, lab practical, and quiz.
2. Have a tub of the materials in front of you at your desk. Kids will come up when called and demonstrate their knowledge using these materials.

### Lesson

The students are taking two tests today: the quiz and the lab practical. The quiz takes about 20 minutes, and you'll find the answer key to make it easy to grade.

### Lab Practical

Students will demonstrate individually that they know how to use blue litmus paper to test for the presence of an acid, turn blue litmus paper red, make a saturated solution, and demonstrate the effects of temperature and humidity on cobalt chloride. While other kids are waiting for their turn, they will get started on their homework assignment. You get to decide whether they do their assignment individually or as a group.

**Homework Assignment** Find the assignment in the next section for students to complete.

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## Student Worksheet

**Overview:** Today you're going to take two different tests: the quiz and the lab practical. You're going to take the written quiz first, and the lab practical at the end of this lab. The lab practical isn't a paper test – it's where you get to show your teacher that you know how to do something.

### Lab Test & Homework

1. Your teacher will call you up so you can share how much you understand about Chemistry 2 and how it works. Since science is so much more than just reading a book or circling the right answer, this is an important part of the test to find out what you really understand.
2. While you are waiting for your turn to show your teacher how much of this stuff you already know, you get to get started on your homework assignment. The assignment is due next week, and half the credit is for creativity and the other half is for content, so really let your imagination fly as you work through it.

Read the following information about acid rain and choose one of these activities to complete:

1. Write an opinion piece stating your opinion about acid rain. Make sure to use information from the article to back up your claims.
2. Write a story about an animal living in an area affected by acid rain. What are some hardships your animal might face?
3. Pretend you have to teach a first-grade class about acid rain. How would you go about showing these 6- or 7-year-olds what acid rain is and some of the problems it can cause?

Here is some background information for your homework assignment:

**What is Acid Rain?** When certain pollutants come into contact with the water droplets found in clouds, the end result is acid rain. The pollutants, which are produced on earth by both natural and man-made processes, can be carried very long distances by the wind. When pollutant-laden clouds collect enough water, acid rain falls on buildings, cars, trees, lakes, and other formations. Pollutants from acid rain which exist in dry form can be inhaled by people and can cause serious health problems in some.

**Sources of Acid Rain** Acid rain is caused by a chemical reaction. One compound that causes acid rain is sulfur dioxide. Sulfur dioxide is naturally released in volcanic eruptions, but is also a product when coal and petroleum are burned. The other main chemical affecting acid rain is nitrogen oxide. Nitrogen oxides are naturally released in a lightning strike, but also occur in the combustion of coal and oil at electric power plants, and in gas-powered automobiles.

Air containing abnormal amounts of nitrogen oxide is sometimes found in large cities, where there is a high amount of automobile traffic. In the Los Angeles area, cars produce the main source of acid rain. In some national

parks such as Yosemite and Sequoia, automobile traffic is limited to lessen the amount of air pollution damage to the trees and plants.

**Neutralization Reactions in the Environment** Some rain is naturally acidic, with a pH around 5.0. When it falls, it comes into contact with some of the alkaline (basic) chemicals on earth. These non-acidic materials can be found in air, soil, rocks, lakes, and streams. The result is a reaction that neutralizes the acid. However, if the rain becomes too acidic, there are not enough basic materials to neutralize all the acid, and the result is damage to crops, trees, lakes, rivers and animals.

**Acid Rain May Cause Health Problems in People** Compounds like sulfur dioxide and nitrogen oxides can affect people with respiratory diseases such as asthma or chronic bronchitis. The pollution that causes acid rain can also create tiny particles that float around in the air. If people breathe these particles, their lungs may be affected. Swimming in an acidic lake or walking in an acidic puddle is not necessarily harmful, but breathing in polluted air may cause health problems.

**Acid Rain Harms Forests** Acid rain can cause harm to forests. When acid rain comes into contact with the forest soil, it can dissolve nutrients such as magnesium and calcium. These nutrients are essential for healthy trees and other greenery. Acid rain also causes the element aluminum to be released into the soil, which makes it difficult for trees to obtain water. Some trees, such as spruce and fir, live at higher elevations. These trees are constantly exposed to clouds and fog, which can hold more acid than rain or snow. When trees don't get the necessary nutrients, it makes them more susceptible to infection, insects, and damage from cold weather.

**Acid Rain Damages Lakes and Streams** Most lakes and streams have a natural pH level of about 6.5 (very slightly acidic). Acid rain has caused that level to drop, meaning some lakes and streams, especially in the northeast United States, are becoming more acidic. The aluminum that is released into the soil due to acid rain eventually washes into lakes and streams. The increase in both acidity and aluminum levels can be very harmful and even deadly to some aquatic wildlife. Some animals particularly affected are phytoplankton, mayflies, rainbow trout, smallmouth bass, frogs, spotted salamanders, and crayfish.

**Acid Rain Damages Buildings and Objects** Acid rain can also wreak havoc on objects such as buildings, statues, monuments, and cars. The chemicals present in acid rain can cause paint to peel and stone statues weather abnormally quickly, making them appear old before their time. The Statue of Liberty and the Egyptian pyramids are two treasures of the world that have been affected by acid rain.