

CHEMISTRY

GRADE 8

ASSESSMENT PACKET

Students perform advanced experiments with ammonia, learn how to burn sulfur, ignite colored fires, decompose hydrogen peroxide, detonate bubbles, unlock energy stored in chemical bonds, supercool solutions, calculate the energy of a single peanut, turn copper into silver and gold, and so much more!

Created by Aurora Lipper, Supercharged Science

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This curriculum is aligned with the National State Standards and STEM for Science.

Educational Goals

A comprehensive course that continues the chemistry adventure from previous years in Chemistry! Students perform advanced experiments with ammonia, learn how to burn sulfur, ignite colored fires, decompose hydrogen peroxide, detonate bubbles, unlock energy stored in chemical bonds, supercool solutions, calculate the energy of a single peanut, turn copper into silver and gold, and so much more.

Here are the scientific concepts:

- Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms.
- Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it.
- Gases and liquids are made of molecules or inert atoms that are moving about relative to each other.
- In a liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations.
- Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals).
- The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter.
- Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants.
- The term “heat” as used in everyday language refers both to thermal motion (the motion of atoms or molecules within a substance) and radiation (particularly infrared and light). In science, heat is used only for this second meaning; it refers to energy transferred when two objects or systems are at different temperatures.
- The relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter present.
- The total number of each type of atom is conserved, and thus the mass does not change.
- Some chemical reactions release energy, others store energy.

By the end of the labs in this unit, students will be able to:

- Predict the results of an experiment of a simple chemical reaction based on electron states of atoms, trends of the periodic table, and knowledge of the patterns of chemical properties. *(For example: predict what happens in the reaction of sodium and chlorine, or of carbon and oxygen, or carbon and hydrogen...)*
- Analyze and interpret data on the properties of substances before and after they interact to determine if a chemical reaction has occurred.
- Show using a model how the number of atoms doesn't change in a reaction and therefore mass is conserved.
- Design an experiment that releases or absorbs thermal energy by a chemical process.
- Differentiate observation from inference (interpretation) and know scientists' explanations come partly from what they observe and partly from how they interpret their observations.
- Measure and estimate the length and volume of objects.
- Formulate and justify predictions based on cause-and-effect relationships.
- Conduct multiple trials to test a prediction and draw conclusions about the relationships between predictions and results.
- Construct and interpret graphs from measurements.
- Follow a set of written instructions for a scientific investigation.

Chemistry 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:

1. States of matter, chemical bonds, and atomic structure.
2. Pressure, temperature and density of a substance.
3. Chemical reactivity of substances and chemical processes during experimentation.

Students will also demonstrate these principles:

1. Collecting and interpreting data from an experiment
2. Making valid observations based on their actions in lab

Materials (one set for entire class)

- | | |
|------------------------|-------------------|
| • large paperclip | • lemon |
| • galvanized nail | • potato |
| • copper penny | • apple |
| • brass screw | • pH paper strips |
| • aluminum foil | • salt |
| • four alligator wires | • sugar |
| • digital multimeter | • glass of water |

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.

Chemistry Grade 8 Evaluation

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. 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. Choose one:
 - a. Write a short story or skit about an element on the periodic table. You'll read this aloud to your class.
 - b. Make a poster that teaches the main concepts of the states of matter. When you're finished, you'll use it to teach to a class in the younger grades and demonstrate each of the principles that you've learned.
 - c. Write and perform a poem or song about electrochemistry. This will be performed for your class.

Chemistry Grade 8 Quiz

Teacher's Answer Key

1. _____ and _____ are made up of molecules and/or atoms that are moving about relative to each other. (liquids, gases)
2. _____ form molecules that range in size from two to thousands of _____. (atoms, atoms)
3. Each pure substance has specific physical and _____ properties that are used to identify it. (chemical)
4. The atomic number is how many _____ are inside the nucleus of that atom. (protons)
5. The particle in the nucleus with no charge is called a _____. (neutron)
6. The energy transferred between two objects at different temperatures is called _____. (heat)
7. The total number of each type of _____ is conserved, and therefore mass does not change. (atoms)
8. Exothermic reactions _____ energy, which is usually seen as a temperature _____. (release, increase)
9. Electrons have a _____ charge and are found _____ the nucleus of the atom. (negative, outside)
10. The state of matter that is higher in energy than a gas is called _____. (plasma)
11. The Ideal Gas Law relates _____, _____, and _____ into one simple statement: _____. (temperature, pressure, volume, $PV=nRT$).
12. Fruit and potatoes can be used to make a battery to generate electricity using _____. (electrochemistry)
13. Electrolysis produces chemical changes at the _____. (electrodes)
14. Combustion is a type of chemical reaction that requires fuel and _____, and releases _____. (oxygen, energy)
15. _____ reactions break a compound into smaller pieces, like hydrogen peroxide into water and oxygen. (decomposition)
16. Electrolytes are substances that become a conductor of _____ when dissolved in a _____. (electricity, solvent)
17. When an atom or molecule loses an electron, it becomes a(n) _____ and takes on a _____ charge. (ion, positive)
18. Supercooled liquids need to _____ in temperature in order to freeze into a solid. (increase)
19. _____ reactions absorb energy from the solution in order for the reaction to take place, which usually looks like a temperature _____. (exothermic, decrease)
20. Crystals are _____ structures with repeating subunits and patterns. (solids)

Chemistry Grade 8 Quiz

Student Quiz Sheet

Name _____

Fill in the blank:

- _____ and _____ are made up of molecules and/or atoms that are moving about relative to each other.
- _____ form molecules that range in size from two to thousands of _____.
- Each pure substance has specific physical and _____ properties that are used to identify it.
- The atomic number is how many _____ are inside the nucleus of that atom.
- The particle in the nucleus with no charge is called a _____.
- The energy transferred between two objects at different temperatures is called _____.
- The total number of each type of _____ is conserved, and therefore mass does not change.
- Exothermic reactions _____ energy, which is usually seen as a temperature _____.
- Electrons have a _____ charge and are found _____ the nucleus of the atom.
- The state of matter that is higher in energy than a gas is called _____.
- The Ideal Gas Law relates _____, _____, and _____ into one simple statement: _____.
- Fruit and potatoes can be used to make a battery to generate electricity using _____.

13. Electrolysis produces chemical changes at the

_____.

14. Combustion is a type of chemical reaction that

requires fuel and _____, and releases

_____.

15. _____ reactions break a compound

into smaller pieces, like hydrogen peroxide into

water and oxygen.

16. Electrolytes are substances that become a

conductor of _____ when dissolved in

a _____.

17. When an atom or molecule loses an electron, it

becomes a(n) _____ and takes on a

_____ charge.

18. Supercooled liquids need to _____ in

temperature in order to freeze into a solid.

19. _____ reactions absorb energy from

the solution in order for the reaction to take

place, which usually looks like a temperature

_____.

20. Crystals are _____ structures with

repeating subunits and patterns.

Chemistry 8 Lab Practical

Teacher's Answer Key

This is your chance to see how well your students have picked up on important key concepts, and if there are any holes. Your students also will be working on their homework assignment as you do this test individually with the students.

Materials:

- large paperclip
- galvanized nail
- copper penny
- brass screw
- aluminum foil
- four alligator wires
- digital multimeter
- lemon
- potato
- apple
- pH paper strips
- salt
- sugar
- glass of water

Lab Practical: *Note: Answers given in italics!*

1. Design an experiment that demonstrates electrochemistry by making a battery from the items provided. Indicate the positive and negative electrodes, ions, electrolyte, electrical current flow direction, and explain the chemical process taking place.

Refer to Fruit Battery experiment. This experiment shows how a battery works using electrochemistry. This experiment uses electrolytes (solution containing free ions, like salt water or lemon juice) to generate a voltage. The copper electrons are chemically reacting with the lemon juice, which is a weak acid, to form copper ions (cathode, or positive electrode) and bubbles of hydrogen. These copper ions interact with the zinc electrode (negative electrode, or anode) to form zinc ions. The difference in electrical charge (potential) on these two plates causes a voltage.

Chemistry Grade 8 Lab Practical

Student Exam

This is your chance to see how well your students have picked up on important key concepts, and if there are any holes. Your students also will be working on their homework assignment as you do this test individually with the students.

Materials:

- large paperclip
- galvanized nail
- copper penny
- brass screw
- aluminum foil
- four alligator wires
- digital multimeter
- lemon
- potato
- apple
- pH paper strips
- salt
- sugar
- glass of water

Lab Practical:

1. Design an experiment that demonstrates electrochemistry by making a battery from the items provided. Indicate the positive and negative electrodes, ions, electrolyte, electrical current flow direction, and explain the chemical process taking place. Make a diagram drawing (label everything!) of your experiment below before completing this exam.